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DETERMINACIÓN DE LA PÉRDIDA DE CALIDAD FUNCIONAL, QUÍMICA, SENSORIAL Y MICROBIOLÓGICA DEL BELLY DE TRUCHA ARCOIRIS (*Oncorhynchus mykiss*) DURANTE SU CONSERVACIÓN EN REFRIGERACIÓN

MEMORIA PARA OPTAR AL TÍTULO DE INGENIERO EN ALIMENTOS

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LA PRESENTE MEMORIA ES PARTE DEL PROYECTO DE INVESTIGACIÓN DEL PROGRAMA DOMEYKO. FINANCIADO POR LA VICERRECTORÍA DE INVESTIGACIÓN Y DESARROLLO DE LA UNIVERSIDAD DE CHILE, TITULADO:

"Evaluación y optimización de los factores que influyen en la inocuidad de alimentos en base a recursos marinos y desarrollo de alimentos funcionales con componentes o subproductos de estos."

DEDICATORIA

A mis Padres, Marianela y Maher…

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ABREVIATURAS

CRA	: Capacidad de retención de agua
N	: Newton
NMP	: Número más probable
p.a.	: Para análisis
pH	: Potencial de Hidrógeno
QDA	: Quantitative descriptive analysis
RAM	: Recuento de aerobios mesófilos
Ufc/g	: Unidades formadoras de colonias por gramo
y cols.	: y colaboradores

RESUMEN

Chile es el segundo país productor de salmónidos más importante a nivel mundial. De ahí que, se convierte en el principal generador de coproductos, por sobre Noruega. Siendo el belly de la trucha arcoiris (*Oncorhynchus mykiss*) un coproducto desconocido, contando con escasos antecedentes de su comportamiento al conservarse refrigerado.

El objetivo del presente trabajo fue determinar la pérdida de calidad funcional, química, sensorial y microbiológica del belly de trucha arcoiris (*Oncorhynchus mykiss*) durante su conservación en refrigeración (0º a 2º C).

Se determinó la evolución de los parámetros funcionales, mediante los cuales se observó un deterioro en la funcionalidad de las proteínas presentes en el belly. También se observó el cambio de color que sufrió el belly a través del tiempo, comportándose de forma constante y sin variaciones significativas ($p \geq 0,05$).

Se determinó la composición centesimal y su variación en el tiempo, obteniéndose resultados similares a aquellos presentes en la literatura. Además, el estudio contempló la determinación de pH que disminuyó en el tiempo, observándose valores de 6,62 y 6,29, al inicio y final del estudio, respectivamente. El índice de anisidina, mostró que el belly sufrió oxidación lipídica secundaria, sin embargo, este valor no superó los límites admitidos.

Durante este estudio no hubo presencia de microorganismos patógenos, ni indicadores de contaminación fecal (*Salmonella sp*., *Listeria Monocytogenes, Staphylococcus aureus*), sin embargo, el recuento de aerobios mesófilos y de enterobacterias, arrojaron valores fuera de lo permitido a partir del día 10 y 24 de estudio, respectivamente.

Los atributos sensoriales más sensibles para estimar el deterioro en la calidad oxidativa y textural del belly de trucha arcoiris fueron el olor típico, rancio y pútrido (crudo), elasticidad, firmeza, cohesividad y goteo. Atributos que, en conjunto con el recuento de aerobios mesófilos, sirvieron para estimar la vida útil del belly de trucha arcoiris conservado refrigerado (0º a 2º C), que fue de 12 días.

De acuerdo a los resultados obtenidos mediante el análisis estadístico de los datos, se pudo determinar que existió una fuerte correlación entre los parámetros y el tiempo, y entre ellos mismos, viéndose afectada la calidad funcional, química, sensorial y microbiológica del belly de trucha arcoiris durante su conservación en refrigeración (0º a 2º C).

SUMMARY

Chile is the second most important producer country of salmonids at worlwide level. For this reason, it turns in to the main coproducer generator, over Norway. Belly of Rainbow trout (*Oncorhynchus mykiss*), is an unknown coproduct, and there are very limited precedents of its behavior during chilled storaged.

The aim of this study was to determined the loss of functional, chemical, sensorial and microbiology quality, during chilled storage (0ºC- 2ºC) of rainbow trout belly.

Functional evolution parameters were studied, which show a deterioration in the functionality of belly proteins. Also, the belly color variation was observed trough time, behaving in a constant way and presenting no significants variations ($p \geq 0,05$)

Centesimal composition and its variation in time was observed, obtaining similar results at those present in literature. The study also, contemplated pH determination, that decreased in time, being observed values from 6,62 and 6,29 at beginning and ending time of study, respectively. Anisidine index showed that belly suffered secondary lipidic oxidation, however, this value did not exceed allowed limits.

During this study, neither patogens microorganisms nor faecal contamination indicators, (*Salmonella sp*., *Listeria Monocytogenes, Staphylococcus aureus*) were found in belly. Nevertheless, mesophyllic aerobic and enterobacters counts, showed values over the limits, from 10 and 24 day of study, respectively.

The most sensitive sensory attributes to estimate the deterioration in the oxidating and textural quality of rainbow trout belly were typical, rancid and putrid odour (raw), elasticity, firmness, cohesiveness and dripping. Attributes that, in addition to the mesophyllic aerobic count, helped to estimate the shelf life of chilled storaged rainbow trout belly (0º to 2º C), that was 12 days.

According to obtained results from statistycal analysis of data, it was possible to determine that a strong correlation existed within parameters and time, and between themselves, affecting functional, chemical, sensory and microbiologycal quality of rainbow trout belly during chilled storage (0º to 2º C).

1. INTRODUCCION

En un plazo de no más de 20 años de expansión, la acuicultura ha pasado a ser el subsector más importante en términos de valor dentro del sector pesca a nivel nacional y sobretodo a nivel de la zona sur del país (www.planregional.cl), siendo además el cuarto sector exportador, generando de este modo unos 45 mil empleos tanto directos como indirectos. La producción y exportación de salmones en Chile es superada en el mundo sólo por Noruega por un estrecho margen (Wigodski y cols., 2009).

A diferencia de Noruega, cuyas exportaciones de salmón corresponden mayormente al pescado completo, Chile envía al exterior principalmente el filete. Esto convierte inmediatamente a Chile en el principal productor de subproductos de salmón a nivel mundial. Por tal razón, la oportunidad estaría en que los desechos como cabeza, piel, vísceras y sangre se conviertan en potenciales materias primas (Ramírez, 2007b).

En los desechos de la industria pesquera en general, hay contenida gran cantidad de macronutrientes y otras sustancias que permiten su valoración para la integración a otra industria colateral de alimentación indirecta (Rodríguez, 1997). La mejor especie de pescado produce solamente alrededor del 50 % de materiales comestibles en forma de filetes o músculo de pescado. El resto, esqueleto, cabeza y desechos posee un contenido en proteína casi tan alto como el del propio filete y en cambio no suele consumirse (Windsor y Barlow, 1984). Además estos desechos tienen una relación de eficiencia proteica y relación proteína neta igual a la del pescado del cual procede (Karmas, 1985).

Piel, ojos y otras partes del cuerpo son importantes ítems de alimentos en muchas partes del mundo. Por ejemplo el alto valor nutritivo de las vísceras del pescado ha sido confirmada por muchos investigadores y constituye un reto para la tecnología de los alimentos (Borgstrom, 1962). De acuerdo a lo informado por Kotzamanis y cols. (2001) la cabeza, espina y cola de trucha poseen una composición química similar 70% humedad, 15% proteína y 11% de grasa. Los Intestinos contienen un alto contenido lipídico correspondiente a un 35%, un bajo contenido de humedad cercana a 56% y un contenido de proteína cerca del 8%.

El belly de trucha arcoiris, según el Servicio Nacional de Aduanas (2010), corresponde al corte longitudinal del pescado, obtenido de la parte central del estómago al que no se le ha removido la piel, espinas ni estribo. De acuerdo a la información entregada por la empresa Salmones Antártica S.A. el belly corresponde a “la porción obtenida del corte longitudinal de la parte del estómago sobre la aleta ventral, de largo y ancho específicos, con piel sin aleta. En la Figura 1.1 se observa la imagen del belly de trucha arcoiris.

Figura 1.1: Fotografía del belly de trucha arcoiris

1.1. ANTECEDENTES GENERALES

1.1.1. Estadísticas del recurso

La industria salmonicultora, que una vez fuera la de más rápido crecimiento de Chile, enfrenta actualmente una profunda crisis que ha provocado la caída de su producción y un aumento de despidos desde la aparición del virus ISA que afectó a los salmones a partir del año 2007 y la floración de algas surgida en el último periodo (SalmónChile 2009; www.xinhuanet.com, 2009).

La información registrada ante Sernapesca, señala que al mes de noviembre del año 2009, las cosechas de recursos pesqueros alcanzaron niveles de 549 mil toneladas, cifra inferior en un 28,7% al mismo período de 2008. Los principales recursos cosechados

a nivel nacional, corresponden a salmón del atlántico, chorito y trucha arcoiris, aportando respectivamente el 30,8%, 28,5% y 18,8% del total cosechado (Tabla 1.1). Las principales regiones donde se registran cosechas corresponden a la X y XI, con 355,9 mil toneladas y 156,9 mil toneladas, respectivamente (SalmónChile, 2009; Subpesca, 2010).

Tabla 1.1: Cosechas por recurso, acumuladas a noviembre de 2009 (ton.)

Especie	2008	2009	Variación (%)
Salmón del Atlántico	341.934	168.927	-50,6
Chorito	176.591	156.411	-11,4
Trucha arcoiris	135.330	103.110	-23,8
Salmón del Pacífico	69.283	82.165	18,6
Otros	41.003	38.394	6,79
Total	770.037	549.107	-28.7

Fuente: Subpesca, 2010.

La Tabla 1.1 muestra las cosechas por recurso de la acuicultura en el país acumuladas a la fecha de noviembre de 2009, donde se observa que la trucha arcoiris ocupa el tercer lugar después del salmón del Atlántico y los choritos, con un total de 103 mil toneladas cosechadas, teniendo una disminución de 23,8% respecto al mismo periodo de 2008.

En el caso de la trucha arcoiris, las cosechas acumuladas al mes de noviembre de 2009 representan el 29% del total de cosechas de salmónidos en Chile. Las principales regiones donde se producen las cosechas corresponden a la X y XI regiones, con 62 mil toneladas y 37 mil toneladas, respectivamente (Subpesca, 2010).

Durante todo el 2009 Chile exportó más de US$ 2.174 millones de salmónidos, cifra que significó un 12,6% menos que los US$ 2.490 millones del 2008. En cuanto a exportación de trucha arcoiris, esta ocupó el segundo lugar en el año 2009, con envíos por US$ 593 millones, cifra similar a la obtenida en el 2008, y con cerca de 99 mil toneladas exportadas, lo que corresponde a un 20,8% menos que la temporada anterior. Esta especie tuvo una participación del 27,5% del total nacional (Revista Aqua, 2010).

1.1.2. Descripción de la trucha arcoiris (*Oncorhynchus mykiss*)

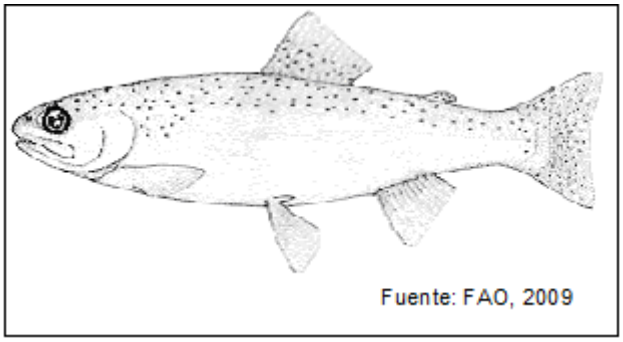


Figura 1.2: Trucha Arcoiris (*Oncorhynchus mykiss*).

Familia: Salmonidae
Género: *Oncorhynchus*
Nombre Científico: *Oncorhynchus mykiss*
Nombre Común: Trucha arcoiris, trucha cabeza de acero.

La trucha arcoiris corresponde a una especie semigrasa de forma perciforme, cuerpo robusto, comprimido, más elongado en hembras que en los machos. Cabeza corta y convexa. Hocico redondeado, boca terminal y pequeña (excepto en machos adultos). De 100 a 140 escamas en la línea lateral. De tonalidades que aparecen como un arco iris a lo largo de todo el cuerpo, presenta un color variable, la parte superior va desde el verde brillante al café y la parte inferior es plateada (IFOP, 1994). A lo largo del flanco se dibuja una franja rojo violáceo iridiscente, característica de esta especie. La cabeza, el opérculo, el cuerpo y la aleta dorsal, caudal y anal, están cubiertas de pequeñas manchas negras. Su peso promedio va desde los 250 gramos y los 4,5 kilogramos (IFOP, 1994).

La carne de trucha arcoiris, independiente de donde se cultive, es un alimento que posee gran calidad nutritiva por sus valores proteicos, con un contenido promedio de 20% de proteínas (Izquierdo y cols., 1999) y gracias a esto puede ser potencialmente utilizada para la fabricación de otros productos procesados de excelente calidad.

Además por su alto contenido de agua, la carne de trucha arcoiris es de textura suave y jugosa, aunque el contenido de agua en la carne va disminuyendo progresivamente con la madurez (Forrest y cols., 1979).

La carne cruda fresca de trucha arcoiris, tiene un pH que fluctúa entre 6,44 y 6,65 inmediatamente después del sacrificio (García y cols., 2004; Morkore y cols., 2002).

La trucha arcoiris es una excelente fuente de ácidos grasos poliinsaturados de cadena larga: los omega 3 y 6, siendo los omega 3 superiores en un 27% respecto a los omega 6. Los ácidos grasos predominantes en su carne son los ácidos: mirístico (C14:0), palmítico (C16:0), esteárico (C18:0), palmitoleico (C16:1), oleico (C18:1), linoleico (C18:2), eicosapentaenoico (C20:5) y docosahexaenoico (C22:6) los que en total corresponden al 80% del total de los ácidos grasos presentes en su carne (Izquierdo y cols., 1999; Yanar y cols., 2007).

1.1.3. Coproductos del salmón

Los coproductos del pescado corresponden a las partes que son removidas de éste antes que llegue al consumidor final, con el fin de mejorar la calidad, reducir el peso de embarque para su transporte, o incrementar el valor del producto principal del pescado, el músculo. Se le llama coproductos a la sangre, vísceras, cabeza, espinas, piel, belly, aletas y cola del pescado (Ramírez, 2007a).

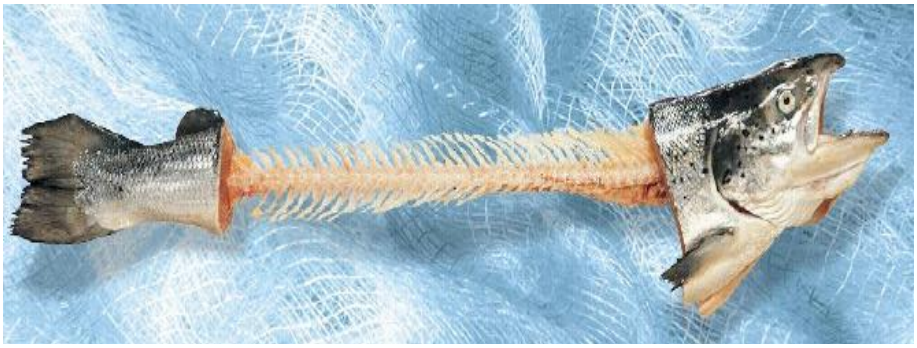


Figura 1.3: Coproductos sólidos del salmón.

Cada año, 30 millones de toneladas de descarte son eliminadas por la industria del pescado a nivel mundial, y solo Noruega, que es el mayor productor de salmón del mundo, se inscribe con 150 mil toneladas de desechos aproximadamente (Waldron y cols., 2004).

En Chile, solo en la industria salmonicultora, se descartan alrededor de 185 mil toneladas de desechos al año (SalmónChile, 2009), las cuales casi en su totalidad se destinan a la producción, de harina de pescado, aceite de pescado y alimento animal (Ramírez, 2007a). A continuación, se muestra la cantidad de subproductos de salmón generados durante el periodo comprendido entre 2001 y 2004:

Tabla 1.2: Chile, generación de coproductos (miles de toneladas)

Coproducto \ año	2001	2002	2003	2004
Vísceras	45	43	44	51
Cabezas	82	79	80	92
Esquelón	31	30	30	34
Piel	8	8	8	9
Total	167	159	161	185

Fuente: Sernapesca 2009

Un estudio realizado por Sernapesca en el año 2000 arrojó los siguientes resultados para distintas especies y subproductos:

Tabla 1.3: Rendimiento de subproductos en diferentes especies.

Salmón \ coproducto	Vísceras (%)	Cabezas (%)	Esquelón (%)	Piel (%)
Atlántico	9,0	18,0	8,6	2,0
Coho	10,0	15,0	0,0	0,0
Trucha	8,0	12,0	3,1	1,2

Fuente: Sernapesca 2009

Desde un punto de vista nutricional, existen grandes cantidades de lípidos y proteínas en los coproductos del salmón, que podrían ser utilizadas para la nutrición humana, pero no lo son debido a las barreras tecnológicas que el proceso de obtención implica. Por lo tanto, los coproductos se destinan casi en su totalidad a la alimentación animal.

Según Ramírez (2007a), el contenido de lípidos en el salmón es especialmente alto en el belly, las vísceras y la cabeza, todos correspondientes a coproductos de pescado.

De acuerdo a Izquierdo y cols. (1999), la carne de trucha arcoiris posee gran calidad nutritiva gracias a sus proteínas de alto valor biológico y su gran contenido de ácidos grasos poliinsaturados de cadena larga como los omega 3 y 6, recomendado en todas la dietas, por sus beneficios a la salud humana. Los coproductos de trucha corresponden aproximadamente al 33% del total de este salmónido y también son indicados como buena fuente de ácidos grasos, con un alto contenido de ácido araquidónico 20: 4 n-6 (Kotzamanis y cols., 2001).

1.1.4. Conservación en refrigeración del pescado

Según el Reglamento Sanitario de los Alimentos (MINSAL, 1997) “Pescado fresco enfriado es aquel que después de su extracción, ha sido eviscerado y enfriado a una temperatura entre 0 y 3ºC con el objeto de conservarlo durante su distribución”.

Para fines prácticos, se aplica la siguiente definición: Refrigeración es el proceso de enfriamiento de pescado hasta una temperatura próxima a la de fusión del hielo (0ºC).

La temperatura es uno de los principales factores que influyen en la tasa de deterioro del pescado, por lo tanto, la finalidad de la refrigeración es prolongar el tiempo de conservación de éste, reduciendo la actividad de enzimas y bacterias, así como los procesos químicos y físicos que pueden afectar a la calidad (Shawyer y Medina, 2005).

De acuerdo a lo estudiado por Cann y cols. (1985) el salmón (*Oncorhynchus sp.)* presenta un período de duración a 10ºC de 3 días, mientras que a 0ºC dura 11,8 días. El salmón coho *(Oncorhynchus kysutch)*, presenta una duración de 12 días conservado entre 0 y 2°C (Maier, 2005).

Kontominas y cols. (2003) indica que la vida útil a temperatura de refrigeración, es de 15 a 16 días para la trucha arcoiris entera, y de 10 a 12 días para la trucha arcoiris fileteada.

1.2. PARÁMETROS DE CALIDAD EN EL PESCADO

La calidad del pescado fresco es una de las principales preocupaciones de la industria y los consumidores, por ser este un producto altamente perecible. El deterioro del pescado se produce principalmente como resultado de la actividad bacteriológica que lleva a la pérdida de calidad y al posterior daño del producto (Liston, 1980).

Los métodos para la evaluación de la calidad del pescado fresco pueden ser convenientemente divididos en dos categorías: sensorial e instrumental. Dado que el consumidor es el último juez de la calidad, la mayoría de los métodos químicos o instrumentales deben ser correlacionados con la evaluación sensorial antes de ser empleados en el laboratorio (Huss, 1999).

1.2.1. Propiedades funcionales

La textura está compuesta por distintos parámetros tales como: firmeza, dureza, fragilidad, adhesividad, cohesividad, elasticidad y viscosidad (Sigurgisladottir y cols., 1999). En la carne de pescado, la textura está influenciada por varios factores tales como la extensión del rigor mortis, la proporción y extensión de la declinación del pH post mortem, y la proporción y extensión de la proteólisis, causando ruptura miofibrilar. Otros parámetros como el contenido de grasa, ácidos grasos y distribución de la grasa en el músculo influyen en la firmeza de la carne (Sigurgisladottir y cols., 1999).

La composición química y estructura física también varía a lo largo del filete y puede afectar las propiedades texturales. Por lo tanto, el lugar de donde es extraída la muestra es de mucha importancia y debe ser considerado cuando se midan las propiedades texturales en el filete (Jonsson y cols., 2000).

La pérdida por driping (Einen y cols., 2002), corresponde al exudado de líquidos, por goteo, en pescados que se descongelan (driping crudo) y en aquellos que se someten a cocción (driping cocido). El aumento del driping en salmón congelado/descongelado es consistente con la disminución de la capacidad de retención de agua debido a la desnaturalización de las proteínas miofibrilares de las fibras musculares, daño celular, menor solubilidad y agregación de las proteínas que tiene lugar durante la congelación y descongelación (Einen y cols., 2002).

El color de la carne juega un importante rol en la percepción del consumidor sobre la calidad de este producto. Algunos estudios en productos del mar muestran que los consumidores asocian el color con la frescura (Yagiz y cols., 2010).

La astaxantina es uno de los pigmentos más importantes en los productos del mar incluyendo el salmón, la trucha arcoiris (*Oncorhynchus mykiss*), camarones (*Pandalus borealis*) y langosta (*Homarus gammarus*) (Yagiz y cols., 2010).

La calidad de la carne de trucha arcoiris está parcialmente determinada por su color que a su vez está influenciado por el contenido de carotenoides. La pigmentación de la carne de trucha arcoiris es producida por los keto-carotenoides (astaxantina (AX) y cantaxantina (CX)), pigmentos que los peces no pueden sintetizar. Los carotenoides proviene de la dieta del pez: en la naturaleza, la trucha los obtiene de sus presas pero en la acuicultura son adicionados en la dieta (Choubert y Baccaunaud, 2006).

Los ketocarotenoides contienen enlaces dobles conjugados carbono-carbono, responsables del color. El alto número de enlaces dobles conjugados están expuestos a la oxidación con el aire lo que provoca una decoloración de los pigmentos (Choubert y cols., 2005).

1.2.2. Propiedades químicas

La composición química de los peces varía considerablemente entre las diferentes especies y también entre individuos de una misma especie, dependiendo de la edad, sexo, medio ambiente y estación del año. Los principales constituyentes son: proteínas, lípidos, cenizas, humedad y extracto no nitrogenado (Huss, 1999).

El contenido de lípidos en filetes de especies grasas varía considerablemente. Sin embargo, la variación en el porcentaje de grasas se refleja en el porcentaje de agua, dado que la grasa y el agua normalmente constituyen el 80 por ciento del filete (Kent y cols., 1992).

Las proteínas del pescado contienen todos los aminoácidos esenciales y al igual que las proteínas de la leche, los huevos y la carne de mamíferos, tienen un valor biológico muy alto (Huss, 1999).

El contenido de carbohidratos en el músculo de pescado es muy bajo, generalmente inferior al 0,5 por ciento (Huss, 1999).

Para el caso de la trucha arcoiris, el agua es su principal componente con un contenido cercano al 77% del total del peso. Las proteínas son el segundo componente mayoritario en la composición proximal de la trucha con un contenido aproximado de un 21% del total del peso, luego le sigue el contenido de lípidos que corresponde a un 1,7% y finalmente las cenizas con un 1,33% aproximadamente (Izquierdo y cols., 1999).

1.2.3. Propiedades sensoriales

Los cambios sensoriales son los que percibimos a través de los sentidos, por ejemplo, apariencia, olor, textura y sabor. Los primeros cambios sensoriales del pescado durante el almacenamiento están relacionados con la apariencia y la textura. El sabor característico de las especies normalmente se desarrolla durante los dos primeros días de almacenamiento en hielo (Huss, 1999; Sigholt y cols., 1997).

La evaluación sensorial del pescado crudo en mercados y sitios de desembarque se efectúa mediante la evaluación de la apariencia, textura y olor. Los cambios característicos varían dependiendo del método de almacenamiento y de la especie. La apariencia del pescado almacenado en condiciones de enfriamiento sin hielo no cambia tanto en relación con el pescado en hielo, pero su deterioro es más rápido (Huss, 1999; Sigholt y cols., 1997).

1.2. 4. Parámetros microbiológicos

El deterioro en carne de pescado refrigerada y mínimamente procesada se atribuye principalmente a la actividad bacteriana (Koutsoumanis y cols., 2002). La finalidad del análisis microbiológico de los productos pesqueros es evaluar la posible presencia de bacterias u organismos de importancia para la salud pública, y proporcionar una impresión sobre la calidad higiénica del pescado, incluyendo el abuso de temperatura e higiene durante la manipulación y el procesamiento.

En general, los resultados microbiológicos no proporcionan ninguna información sobre la calidad comestible y la frescura del pescado (Huss, 1999).

Los análisis bacteriológicos tradicionales son laboriosos, costosos, consumen tiempo y requieren de personal capacitado en la ejecución e interpretación de los resultados. Es recomendable que este tipo de análisis sea limitado en número y en extensión (Huss, 1999).

1.3. HIPOTESIS DE TRABAJO

El belly de trucha arcoiris (*Oncorhynchus mykiss)* almacenado refrigerado (0ºC a 2ºC), vería afectados sus parámetros funcionales, químicos, sensoriales y microbiológicos durante este período. Lo anterior se traduce a una evolución negativa de su calidad.

Este estudio se realizó con la finalidad de conocer con mayor profundidad, un coproducto de la industria salmonera, que a pesar de sus cualidades químicas y sensoriales, entre otras, no ha sido aprovechado en su totalidad como una materia prima para elaborar productos derivados, como nuggets y hamburguesas, entre otros.

2. OBJETIVOS

2.1 OBJETIVO GENERAL

Evaluar a través del tiempo de almacenamiento refrigerado (0ºC a 2ºC) los parámetros funcionales, químicos, sensoriales y microbiológicos del belly de trucha arcoiris (*Oncorhynchus mykiss).*

2.2 OBJETIVOS ESPECÍFICOS

Determinar los cambios en el belly de trucha arcoiris (*Oncorhynchus mykiss*) almacenado refrigerado (0ºC a 2ºC) durante 30 días. Realizando los siguientes ensayos:

2.2.1 Propiedades funcionales: Evaluar la textura (ensayo de cizalla), capacidad de retención de agua (CRA), driping cocido y color instrumental y visual.

2.2.2 Propiedades químicas: Evaluar pH, índice de anisidina y composición centesimal (cuantificación de proteínas, lípidos, cenizas y agua).

2.2.3 Evaluación sensorial: Estudiar a través del tiempo los cambios o modificaciones en la calidad sensorial del belly de trucha arcoiris (*Oncorhynchus mykiss*) crudo y cocido al estado refrigerado (0ºC a 2ºC).

2.2.4 Parámetros microbiológicos: Determinar la posible presencia inicial de microorganismos patógenos tales como *Listeria monocytogenes*, *Staphylococcus aureus* y *Salmonella spp.* Evaluar el desarrollo a través del tiempo de microorganismos aerobios mesófilos y enterobacterias según lo establecido por el MINSAL (1997).

2.2.5 Establecer la vida útil del belly de trucha arcoiris refrigerado de acuerdo a los resultados de los ensayos microbiológicos y sensoriales.

2.2.6 Determinar la correlación entre las propiedades funcionales, sensoriales, químicas y con el tiempo de almacenamiento refrigerado y obtener los modelos matemáticos que expliquen su comportamiento.

3. MATERIALES Y METODOS

3.1. MATERIALES

3.1.1. Materia prima

El estudio se realizó en belly de trucha arcoiris cultivados por la empresa Salmones Antártica S.A. (Aysén) y procesados en la planta ubicada en la ciudad de Chiloé.

Los peces se recepcionaron vivos en la planta de Chiloé el 12 de abril a las 15:00 horas a una temperatura de 10,5° C y se almacenaron en solución de hielo líquido (FLOW-ICE® Pty Ltda.) a una temperatura de -1,7° C, al interior de una cámara de frío a una temperatura de 5º C.

Los pescados se procesaron el día 14 de abril a las 10:00 horas, en esta etapa se desangraron y se dejaron en reposo un tiempo de 55 horas. Luego se procedió a realizar el fileteado para obtener los cortes de belly en la etapa de trim. El belly salió de esta etapa a una temperatura de 4,3ºC y se sometió a un golpe de frío en túnel a -40ºC durante 60 minutos, este proceso es conocido como freeze-chilling, luego se refrigeró a 0ºC.

El belly se envasó a granel a -3ºC, cubiertos con láminas de polietileno y adición de gelpack dentro de una caja térmica y fue enviado a la Facultad de Ciencias Químicas y Farmacéuticas por servicio over-night.

El belly se recepcionó en la Facultad a las 11:00 horas, a una temperatura de 1,2ºC. Luego, se procedió a medir y pesar 50 unidades de belly y a separarlos en bolsas plásticas con cierre en cantidades de 1 kilogramo para finalmente mantenerlos en refrigeración entre 0 y 2°C. El peso promedio del belly fue de 41,1 ± 12,4 gramos y un largo de 18,3 ± 2,0 cm.

3.1.2. Equipos e insumos

Para llevar a cabo este estudio, se emplearon materiales, insumos y equipos usuales en un laboratorio de análisis de alimentos. Todos los reactivos químicos empleados fueron de grado p.a. y se contó con todos las soluciones patrones necesarias cuando procedió (Ver Anexo 1)

3.2. MÉTODOS

El estudio se realizó en belly de trucha arcoiris refrigerado durante un mes, efectuándose siete controles, donde se escogió al azar el belly para cada análisis. Los controles efectuados durante el mes de estudio fueron designados según Tabla 3.1.

Tabla 3.1: Nomenclatura utilizada en el estudio de belly de trucha arcoiris almacenado refrigerado y temperatura de las muestras.

Controles (puntos)	Tiempo (días)	Temperatura belly (ºC)
1	0	1,2
2	4	2,0
3	8	2,0
4	14	1,0
5	20	1,0
6	25	0,0
7	29	1,0

3.2.1. Propiedades físicas

3.2.1.1. Test de cizalla

Muestras de 4x4 cm (largo x ancho) se cizallaron utilizando una hoja Wagner-Bratzler con ángulo de apertura de 60º a una velocidad de 1 mms^{-1} (60 mm/min), y temperatura de 4ºC (Sigurgisladottir y cols., 1999). La máquina de ensayos de materiales Lloyd Instrument LR-5K se conectó a un computador usando un software para el análisis de los datos (Dapmat 40- 0465, versión 3.05, Lloyd Instruments Limited, Hampshire, England). Se realizó una curva fuerza (N) vs deformación (cm). Este análisis se realizó con 6 repeticiones.

La máxima fuerza de cizalla en Newton es el peak más alto de la curva, representando la máxima resistencia de la muestra al cizallamiento, correspondiendo a la firmeza del belly.

3.2.1.2. Capacidad de retención de agua

Se utilizó el método de centrifugación. Dos gramos de muestra fueron colocadas en una tela desecada y se centrifugó a 3600 rpm por 5 min. El líquido removido drenó a través de la tela y se recolectó en el fondo del tubo de centrífuga. Con el peso de la muestra y la tela antes y después de la centrifugación se determinó la pérdida de peso de la muestra. Este ensayo se realizó con 6 repeticiones.

La capacidad de retención de agua relativa se expresó como g de agua perdida/g de materia centrifugada seca y libre de grasa (Eide y cols., 1982).

La cantidad exacta de agua perdida no pudo ser determinada por este método debido al contenido de diferentes componentes proteicos y grasa que se obtiene junto con el agua removida. Por lo tanto, este método se utilizó para determinar capacidad de retención de agua relativa (Wierbicki y Deatherage, 1958).

3.2.1.3. Driping o exudado cocido

Fueron cortados trozos de belly de 4 x 2 x 2 cm. y se colocaron en bolsas dobles, la bolsa interior, donde se encuentra la muestra, se perforó para permitir que los jugos de cocción del pescado drenaran durante la cocción. La cocción se efectuó en un baño de agua calentado a 76ºC. Cuando las muestras alcanzaron una temperatura de 60ºC en el centro de la muestra, fueron mantenidas durante 15 minutos a esa temperatura (Barnett y cols., 1991). Las muestras fueron pesadas antes y después de la cocción, siendo la diferencia de peso el líquido perdido por driping (Barnett y cols., 1991). Este ensayo se realizó con 6 repeticiones y sus resultados fueron expresados como porcentaje de líquido exudado.

3.2.1.4. Color instrumental

Se utilizó un espectrocolorímetro triestímulo, Hunter Labscan, modelo 2.0/45, fuente de iluminación luz-día D65, 10 grados, que determinó los componentes del color en términos de L*, a* y b*. Siendo:

L: Luminosidad.

a*: Cromaticidad rojo-verde, representa el rojo de la carne.

b*: Cromaticidad amarillo-azul, representa el amarillo de la carne.

A partir de estos valores se obtuvo el Hue (H_0) que indica el tono y expresa la relación entre el amarillo y el rojo de la carne, y se calcula como arcotangente b*/a*.

Con estas mismas variables se obtuvo el Croma (C*) que representa la saturación o intensidad y claridad del color, el cual se calcula como $C^* = (a^{*2} + b^{*2})^{0,5}$ (Skjervold y cols., 2001).

Para utilizar el instrumento se cortó láminas delgadas de belly desprovistas de la zona grasa, y se efectuaron cuatro lecturas, las cuales fueron promediadas para obtener el resultado final. Este ensayo se realizó con 4 repeticiones.

3.2.1.5. Color visual

Se empleó una escala *Salmo*Fan™ lineal de colores de Roche, con una escala 20-34. Estas mediciones visuales fueron realizadas por 8 panelistas en cada muestreo, los que debieron comparar el color del salmón con la escala. Los resultados corresponden a la moda de las calificaciones de los panelistas para cada tiempo.

3.2.2 Propiedades químicas

Todos los análisis químicos fueron realizados en triplicado.

3.2.2.1. Humedad

Según método oficial AOAC (1990). El método se basa en la determinación gravimétrica de la pérdida de masa, de la muestra desecada hasta masa constante en estufa de aire.

3.2.2.2. Materia grasa

De acuerdo al método Bligh & Dyer (1959). El método se basa en la homogeneización del alimento con metanol y cloroformo en proporciones tales que forman una fase sencilla miscible con el agua en los alimentos, que al adicionar posteriormente cloroformo y agua se separan dos fases con los materiales lípidos en la capa de cloroformo.

3.2.2.3. Proteínas

Según el método Kjeldhal AOAC (1984). El método se basa en la destrucción de la materia orgánica con ácido sulfúrico concentrado, formándose sulfato de amonio que en exceso de hidróxido de sodio libera amoníaco, el que se destila recibiéndolo en ácido

sulfúrico donde se forma sulfato de amonio y el exceso de ácido es valorado con hidróxido de sodio en presencia de rojo de metilo.

3.2.2.4. Cenizas

Según método oficial AOAC 923.03 (2005). El método se basa en la destrucción de la materia orgánica presente en la muestra por calcinación y determinación gravimétrica del residuo.

3.2.2.5. pH

Según método oficial AOAC 981.12 (1982). El método se basa en la determinación de la actividad de los iones hidronio por medición potenciométrica en una muestra preparada bajo condiciones específicas, empleando un electrodo de vidrio y un electrodo de referencia, previa calibración del instrumento con soluciones de pH estándar.

3.2.2.6. Índice de anisidina

Según método oficial AOCS Cd 18-90 (1993). Este método determina la cantidad de aldehídos (principalmente 2-alquenales y 2,4-dienales) en grasas y aceites animales y vegetales mediante reacción de compuestos aldehídicos en una solución de ácido acético en aceites y p-anisidina midiendo la absorbancia a 350 nm.

3.2.3. Análisis sensorial

3.2.3.1. Selección del panel

Después de un período de entrenamiento de una semana se seleccionaron 8 panelistas correspondientes a alumnos egresados de la carrera de Ingeniería en Alimentos de la Universidad de Chile. El entrenamiento del panel consideró 2 sesiones en que se presentaron muestras de pescado con diferentes tiempos de conservación y donde los panelistas aprendieron a reconocer dichas muestras de acuerdo al deterioro sufrido con el tiempo en todos los atributos de interés para esta memoria. Posteriormente el panel fue familiarizado con la escala *Salmo*Fan^{TM} y la ficha de evaluación sensorial, que evaluó la calidad de los atributos: aspecto, color, olor y textura, tanto en el salmón crudo como cocido, con escala no estructurada, estableciéndose como valor mínimo 0 y máximo 10.

Finalmente, se realizó una evaluación sensorial con dos muestras que tenían diferentes tiempos de conservación con la finalidad de seleccionar definitivamente a los panelistas, mediante un análisis estadístico de los resultados determinando si existían diferencias significativas entre ellos.

3.3.3.2. Evaluación sensorial

La metodología escogida para realizar el análisis sensorial fue la técnica de Análisis Descriptivo Cuantitativo QDA. Para esto, se desarrolló una ficha de evaluación (Anexo 1) basada en la CAC/GL 31 (1999) entregada por el *Codex Alimentarius* (1999).

Las muestras de belly utilizadas en el análisis sensorial se presentaron tanto crudas como cocidas, y en ellas se evaluaron descriptores de los atributos aspecto, color, olor y textura. Además se evaluó la Calidad Total en una escala de 0 a 100, evaluando de forma general el belly de trucha arcoíris refrigerado.

En el análisis sensorial del belly cocido y el driping se utilizaron las mismas muestras, las que fueron cortadas en trozos de 4 x 2 x 2 cm, depositadas en una doble bolsa de polietileno y sometidas a cocción por inmersión en un baño termorregulado hasta alcanzar 60º C en el centro de la muestra y luego durante 15 minutos, el pescado cocido fue presentado tibio al panel de jueces que procedió a evaluar: aspecto; color; textura; sabor; y olor del salmón (Norma CAC/GL 31-1999).

3.2.4 Parámetros microbiológicos

Se enviaron 100 gramos de muestra de belly de trucha arcoiris a la Unidad de Calidad de la Universidad de Chile, para realizar los análisis microbiológicos en cada punto. Los métodos de ensayo utilizados fueron los siguientes:

a) Recuento de aerobios mesófilos a 35º C: NCh 2659 Of. 2002
b) *Staphylococcus Aureus* (UFC): NCh. 2671 Of. 2002
c) *Listeria Monocytogenes*: NCh 2657 Of 2001
d) *Salmonella*: NCh. 2675 Of. 2002
e) Enterobacterias: NCh. 2676 Of. 2002

3.2.5 Análisis Estadístico.

Se realizó tratamiento estadístico de los datos para determinar si existen diferencias significativas ($p \leq 0,05$) en los parámetros analizados entre tiempos de almacenamiento, panelistas, especímenes. Para tal propósito se utilizó el programa computacional Statgraphics Plus versión 5.1. Los análisis estadísticos que se aplicaron fueron análisis de varianza (ANOVA) y comparación múltiple de medias (Test de Tukey). Se determinó la correlación entre los parámetros funcionales, sensoriales y químicos según el método de Pearson y se determinaron los modelos matemáticos para aquellos parámetros significativos mediante regresión simple ($p \leq 0,05$) utilizando el programa computacional Statgraphics Plus versión 4.0.

4. RESULTADOS Y DISCUSIONES

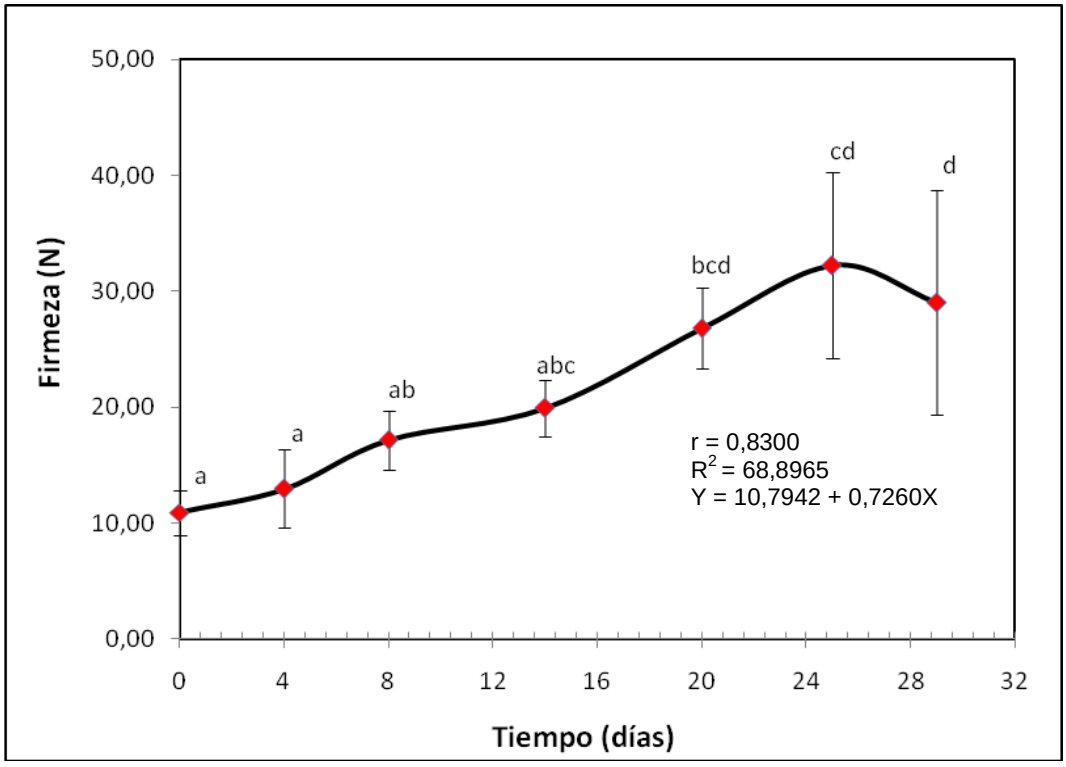
4.1. PARÁMETROS FÍSICOS

4.1.1. Propiedades texturales

4.1.1.1 Test de Cizalla

Casas y cols. (2006) informaron que entre el belly y el músculo de salmón atlántico (*Salmo salar)* crudo, no existen diferencias significativas en los valores obtenidos para cohesividad y firmeza, realizados mediante test de cizalla. De acuerdo a esto, cabe comparar el belly de trucha arcoíris con el músculo de esta especie o de otra especie salmonídea como el salmón coho (*Oncorhyncus kisutch*) o salmón atlántico (*Salmo salar*), ampliamente estudiados.

4.1.1.1.a Fuerza máxima de cizalla (N)



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.1: Evolución de la máxima fuerza de cizalla del belly de trucha arcoiris en el tiempo conservado en estado refrigerado durante 29 días.

En la Figura 4.1 se observa el aumento de la máxima fuerza de cizalla medida con una hoja Wagner-Bratzler, del belly de trucha arcoíris conservado en estado refrigerado durante 29 días, la máxima fuerza de cizalla es una medida de la firmeza del músculo.

La firmeza del belly de trucha presentó diferencias significativas en el tiempo con respecto al control ($p \leq 0,05$). La conservación en refrigeración llevó a un pronunciado aumento de los valores de firmeza durante todo el periodo de almacenamiento refrigerado, alcanzando su máximo valor el día 29 con 33,78 $\pm$ 9,68 N.

Valores de firmeza de 14,40 $\pm$ 1,16 a 13,55$\pm$ 0,85 N se encontraron en músculo de salmón Coho (*Oncorhyncus kisutch*) procesado en conserva con método tradicional y 18,75 $\pm$ 2,10 a 19,13 $\pm$ 2,01 con tratamiento previo de hielo líquido durante 9 días (Rodríguez y cols., 2010). Los mayores valores de firmeza obtenidos en este estudio, podrían explicarse como resultado de un incremento de la pérdida de agua durante el tiempo de almacenamiento refrigerado, y por lo tanto de un aumento de la concentración de lípidos en el belly. Se ha encontrado en músculo de Belly Flaps de albacora valores de lípidos totales de 18,54$\pm$ 0,92%, principalmente con una proporción de TG/DG (triglicéridos/diglicéridos) de 64,36$\pm$ 1,10% (Gallardo y cols., 1989).

Espe y cols. (2004) encontraron que la estación del año de cosecha, el tiempo de almacenamiento en refrigeración y la sección de corte en *salmón sp.* tienen una importante influencia en la fuerza de cizalla.

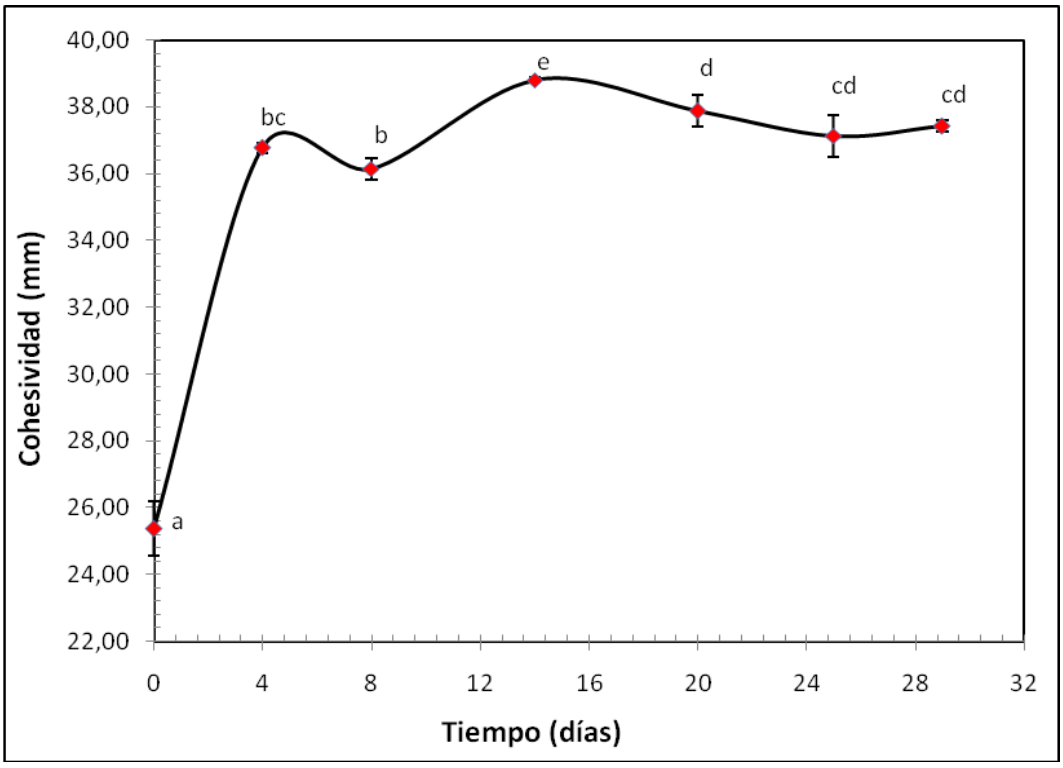
El belly y el miosepto están compuestos por una capa subcutánea de grasa conteniendo adipositos de morfología y densidad similar al tejido mesentérico el que disminuye hacia la región dorsal del músculo blanco (Shengying y cols., 1996). Debido a esta alta concentración de adipositos, el belly, tiene un alta tendencia a acumular grasa (Morkore y cols., 2002).

La firmeza medida mediante prueba de cizalla correlacionó fuertemente con el tiempo ($p \leq 0,05$) ($r = 0,9716$) (Figura 4.1) y con el contenido de lípidos ($r = 0,9660$) (Figura 4.8) existiendo entre dichas variables una relación directa, además la firmeza correlacionó inversamente con la concentración de proteínas ($p \leq 0,05$) ($r = -0,9629$) (Figura 4.7).

Los resultados de firmeza en belly concuerdan con los obtenidos por Landeros y López (2005) en salmón coho congelado mientras que, se oponen a los observados por Hernández y cols (2001) en salmón coho fresco quienes indicaron que mientras menor sea la relación proteína/lípidos, existe una disminución de la firmeza.

Existen evidencias que indican que la textura de pescados ricos en grasa tiende a hacerse más dura durante el almacenamiento congelado, al producirse la formación de enlaces cruzados entre las proteínas miofibrilares, que reducen la capacidad de retención de agua (Lou y cols., 2000; Citado por Latorre, 2008).

4.1.1.1.b Cohesividad mediante prueba de cizalla (mm.)



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.2. Evolución de la cohesividad mediante prueba de cizalla del belly de trucha arcoíris crudo conservado en estado refrigerado por 29 días.

La máxima deformación obtenida con el método de cizalla es una medida de la cohesividad del músculo. En la Figura 4.2 se observa la evolución de la cohesividad o grado de deformación máxima de cizalla en el tiempo, en belly de trucha arcoíris presentando diferencias significativas con respecto al control (p≤0,05). La tendencia presentada fue un rápido aumento de la cohesividad, alcanzando su máximo valor el dia 14 con 38,81 ± 0,06 mm., para continuar con una paulatina disminución, lo que se traduce en una menor conexión entre las fibras proteicas presentes en el belly de trucha arcoiris y por ende, una mayor deformación en el tiempo (Latorre, 2008).

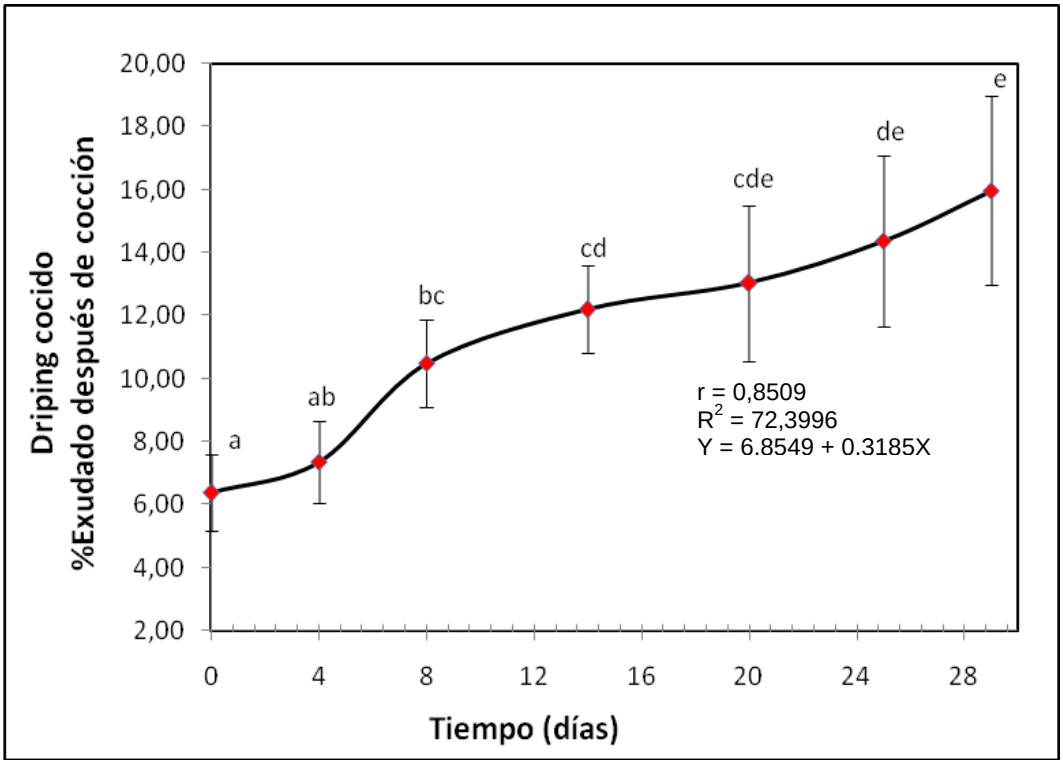
Este resultado es similar al obtenido por Maier (2005), quién encontró en músculo de salmón coho refrigerado un decrecimiento en la cohesividad después de 24 días de almacenamiento.

Latorre (2008) informó que para el músculo de salmón coho (*Oncorhyncus kisutch*) conservado al estado congelado, la cohesividad disminuyó a través del tiempo.

El deterioro de la firmeza de los filetes de salmón durante almacenamiento en bajas temperaturas es causado por la desnaturalización y agregación de las proteínas musculares (específicamente proteínas miofibrilares), lo que provoca una disminución de la firmeza (Ben-Gigirey y cols, 1999).

4.1.1.2 Driping o exudado cocido

En la Figura 4.3 se observa la evolución a través del tiempo del driping cocido que corresponde al porcentaje de líquido exudado por el belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) sometido a proceso de cocción.



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.3: Evolución del driping cocido expresado en porcentaje de agua perdida del belly de trucha arcoiris, conservado en estado refrigerado (0 a 2º C) crudo durante 29 días, evaluado cocido.

La tendencia presentada es un sostenido aumento del exudado a través de los días. Se observa el mínimo valor de driping el día cero que corresponde a un 6,39% de exudado, cuando el belly presenta su mayor nivel de frescura. Existieron diferencias significativas del driping cocido a través del tiempo ($p \leq 0,05$), y estas diferencias se presentaron a partir del día 4 de análisis.

Este estudio demostró que durante el almacenamiento en refrigeración, existe un aumento del driping cocido (líquido exudado por el belly luego de someterlo a cocción), llegando a perderse casi un 16% de líquido al final del estudio.

Los resultados obtenidos en este estudio concuerdan con los de Maier (2005), que encontró valores de 8,2% y 12,7% de exudado para los días 0 y 24, respectivamente, en músculo de salmón coho refrigerado entre 0º y 2º C.

Latorre (2008) encontró valores máximos de driping cocido al tercer mes de almacenamiento congelado en músculo de salmón coho, con un 9,9% de exudado. Ben-Gigirey y cols. (1999) encontraron valores máximos de 11,0% para la albacora tuna almacenada a –25ºC durante 9 meses. Barnett y cols. (1991) obtuvo resultados similares en salmón rosado y salmón coho conservados en congelación, con valores máximos a los 6 meses de estudio, siendo estos 18,4 ± 1,1% y 19,8 ± 1,7% respectivamente.

El driping por cocción (expresado como % de exudado) mostró una fuerte correlación positiva con el tiempo ($p \leq 0,05$) ($r = 0,9716$) y con la capacidad de retención de agua (g agua perdida/ 100 g materia seca libre de grasa) ($r = 0,9788$) (Figura 4.3 y 4.4), respectivamente. Además, presentó una alta correlación inversa con el contenido de humedad ($r = -0,9758$) (Figura 4.9) y con el valor de pH ($r = -0,9786$) (Figura 4.11).

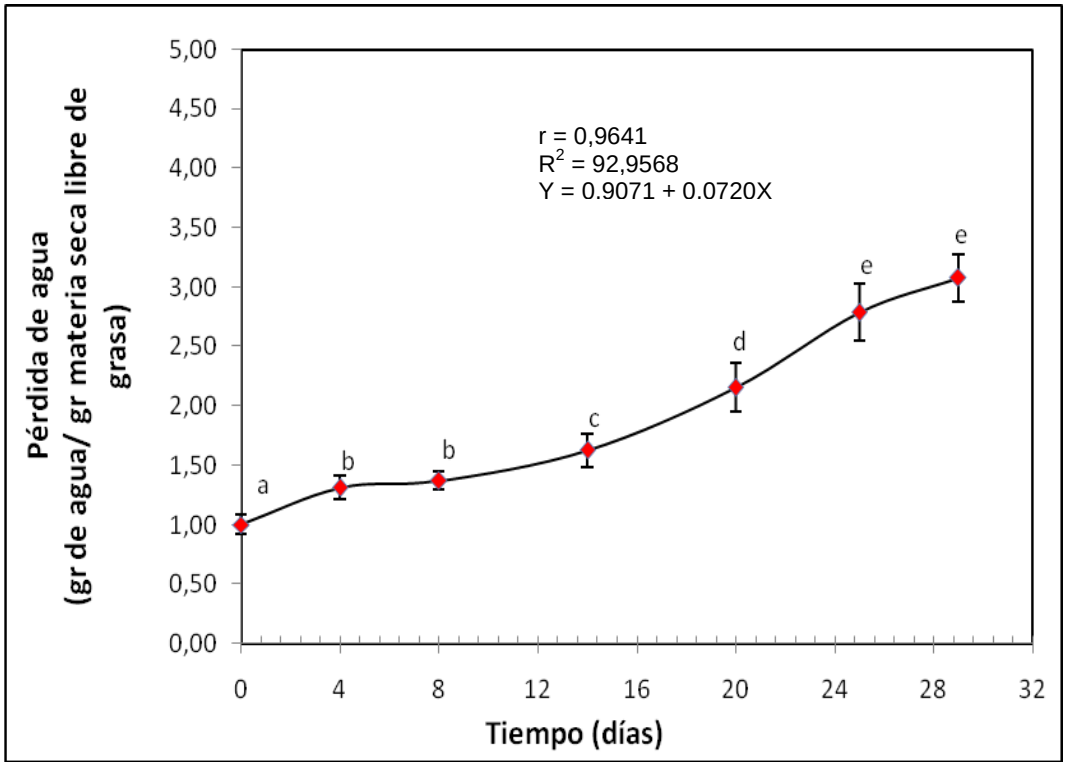
La pérdida más significativa durante el proceso de cocción del músculo, es parte del agua (mas del 85%), también parte de lípidos y sólidos, que incluye colágeno o gelatina, fragmentos de músculo y proteínas sarcoplásmicas coaguladas. La desnaturalización térmica de las proteínas del músculo es el mecanismo principal mediante el cual se produce la pérdida de humedad, ya que el calor causa la desnaturalización de la miosina y un acortamiento de las miofibrillas con una subsecuente expulsión del agua (Kong y cols., 2007).

La disminución *post mortem* en el pH del músculo de pescado tiene un efecto en las propiedades físicas del músculo. A medida que el pH disminuye, se reduce la carga neta de la superficie de las proteínas musculares, causando su desnaturalización parcial y disminuyendo su capacidad de enlazar agua.

El músculo en estado de *rigor mortis* pierde su humedad cuando es cocido y resulta particularmente inadecuado para un procesamiento posterior que involucre calentamiento, puesto que la desnaturalización por calor incrementa la pérdida de agua (Huss, 1999).

4.1.1.3 Capacidad de retención de agua relativa (CRAr)

En la Figura 4.4: se observa la evolución a través del tiempo de la capacidad de retención de agua relativa (CRAr), expresada como porcentaje de agua perdida por el belly seco y libre de grasa de trucha arcoíris conservado en estado refrigerado (0 a 2º C) y sometido a centrifugación a 5º C.



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.4: Evolución de la capacidad de retención de agua (expresado en porcentaje de agua perdida en el tiempo), del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

La capacidad de retención de agua relativa presentó diferencias significativas a través del tiempo, estas diferencias se presentaron a partir del día 0 de estudio. La tendencia presentada fue un aumento leve pero sostenido de la pérdida de líquido desde el belly de trucha arcoíris, obteniéndose el día 0 la menor pérdida con un 1,0% (gr agua

perdida/100 gr de materia seca libre de grasa), y el máximo valor de pérdida de líquido fue el último día de estudio con 3,08% (gr agua perdida/100 gr de materia seca libre de grasa). Este comportamiento se traduce en una disminución de la capacidad de retención de agua relativa del belly durante todo el periodo de estudio.

Olsson y cols. (2003) encontraron que en el músculo del halibut refrigerado durante 15 días, la capacidad de retención de agua disminuyó entre los días 0 y 4 para luego incrementarse significativamente a partir del día 8 hasta el día 15.

Fagan y cols. (2003) encontraron valores de pérdida de líquido de 1,02 ± 0,79 (gr agua perdida/100 gr de materia seca y libre de grasa) en músculo refrigerado de *Salmón sp,* y valores de 5,08 ± 0,79 (gr agua perdida/100 gr de materia) en músculo congelado de *Salmón sp.*

La capacidad de retención de agua (expresada como pérdida de agua por el belly seco y libre de grasa) presentó una correlación positiva con el tiempo ($p \leq 0,05$) ($r = 0,9970$) (Figura 4.4) y una alta correlación negativa con la concentración de proteínas ($r = -0,9912$) (Figura 4.7) y con el contenido de humedad ($r = -0,9805$) (Figura 4.9).

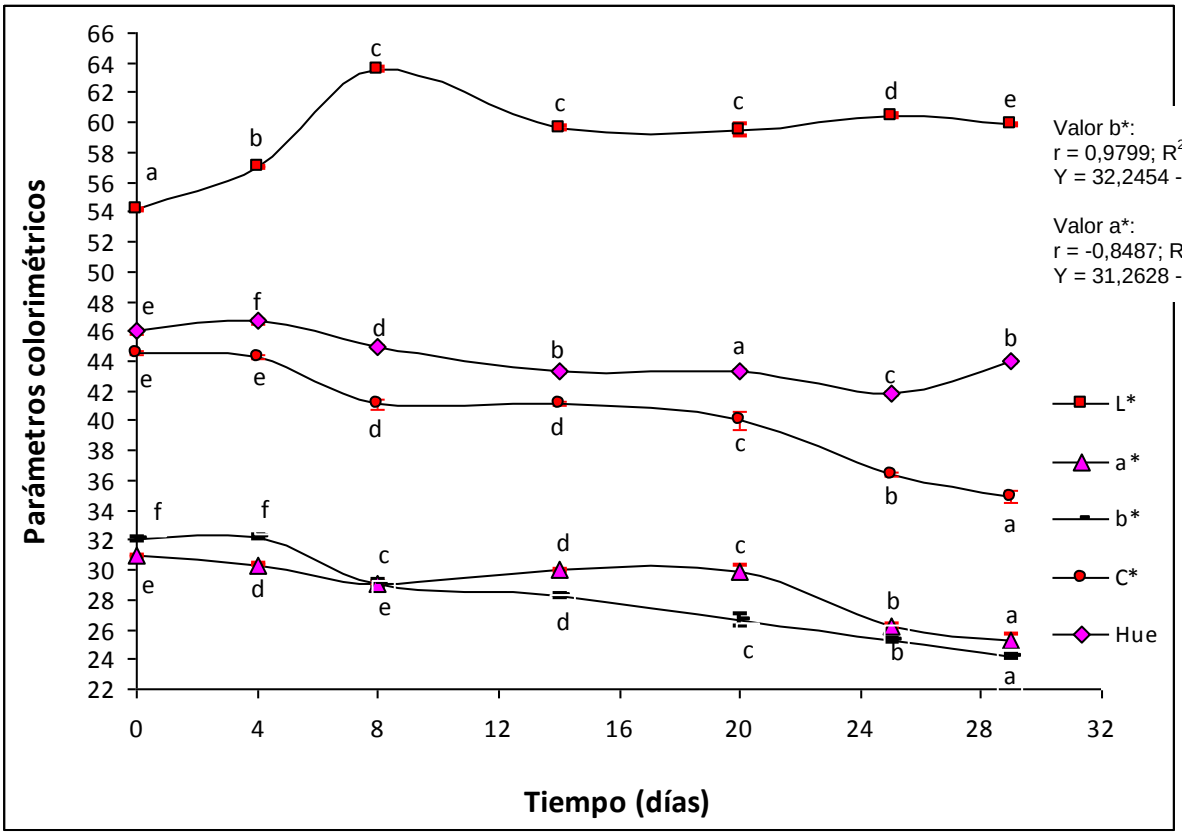
Cheftel (1989) encontró que la congelación y el almacenamiento a bajas temperaturas causan desnaturalización y agregación de las proteínas, así como la ruptura de las células musculares, cuya principal consecuencia es un descenso en la CRA que se manifiesta después de someterlas a temperatura ambiente, además, existen diversos factores, tanto intrínsecos como extrínsecos, que tienen influencia en la capacidad de retención de agua en cada capa del músculo (Olsson y cols., 2003).

4.1.2 Color

El color del músculo de los salmónidos es resultado de la deposición de los carotenoides obtenidos de su dieta, y el contenido de carotenoides está influenciado por la fuente de carotenoides, velocidad de suplementación, la especie, tamaño, edad y la misma dieta (Torrisen y cols., 1988; Torrisen y cols., 1989)

La carta de color Roche y el sistema de color L*, a* y b* son los métodos más frecuentes para cuantificar el color percibido de los filetes de salmónidos. El valor a* es el parámetro que se correlaciona de mayor forma con el contenido de carotenoides (Skjervold y cols., 2001).

4.1.2.1Color instrumental



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.5: Evolución de los parámetros colorimétricos a través del tiempo del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

En la Figura 4.5 se observa la evolución a través del tiempo de los parámetros colorimétricos (a*, b*, L*, C* y Hue) del belly de trucha arcoíris, además se observan el coeficiente de correlación, r, el coeficiente de determinación, R^2 y la ecuación lineal que mejor se ajusta al comportamiento para los valores a* y b*, que fueron los que presentaron un mejor coeficiente de correlación.

Para el parámetro a*, que corresponde a la cromaticidad rojo-verde, se encontraron diferencias significativas a partir del día 4 de estudio (p≤0,05). El menor valor de a* se encontró el día 29 siendo 25,23 ± 0,11 y el máximo valor se obtuvo el primer día de estudio siendo 30,95 ± 0,08. La tendencia general fue una paulatina disminución de este parámetro a través del tiempo, lo que indicaría una disminución en la concentración de

astaxantinas en el belly, según Yagiz y cols. (2010) quienes encontraron una fuerte correlación entre el valor a* y la cantidad de astaxantina.

El valor b* disminuyó paulatinamente a través del tiempo. El menor valor encontrado fue de 24,17 ± 0,16 el día 29 de estudio, y el máximo valor se encontró el día 4 de estudio siendo 32,18 ± 0,14, a partir del cual se encontraron diferencias significativas en el valor b* a través del tiempo. Además el valor b* presentó una correlación positiva con el valor C* ($p \leq 0,05$) ($r = 0,9727$) y con la calidad total ($r = 0,9850$).

Por último, el valor C* presentó también una marcada disminución en el tiempo, encontrándose el valor más bajo el día 29 de estudio con 34,93 ± 0,39 y el máximo valor el día 0 con 44,53 ± 0,17. Se encontraron diferencias significativas desde el día 4 en adelante.

En general, se observó que los parámetros a*, b* y C* disminuyeron con el tiempo, y los parámetros L* y Hue no mostraron una tendencia definida.

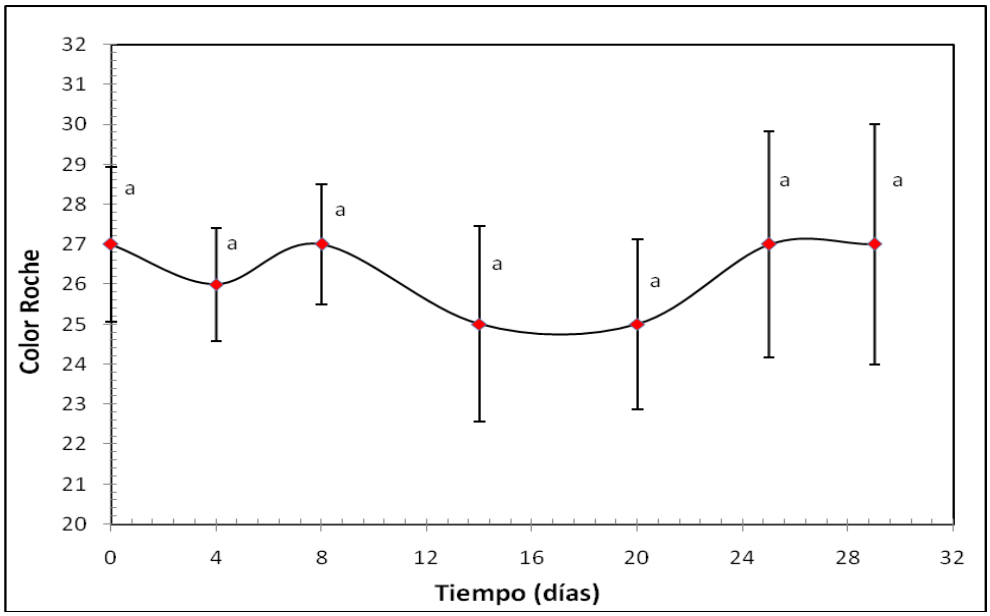
Los resultados obtenidos en este estudio condicen con aquellos obtenidos por Skjervold y cols. (2001) quienes encontraron que al cabo de 14 días de almacenamiento en hielo, todos los parámetros de color en músculo de salmón atlántico (*Salmo salar*) disminuyeron en el tiempo.

Espe y cols. (2004) encontraron que en el músculo de salmón atlántico (*Salmo salar*), cosechado en diferentes estaciones del año, el color no presenta una tendencia definida.

En truchas arcoiris, pigmentadas con astaxantina, existe una alta correlación entre los colores medidos con colorímetro y la concentración de este carotenoide en el músculo. Además, a medida que se incrementa la concentración de astaxantina muscular el valor a* aumenta y disminuye el valor L* (No y Storebakken, 1991).

4.1.2.1 Color Visual

En la Figura siguiente se observa la evolución a través del tiempo del color medido con el abanico Roche *Salmo*Fan™ en belly de trucha arcoíris.



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.6: Evolución del color, medido con abanico Roche *Salmo*Fan™, a través del tiempo del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

De acuerdo a lo establecido por la Asociación de Productores de Salmón y Trucha (2002), los valores superiores a 30 en la escala, corresponden a un Grado de Calidad Premium y los valores entre 30 y 22 corresponden a Grado de Calidad 1.

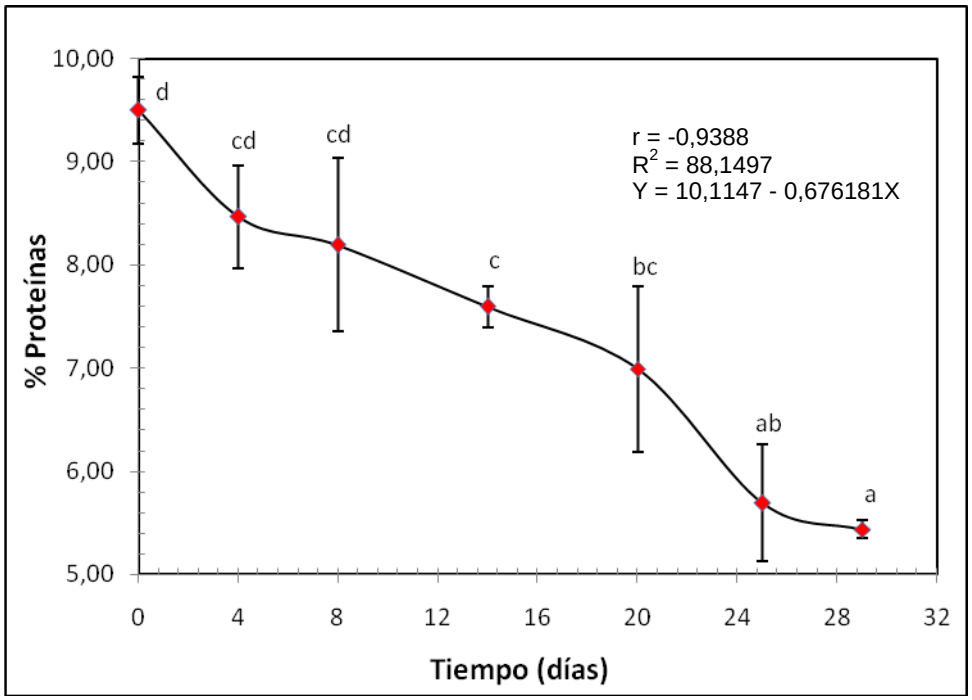
Durante todo el periodo de estudio el color, según el abanico Roche *Salmo*Fan™, no tuvo diferencias estadísticamente significativas, manteniendo sus valores entre 25 y 27.

Se debe considerar que la relación entre coloración y concentración de carotenoides es muy buena a bajos niveles de pigmentación en peces de cultivo, pero a altos niveles de astaxantina, esta asociación es baja (Hardy, 1988). Torrisen y cols. (1989) agregan que esto se debería a que el ojo humano parece ser menos sensible a concentraciones de carotenoides sobre 3 a 4 mg/kg comparado con concentraciones inferiores. El uso del Abanico Colorimétrico ayudaría a discriminar en mejor forma la intensidad de color que presentan los filetes de salmón al momento de su cosecha (Pokniak y cols., 2005).

4.2 PARAMETROS QUIMICOS

4.2.1 Composición centesimal

4.2.1.1 Proteínas



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.7: Evolución del contenido de proteínas (expresado en porcentaje), a través del tiempo, del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

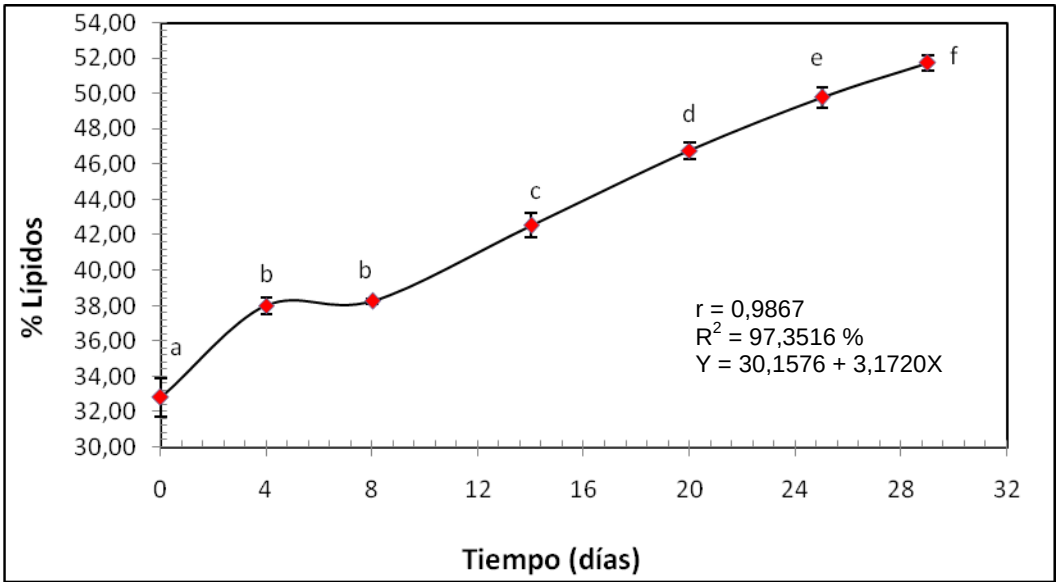
En la Figura 4.7 se observa que el contenido de proteínas (expresado en porcentaje) en belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C), disminuyó a través del tiempo desde un 9,50% hasta un 5,44% del peso total del belly de trucha arcoíris. Existieron diferencias significativas en el tiempo a partir del primer día de estudio, y además los datos arrojaron un coeficiente de correlación de 0,9388 lo que indica que la disminución del contenido de proteínas tiene un comportamiento lineal y se ajusta a la ecuación presentada en la Figura 4.7.

Morkore y cols. (2002) encontraro un contenido de proteínas de 17,5% en belly flap de trucha arcoíris conservada en estado congelado, mientras que para trucha arcoíris entera el porcentaje de proteínas encontrado fue de 20,66% (Izquierdo y cols., 1999).

Einen y cols. (1998) encontraron en el salmón atlántico (*Salmo Salar*) entero alimentado con diversas dietas, un contenido de proteínas de 18,8% al 19% del peso.

La concentración de proteínas presentó una correlación positiva con la calidad total ($p \leq 0,05$) ($r = 0,9730$).

4.2.1.2 Lípidos



Letras distintas indican diferencias significativas ($p \leq 0,05$)

Figura 4.8: Evolución del contenido de lípidos (expresado en porcentaje, en base seca), a través del tiempo, del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

En la Figura 4.8 se observa el aumento del contenido de lípidos a través del tiempo, desde un 32,82 ± 1,10% hasta un 51,73 ± 0,46% del peso total del belly de trucha arcoíris. Existieron diferencias significativas ($p \leq 0,05$) en el tiempo a partir del día cero de estudio y los datos presentaron un coeficiente de correlación de 0,9867, lo que se traduce en un comportamiento lineal que se ajusta a la ecuación mostrada en la misma figura.

Morkore y cols. (2002) encontraron en la zona de belly flap en trucha arcoíris congelada un contenido de lípidos de 19,6%. Estudios en belly flaps de otras especies, como la albacora *(Thunnus alalunga)* crudo, informan que el contenido de lípidos corresponde a un 18,54 ± 0,92% del peso (Aubourg y cols. 1990), mientras que Gallardo y

cols. (1989) encontraron que para la misma especie de pescado un 18,54 ± 0,92% corresponde al contenido de los lípidos.

La concentración de lípidos presentó una fuerte correlación con el tiempo ($p \leq 0,05$) ($r = 0,9924$) (Figura 4.8) y una correlación inversa con el contenido de humedad ($r = -0.9798$) (Figura 4.9) y con la concentración de proteínas ($r = -0,9889$) (Figura 4.7).

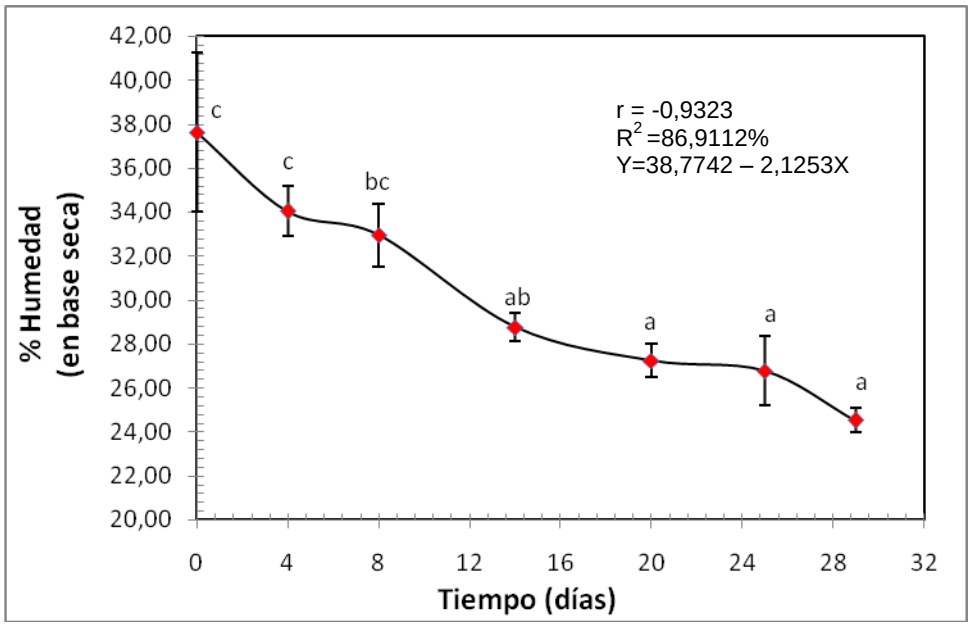
Los resultados obtenidos en el presente estudio condicen con lo indicado por Morkore y cols. (2002) quienes indican que la zona del belly del pescado tiene una tendencia a acumular grasa debido a su alta concentración de adipocitos. Además, ellos indican que, generalmente, el contenido de agua y el contenido de lípidos en el músculo de los salmones, están inversamente relacionados.

Además los mismos autores indican que el contenido de proteínas tiende a mantenerse estable y no se ve afectado por las variaciones en el contenido de lípidos, lo que se contrapone a la correlación obtenida entre ambos parámetros, en el presente estudio.

Los tejidos ubicados en la zona del belly corresponden al depósito de lípidos más importante del tejido muscular en el salmón atlántico, donde el contenido de lípidos es 10 veces mayor que en el músculo blanco dorsal (Ackman y cols., 1994).

Los pescados grasos son, por su puesto, particularmente susceptibles a la degradación lipídica, la cual puede ocasionar severos problemas en la calidad, incluso durante el almacenamiento a temperaturas bajo cero (Huss, 1999).

4.2.1.3 Humedad



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.9: Evolución de la humedad (expresado en porcentaje) a través del tiempo, del belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

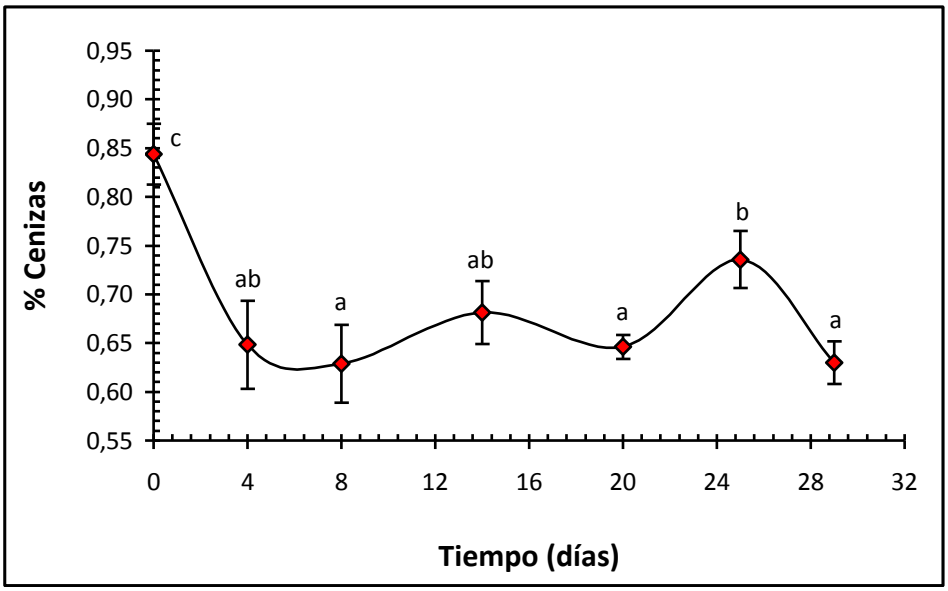
En Figura 4.9, se observa que la humedad en el belly de trucha arcoíris conservada refrigerada (0º a 2ºC), disminuyó desde 37,62 ± 3,62% hasta 24,52 ± 0,54% del peso total, presentando diferencias significativas a partir del día 8 de estudio y una correlación negativa con el tiempo (p≤0,05) (r = -0,9755).

La disminución del contenido de humedad junto con el aumento del contenido de lípidos en el belly de trucha arcoíris, reafirman lo indicado por Morkore y cols. (2002) respecto a que ambos están inversamente relacionados, indicando además que el belly flap de trucha arcoíris está compuesto por un 62,5% de humedad. Cabe mencionar que el corte “belly flap” corresponde al belly más el músculo ventral.

Según Izquierdo y cols. (1999) el filete de trucha arcoíris contiene un 77,3% de humedad, mientras que en otros salmónidos como el salmón coho (*Oncorhynchus mykiss*) Landeros y López (2005) informaron un contenido de humedad del 71,8 ± 0,2% del total del peso del músculo. Skjervold y cols. (2000) encontraron que en el filete de salmón atlántico (*Salmo salar*) el contenido de humedad corresponde al 61,3 ± 0,91% del total del peso.

El contenido de humedad presentó una fuerte correlación directa con la calidad total (r = 0,9844).

4.2.1.4 Cenizas



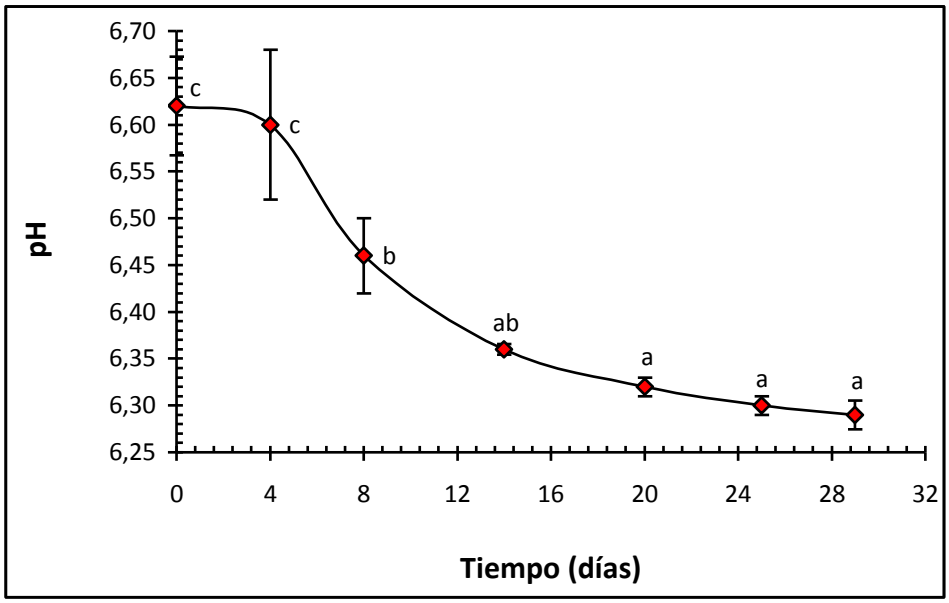
Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.10: Evolución del contenido de cenizas (expresado en porcentaje) a través del tiempo, del belly de trucha arcoíris conservado refrigerado (0 a 2º C) durante 29 días.

En la Figura 4.10 se observa que el contenido de cenizas en el belly de trucha arcoíris, sufrió variaciones en el tiempo pero no presentó una tendencia marcada, manteniendo su contenido entre 0,63 y 0,84% presentando diferencias significativas desde el primer día de estudio.

Landeros y López (2005) encontraron en filete de salmón coho un 1% de cenizas, Morkore y cols. (2002) encontraron en el belly flap de trucha arcoíris un contenido de 1,2% de cenizas, mientras que para filete de trucha arcoíris el contenido de cenizas es de 1,33% (Izquierdo y cols., 1999).

4.2.2 pH



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.11: Evolución del pH a través del tiempo, de belly de trucha arcoíris conservado en estado refrigerado (0 a 2º C) durante 29 días.

En la Figura 4.11 se observa que el pH del belly de trucha arcoiris disminuyó en el tiempo, desde 6,62 ± 0,05 hasta 6,29 ± 0,02, presentando diferencias significativas (p≤0,05) a partir del cuarto día de estudio y un coeficiente de correlación de -0,9196.

El Reglamento Sanitario de los Alimentos (MINSAL, 1997) establece que el valor de pH permitido en pescado fresco es 6,80 máximo.

Como regla, el pescado bien descansado y bien alimentado contiene más glucógeno que el pescado exhausto y hambriento. Estudios realizados por Chiba y cols. (1991), demostraron que el desangrado del pescado disminuye significativamente la producción de ácido láctico post mortem y que la disminución del pH del músculo de pescado, en este periodo, tiene un efecto en las propiedades físicas del músculo. A medida que el pH disminuye, se reduce la carga neta de la superficie de las proteínas musculares, causando su desnaturalización parcial y disminuyendo su capacidad de enlazar agua.

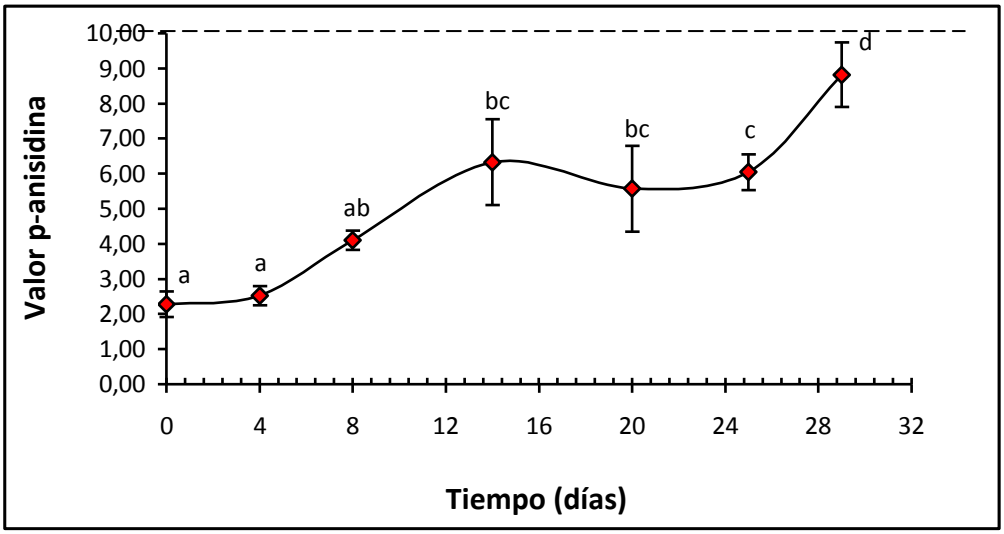
El músculo en estado de rigor mortis pierde su humedad cuando es cocido y resulta particularmente inadecuado para un procesamiento posterior que involucre calentamiento, puesto que la desnaturalización por calor incrementa la pérdida de agua.

La pérdida de agua tiene un efecto perjudicial en la textura del músculo; ha sido demostrado por Love (1975) que existe una relación inversamente proporcional entre la dureza del músculo y el pH, donde los niveles inaceptables de dureza (y pérdidas de agua por cocción) ocurren a menores niveles de pH (Figura 5.3).

Morkore y cols. (2002) encontraron valores de pH de 6,44 en belly flap de trucha arcoiris conservada refrigerada al cabo de 7 días. Landeros y López (2005) encontraron valores de pH de 6,06 al mes 0 de estudio en músculo de salmón coho congelado, y al cabo de los 12 meses el pH aumentó a 6,27, pero los datos que obtuvieron no arrojaron diferencias significativas en el tiempo.

Tras su sacrificio, el pescado entra en etapa de rigor mortis, periodo en el cual disminuye el pH, observándose en especies como el Bacalao un descenso desde 6,8 hasta un pH extremo de 6,1 – 6,5 (Huss, 1988). Según lo anterior, los valores obtenidos en el presente estudio representarían un pH post mortem.

4.2.3 Índice de Anisidina



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.12: Evolución del índice de anisidina en el tiempo, del belly de trucha arcoiris conservada en refrigeración (0º a 2º C) durante 29 días.

En la Figura 4.12 se observa que el índice de anisidina tuvo un aumento en el tiempo, desde 2,28 ± 0,36 hasta 8,82 ± 0,92, presentando diferencias significativas a partir del día 8 de estudio, y un coeficiente de correlación de 0,8990. Mediante el programa estadístico, se establece que los datos se comportan, en mayor medida, de forma lineal, por lo que se ajustarían a la ecuación entregada en la figura.

El índice de anisidina presentó una fuerte correlación con el parámetro sensorial Olor a Rancio Crudo ($p \leq 0,05$) ($r = 0,9618$), ya que ambos parámetros serían indicadores de la rancidez u oxidación lipídica en el belly de trucha arcoiris.

La gran cantidad de ácidos grasos poliinsaturados presentes en los lípidos del pescado lo hace altamente susceptible a la oxidación mediante un mecanismo autocatalítico (Huss, 1999).

El valor del índice de anisidina equivale por convenio a 100 veces la densidad óptica medida a 350 nm en una cubeta de 1 cm con una solución de 1 g de aceite en 100 mL de una mezcla de disolvente y reactivo, de acuerdo con el procedimiento descrito por la AOCS, y de acuerdo a lo indicado por Castro (1994), como valor máximo se estima adecuado un valor del orden de 10.

Rodríguez y cols (2006) encontraron valores de 1.15 ± 0.25 para el índice de anisidina en salmón coho fresco y valores de 53.03 ± 0.48 en salmón coho refrigerado durante 9 días para su posterior cocción.

La oxidación lipídica a nivel secundario, no se vio gravemente afectada durante el periodo de refrigeración del belly, y además el sistema de extracción de lípidos a baja temperatura no ayudó a la oxidación de estos.

4.3 PARAMETROS SENSORIALES

En la Tabla 4.1 se observa los niveles de significancia de cada descriptor del Análisis Descriptivo (QDA) evaluado por 8 panelistas en belly de trucha arcoiris durante 29 días conservado refrigerado.

Tabla 4.1: Nivel de significancia para panelistas y tiempo por descriptor evaluado en el belly de trucha arcoiris refrigerado (0º a 2ºC).

Atributos	Nivel de Significancia	
	Panelistas	Tiempo
Brillo	n.s.	n.s.
Humedad	n.s.	n.s.
Goteo	n.s.	s.
Olor típico crudo	n.s.	s.
Olor rancio crudo	n.s.	s.
Olor pútrido crudo	n.s.	s.
Olor típico cocido	n.s.	s.
Olor rancio cocido	n.s.	s.
Olor pútrido cocido	n.s.	s.
Color roche	n.s.	n.s.
Color típico	n.s.	n.s.
Dureza crudo	n.s.	s.
Cohesividad crudo	n.s.	s.
Elasticidad crudo	n.s.	s.
Firmeza crudo	n.s.	s.
Firmeza cocido	n.s.	n.s.
Calidad total	n.s.	s.

n.s.: no significativo ($p>0,05$).

s.: significativo ($p\leq0,05$).

En la Tabla 4.2 se aprecia las repuestas del análisis descriptivo cuantitativo (QDA) en belly de trucha arcoiris almacenada refrigerada durante 29 días

Tabla 4.2 Descriptores de belly de trucha arcoiris refrigerada durante 29 días.

Atributo (escala)/ Tiempo	0	4	8	14	20	25	29
Brillo (1 – 10)	9,15^{e} (0,46)	8,51^{de} (0,95)	6,99^{cd} (2,04)	7,55^{bc} (1,52)	7,85^{bc} (2,14)	7,45^{ab} (2,49)	6,37^{a} (3,16)
Humedad (1 – 10)	9,25^{a} (0,78)	8,52^{a} (1,20)	8,11^{a} (1,70)	7,64^{a} (1,93)	8,18^{a} (2,07)	7,88^{a} (2,19)	6,80^{a} (2,90)
Goteo (1 – 10)	0,48^{a} (0,45)	0,60^{a} (0,51)	1,31^{ab} (1,28)	1,50^{ab} (1,77)	3,60^{bc} (2,50)	3,61^{bc} (2,61)	4,81^{c} (2,42)
Olor típico crudo (1 – 10)	9,42^{e} (0,84)	7,67^{d} (1,19)	3,64^{d} (2,72)	2,88^{c} (2,25)	1,76^{b} 2,56	0,58^{a} (0,64)	0,61^{a} (0,61)
Olor rancio crudo (1 – 10)	0,11^{a} (0,10)	0,52^{ab} (0,67)	3,74^{bc} (2,69)	5,84^{cd} (2,44)	6,38^{cd} (3,34)	7,48^{d} (2,57)	9,01^{d} (0,96)
Olor pútrido crudo (1 – 10)	0,15^{a} (0,14)	0,34^{a} (0,35)	2,53^{ab} (2,41)	3,16^{ab} (2,09)	5,98^{bc} (3,73)	7,98^{c} (2,74)	8,39^{c} (2,29)
Olor típico cocido (1 – 10)	9,35^{c} (0,68)	8,18^{bc} (1,32)	7,15^{abc} (2,66)	8,05^{abc} (2,06)	6,96^{abc} (2,79)	4,99^{ab} (3,12)	4,34^{a} (3,55)
Olor rancio cocido (1 – 10)	0,15^{a} (0,12)	0,41^{a} (0,29)	1,23^{ab} (1,53)	2,05^{ab} (1,83)	3,93^{bc} (2,47)	6,54^{cd} (3,06)	7,17^{d} (2,65)
Olor pútrido cocido (1 – 10)	0,15^{a} (0,13)	0,44^{ab} (0,37)	0,74^{ab} (1,07)	1,31^{ab} (1,56)	3,25^{bc} (2,68)	5,65^{cd} (3,13)	6,57^{d} (2,44)
Olores extraños (1 – 10)	0,00^{a} (0,00)	0,00^{a} (0,00)	0,00^{a} (0,00)	0,00^{a} (0,00)	0,00^{a} (0,00)	0,00^{a} (0,00)	0,00^{a} (0,00)
Color típico (1 – 10)	6,84^{a} (1,45)	6,75^{a} (1,28)	5,26^{a} (1,95)	5,54^{a} (0,90)	5,60^{a} (2,06)	5,36^{a} (1,61)	5,44^{a} (1,99)
Dureza crudo (1 – 10)	8,66^{c} (0,75)	8,11^{bc} (1,21)	8,11^{abc} (1,41)	7,73^{abc} (1,39)	5,81^{ab} (2,74)	6,40^{abc} (2,57)	5,41^{a} (2,04)
Cohesividad crudo (1 – 10)	9,12^{c} (0,93)	7,62^{bc} (2,76)	8,00^{bc} (1,36)	7,43^{abc} (2,21)	4,18^{a} (2,47)	5,61^{ab} (2,88)	5,60^{abc} (2,75)
Elasticidad crudo (1 – 10)	9,41^{d} (0,55)	8,12^{cd} (1,52)	8,13^{bcd} (1,56)	7,68^{bcd} (1,65)	4,11^{a} (3,39)	5,75^{abc} (2,85)	4,84^{ab} (3,44)
Firmeza crudo (1 – 10)	8,97^{b} (1,25)	8,59^{b} (0,83)	8,16^{b} (1,01)	8,04^{b} (1,37)	4,58^{a} (2,89)	6,68^{ab} (3,06)	6,24^{ab} (2,91)
Firmeza cocido (1 – 10)	0,56^{a} (0,48)	0,36^{a} (0,32)	0,25^{a} (0,34)	0,26^{a} (0,23)	0,60^{a} (1,42)	0,21^{a} (0,33)	0,31^{a} (0,54)
Calidad total (1 – 100)	96,00^{d} (5,00)	88,00^{d} (11,00)	78,00^{cd} (5,00)	69,00^{bc} (13,00)	57,00^{ab} (18,00)	53,00^{ab} (10,00)	44,00^{a} (11,00)

Las desviaciones estándar se indican en paréntesis. Promedios con superíndices diferentes a la derecha indican diferencias significativas entre tiempos de refrigeración ($p \leq 0,05$).

Los siguientes atributos presentaron diferencias significativas en el tiempo, ($p \leq 0,05$):

El goteo aumentó a medida que transcurrieron los días, dicho comportamiento puede deberse a la disminución de la capacidad de retención de agua presentada por el belly. Además el goteo presentó una fuerte correlación inversa con la dureza sensorial ($p \leq 0,05$) ($r = -0,9809$) y con la calidad total ($r = -0,9667$).

El olor típico crudo disminuyó significativamente en el tiempo y además presentó fuerte correlación inversa con el olor rancio crudo ($r = -0,9717$). Este atributo fue utilizado por Maier (2005) como indicador del deterioro en salmón coho fresco refrigerado.

El olor rancio crudo aumentó con el tiempo y presentó una alta correlación con el índice de anisidina ($r = 0,9618$), estos son resultados concordantes e indican que los panelistas pudieron detectar la rancidez que comenzó a sufrir el belly de trucha arcoiris.

Los tres atributos, olor típico crudo, rancio crudo y pútrido crudo, presentaron alta correlación con la calidad total ($r = 0,9538$; $r = -0,9815$; $r = -0,9792$; respectivamente). Esta fuerte relación entre dichos atributos y la calidad total indica que los panelistas relacionaron en gran medida el olor del belly con el grado de calidad del mismo. Estos resultados concuerdan con otras investigaciones que destacan el olor como el atributo notoriamente más afectado y que reduce considerablemente la calidad del producto después del día 8 a 10 de conservación en refrigeración (Sigholt y cols., 1997).

El olor típico cocido, rancio cocido y pútrido cocido presentaron el mismo comportamiento que la evaluación de olor en belly crudo. Además el olor rancio cocido y el olor pútrido cocido presentaron una alta correlación directa ($p \leq 0,05$) ($r = 0,9956$) entre ellos, aumentando ambos a medida que transcurrió el tiempo de almacenamiento.

En la evaluación sensorial, los jueces determinaron la presencia de olores extraños (olor generado por un agente externo) en el belly de trucha arcoiris, los jueces determinaron que no existieron olores extraños a ningún tiempo.

La dureza, cohesividad, elasticidad y firmeza sensoriales en belly crudo, tuvieron similar comportamiento, disminuyendo significativamente a medida que transcurrió el tiempo, presentando cada uno de ellos su menor valor el día 20.

La elasticidad sensorial del belly crudo correlacionó positivamente con la dureza sensorial ($r = 0,9776$), con la cohesividad sensorial ($r = 0,9854$) y con la firmeza sensorial en belly crudo ($r = 0,9697$).

La baja en la elasticidad se debe principalmente a la desnaturalización y agregación de las proteínas que forman parte de las miofibrillas (proteínas miofibrilares), que son responsables de mantener unidas las fibras del músculo (Ben-Gigirey y cols., 1999).

Los resultados de textura sensorial obtenidos no correlacionan con aquellos obtenidos en forma instrumental, esto puede deberse a que el belly es diferente según el lado (izquierdo o derecho) de donde se haya extraído lo que podría afectar los resultados instrumentales, que tienen mayor sensibilidad.

De acuerdo a resultados obtenidos en otros estudios similares (Maier, 2005; Landeros y López, 2005) donde se han analizados los mismos parámetros de forma sensorial e instrumental en salmón coho (refrigerado y congelado), se puede establecer que el análisis sensorial de textura es el mas idóneo para evaluar estos parámetros en pescado.

Latorre (2008) encontró que la pérdida de elasticidad, aumento en el goteo y el aumento de la deshidratación, coinciden con la pérdida de funcionalidad de las proteínas producto de la desnaturalización ocurrida en músculo del salmón coho congelado.

Finalmente en base a los resultados obtenidos se concluye que los atributos que más contribuyeron a evaluar los cambios sensoriales de forma temprana, fueron el olor típico, el olor rancio, el olor rancio pútrido y los parámetros de textura sensoriales como la elasticidad, dureza, cohesividad y firmeza en belly crudo de trucha arcoiris, pudiendo los panelistas reconocerlos y acusarlos antes que el resto de los atributos.

La evaluación sensorial del pescado crudo en mercados y sitios de desembarque se efectúa mediante la evaluación de la apariencia, textura y olor, parámetros en los cuales se producen los primeros cambios sensoriales del pescado almacenado en hielo (Huss, 1999).

De acuerdo a la Figura 4.12, es posible determinar la vida útil en base al día donde el olor pútrido comienza a detectarse más intensamente por sobre el olor típico, y correspondería al día 12 de conservación en refrigeración (0º a 2º C) del belly de trucha arcoiris. Estos resultados se complementan con el Recuento de Aeróbios Mesófilos, que llegó a su límite máximo permitido ($5x10^5$ UFC/gr) por el Reglamento Sanitario de Alimentos, el día 12 de análisis.

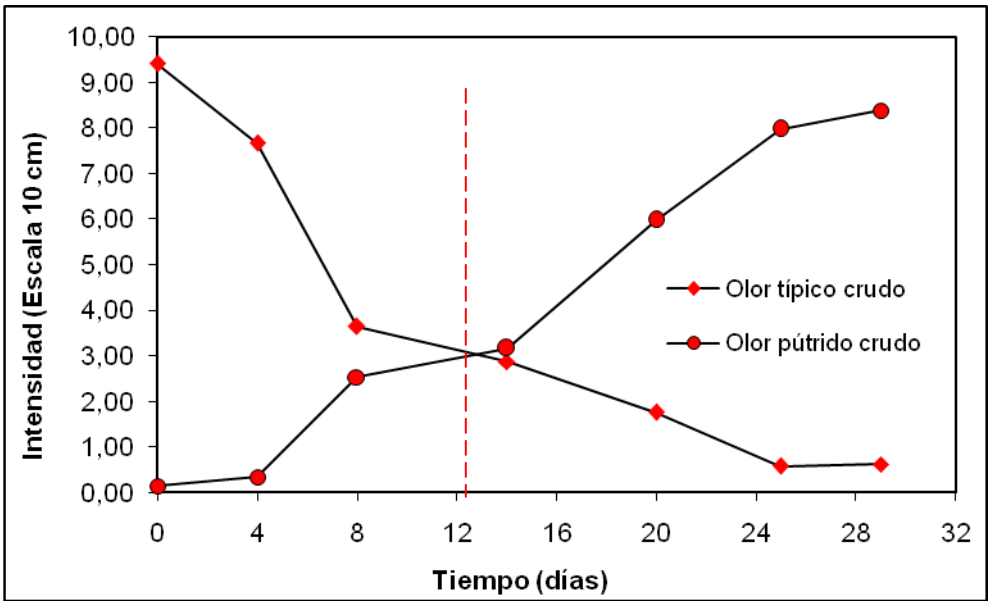


Figura 4.12: Determinación de la vida útil del belly de trucha arcoiris, según parámetros microbiológicos y sensoriales.

De acuerdo a lo estudiado por Cann y cols. (1985) el salmón (*Oncorhynchus sp.)* presenta un período de duración a 10ºC de 3 días, mientras que a 0ºC dura 11,8 días. El salmón coho *(Oncorhynchus kysutch)*, presenta una duración de12 días conservado entre 0 y 2°C (Maier, 2005).

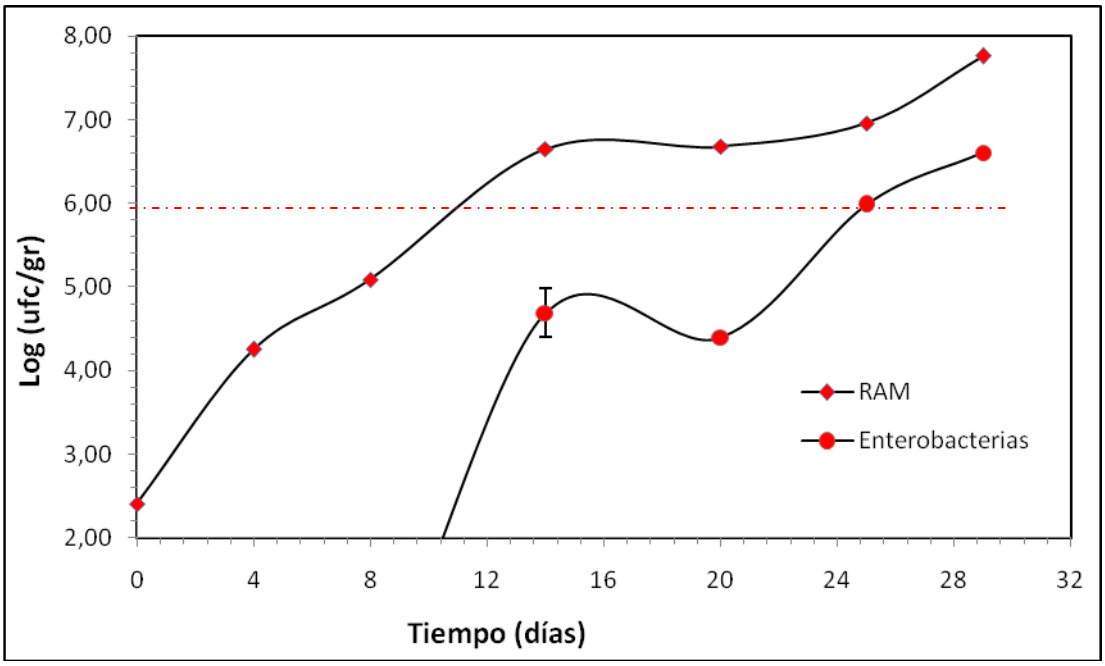
Kontominas y cols. (2003) indica que la vida útil a temperatura de refrigeración, es de 15 a 16 días para la trucha arcoiris entera, y de 10 a 12 días para la trucha arcoiris fileteada.

La calidad total presentó una fuerte correlación inversa con el tiempo (r = -0.9953), valor que corroboraría los resultados obtenidos en todos los parámetros estudiados. La calidad total, al día 12 de refrigeración del belly de trucha arcoiris, arrojó un valor de 73. De acuerdo a esto se puede establecer que, valores menores a 75 para el atributo Calidad Total en evaluación sensorial de belly de trucha arcoiris refrigerada, representaría un producto no apto para el consumo humano, ya que a ese tiempo, el recuento de aerobios mesófilos excede lo permitido por la autoridad nacional.

4.4 PARAMETROS MICROBIOLOGICOS

La actividad microbiana es responsable del deterioro de la mayoría de los productos pesqueros frescos. Por lo tanto, la duración de los productos pesqueros se extiende marcadamente cuando los productos son almacenados a bajas temperaturas (Huss, 1999)

El músculo de un pez saludable o de un pescado recién capturado es estéril, debido a que el sistema inmunológico del pez previene el crecimiento de bacterias en el músculo. Cuando el pez muere, el sistema inmunológico colapsa y las bacterias proliferan libremente (Huss, 1999).



Letras distintas indican diferencias significativas (p≤0,05)

Figura 4.13: Recuento de aerobios mesófilos y de Enterobacterias expresado en Logaritmo de unidades formadoras de colonias por gramo de belly de trucha arcoiris conservado en estado refrigerado (0º a 2º C).

El recuento de aerobios mesófilos presentó diferencias significativas (p≤0,05) en el tiempo a partir del día 4 de estudio de almacenamiento a temperatura de refrigeración (0º a 2ºC). El día 12 superó el límite máximo permitido por la legislación nacional establecidos

por MINSAL (1997) y SERNAPESCA, los que estipulan como valor máximo 1 x 10^6 unidades formadoras de colonias/g para microorganismos aerobios mesófilos.

Al finalizar el estudio, el RAM alcanzó las 1 x 10^7 UFC/g, esto indicaría la importancia de estos microorganismos en la vida útil de los pescados y productos de origen marino.

Barnett y cols. (1991) encontraron en la piel del salmón coho un recuento de aerobios mesófilos cercano a las 10^6 UFC/g en el día 11 de almacenamiento en hielo y en salmón rosado el mismo recuento se encontró posterior al día 13 en las mismas condiciones de almacenamiento.

En la Figura 4.13 se observa la evolución en el tiempo del Recuento de enterobacterias de belly de trucha arcoiris conservado en estado refrigerado (0º a 2º C), presentando diferencias significativas a partir del día 20 de almacenamiento refrigerado.

El pescado conservado en hielo y en condiciones anaerobias o una atmósfera controlada con CO_2, presenta un recuento de bacterias psicrófilas, como la *S. putrefaciens* y *Pseudomonas,* generalmente menor (10^6 y 10^7 ufc/g.) que en pescado almacenado en condiciones aeróbicas. Sin embargo, el nivel de bacterias psicrófilas como *P. phosphoreum* alcanza las 10^7 - 10^8 ufc/g cuando el pescado está deteriorado (Dalgaard y cols*.,* 1993).

El recuento de *Staphylococcus aureus* está acotado por la legislación nacional, que estipula que el límite máximo son 100 UFC/g, mientras que en el presente estudio, el nivel de esta bacteria se mantuvo por debajo de las 10 UFC/g, durante todo el periodo de conservación en refrigeración.

El mayor peligro como fuente de contagio para el hombre son los alimentos listos para el consumo, especialmente los que se conservan refrigerados por periodos prolongados (Schobitz y cols., 2009) y una de las bacterias responsable de este contagio es la *Listeria Monocytogenes,* altamente patógena para el hombre. Se analizó la presencia de esta bacteria, no encontrándose a ningún tiempo de análisis, al igual que la *Salmonella spp* que no se detectó durante todo el periodo de estudio.

La ausencia de *Salmonella spp*., puede deberse a que es una bacteria poco asociada a pescado y relacionada en mayor medida con los productos avícolas (Maier, 2005, citando a Solari, 2001).

5. CONCLUSIONES

Los parámetros de textura demuestran un ablandamiento del músculo del salmón, a excepción de la firmeza y cohesividad del belly medida a través de la prueba de cizalla. Estos resultados son asociados a la desnaturalización de las proteínas presentes en el belly. De acuerdo a la bibliografía estudiada, se podría considerar que la firmeza y cohesividad sensoriales, son los mejores indicadores de textura en belly de trucha arcoiris.

El driping por cocción y la capacidad relativa de retención de agua, mostraron un deterioro progresivo durante todo el periodo de estudio. El driping por cocción presentó un aumento en el tiempo, mientras que el CRAr tiene una clara tendencia a disminuir.

El color visual, medido con escala Salmo Fan, no presentó variación durante el tiempo, y clasificó al belly en un producto con grado de calidad 1, durante todo el periodo de estudio.

Driping por cocción y CRAr, presentaron una correlación directa, así como también, el valor b* y C*.

La composición centesimal, indicó que, el belly de trucha arcoiris es rico en lípidos y tiene una alto contenido de humedad. Los parámetros químicos, excepto las proteínas y las cenizas, mostraron una importante variación durante todo el periodo de estudio.

El pH disminuyó en el tiempo, y se mantuvo dentro del rango permitido por la autoridad nacional correspondiente. El índice de anisidina mostró un aumento en el tiempo, pero no superó el valor máximo establecido, esto puede deberse a la extracción de lípidos en frio utilizado, y a que se congelaron las muestras de lípidos inmediatamente después de ser extraídos.

Todos los parámetros químicos presentaron fuerte correlación con el tiempo. Lípidos y Proteínas presentaron correlación inversa, mientras que índice de anisidina y olor rancio crudo, presentaron fuerte correlación directa.

Mediante la evaluación sensorial, se observó que los primeros atributos que se deterioran son el olor (crudo y cocido) ya que los panelistas lograron identificarlos facilmente con el tiempo, y se correlacionaron fuertemente con la calidad total del belly de trucha arcoiris.

No existieron microorganismos patógenos, ni indicadores de contaminación fecal (*Salmonella sp*., *Listeria Monocytogenes, Staphylococcus aureus, enterobacterias)*, en las muestras de de belly de trucha arcoiris analizadas en el primer día de estudio.

La carga microbiana en relación a microorganismos aerobios mesófilos y enterobacterias, cumplió con los parámetros establecidos por la legislación nacional, MINSAL (1997), hasta el día 12 de estudio Estos microorganismos al encontrarse en bajos niveles, no afectaron significativamente el deterioro de la calidad del belly, al menos hasta el día indicado.

Los atributos sensoriales más sensibles para estimar el deterioro en la calidad oxidativa y textural del belly de trucha crudo fueron el olor típico, rancio y pútrido, elasticidad, firmeza, cohesividad y goteo.

El olor a rancio (crudo y cocido) evaluado sensorialmente aumentó en el tiempo correlacionando con los índices instrumentales de oxidación secundaria.

Pese a la pérdida de calidad, producto de la oxidación lipídica, agregación y desnaturalización proteica, la vida útil del belly de trucha arcoiris conservado refrigerado (0º a 2º C) puede estimarse en 12 días y fue determinada por las propiedade sensoriales y microbiológicas.

Gracias a la correlación de Pearson, se pudo determinar que existen parámetros que están fuertemente relacionados y podrían ser estudiados en el futuro para establecer algún patrón de comportamiento del belly de trucha arcoiris conservado refrigerado.

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Patrimonio cultural y Natural de China. 2009 “Especial: En crisis industria salmonera de Chile” http://www.spanish.xinhuanet.com/spanish/2009-06/18/content_894785.htm Citado en Enero de 2010.

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Programas utilizados:

Statistical Graphic Corp. 1994-1999, Statgraphics Plus®, Versión 4.0.

Microsoft Office 2003, Microsoft Word y Microsoft Excel.

ANEXO 1

Materiales, equipos y técnicas utilizadas durante todo el estudio.

Reactivos Utilizados:

Análisis proximal:

- Ácido Sulfúrico concentrado (H_2SO_4)
- Ácido Sulfúrico 0,1 N
- Hidróxido de sodio (NaOH) 0,1 N
- Hidróxido de sodio (NaOH) 30%
- Sulfato de Cobre ($CuSO_4$)
- Sulfato de Potasio (K_2SO_4)
- Indicador rojo metilo
- Indicador Fenoftaleína
- Cloroformo ($CHCl_3$)
- Metanol (CH_3OH)
- Solución patrón de NaOH (0.0824 N)

Determinación de anisidina:

- Isooctano (2, 2, 4-trimetilpentano) óptimamente claro
- Acido acético glacial
- p-anisidina para síntesis
- Carbón activo
- Sulfito de sodio

Equipos utilizados:

Lloyd Instruments LR- 5K, Inglaterra.

Hunter Lab, Labscan spectrocolorimeter, U.S.A.

Spectrometer Lambda 11 UV/VIS, Alemania.

Digestion Unit Büchi 426, Suiza.

Destillation Unit Büchi 323, Suiza.

Estufa WC Heraeus GMBH Hanau, Alemania.

Centrífuga Sorvall Super Speed RC2-B Automatic Centrifuge, U.S.A.

Balanza Precisa 125A, Suiza.

Rotavapor Büchi R-205, Suiza.

Mufla Wild Barfield, Inglaterra.

Mini Pimer Phillips HR 1364.

Técnicas utilizadas:

1.- Humedad: método gravimétrico (AOAC, 1990)

Consiste en una desecación en estufa de aire forzado a 105ºC hasta peso constante, considerando peso constante una variación de 5mg entre las últimas pesadas consecutivas.

Procedimiento general:

- Se coloca las cápsulas de aluminio con 5g de arena y una varilla de vidrio por 1 h a 105ºC.
- Se lleva a desecador (20 min.) y se pesa (M1).
- Se pesa 5g de muestra homogeneizada en la cápsula tarada y se mezcla con la arena con ayuda de la varilla de vidrio, registrándose el peso (M2).
- Se coloca la cápsula de aluminio en la estufa indicada y cada 2 hrs. Se controla la pérdida de peso, enfriando previamente en el desecador hasta lograr peso constante en el tiempo (M3).

$$\% \text{ Humedad} = \frac{(M2-M3-M1)}{M2} * 100$$

2.- Proteínas: método Kjeldhal (AOAC, 1984)

El método se basa en la destrucción de la materia orgánica por ácido sulfúrico concentrado, el cual se reduce en parte a SO2 el que a su vez reduce al N de la materia orgánica a NH4 y que luego en presencia de H2SO4 forma sulfato de amonio, El NH3 se libera con NaOH y al destilarlo se recibe sobre ác. Sulfúrico 0,1N.

Finalmente, el ácido excedente se valora con NaOH 0,1N por diferencia se cuantifican los meq de NH3 y se calcula la masa de nitrógeno. Utilizando la Tabla de Composición de Alimentos Chilenos se obtiene contenido de proteínas (g prot./100g alimento) aportado el alimento y con esto se calcula la cantidad a pesar de muestra equivalente 30 mg de N utilizando la siguiente fórmula :

% proteína (tabla) = mg N x 6,25

Donde 6,25 corresponde al contenido promedio (16%) de N en 100 g de proteína.

3.- Lípidos: método Bligh & Dyer (1959)

Se aplica para extraer lípidos de tejidos vegetales con 80% de humedad. En caso de que la humedad sea diferente es necesario ajustarla a ese valor.

Procedimiento general:

- Se pesan 50 g de muestra, se homogeneiza en vaso de acero inoxidable por 2 min con 50 ml de cloroformo y 100 ml de metanol. A la mezcla se añade 50 ml de cloroformo y 50 ml de agua y se agita por 30 segundos.
- El homogeneizado se filtra por embudo Büchner empleando un papel whatman Nº 1, se lava el vaso y el residuo con 25ml de cloroformo, se traspasa el filtrado a una probeta de 500 ml, se deja reposar 24h. Se mide el volumen de cloroformo en la probeta y luego se saco por aspiración la capa superior de metanol-agua. La homogeneizadora y el vaso se lavan con 25 ml de cloroformo.
- Se mide con pipeta volumétrica una alícuota (10ml) del filtrado, se evapora a sequedad en una cápsula tarada, se toma el peso del residuo lipídico y se relaciona esta masa al volumen de la alícuota tomada y luego al volumen total de la fase clorofórmica y se expresa como g de materia grasa en 100g de muestra.
- Se pesan en balanza analítica cerca de 5 g de muestra en una cápsula de porcelana previamente tarada, la cual se debe identificar con tinta especial.

ANEXO 2

Ficha utilizada en evaluación sensorial

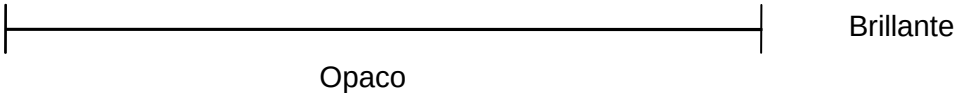
TEST DESCRIPTIVO CUANTITATIVO

Nombre: _____ Fecha: _____

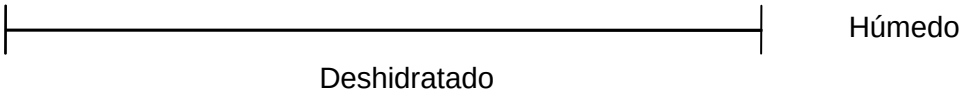
Evalúe los atributos del belly de Trucha arcoiris. Marque en forma perpendicular a la escala donde mejor represente la intensidad de cada descriptor.

APARIENCIA: Evalúe el producto crudo

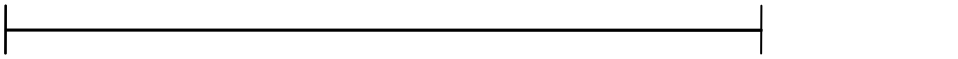
- Brillo del producto



- Humedad del producto

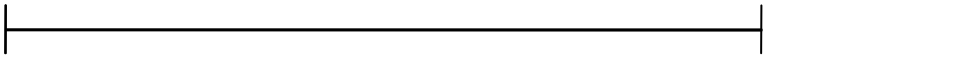


- Goteo o exudación: *Presencia de líquido en el plato*

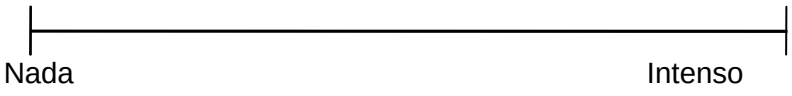


OLOR: Evalúe el producto crudo

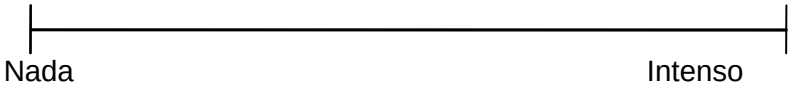
- Olor típico: *Olor a pescado fresco, marino.*



- Olor rancio: Olor producido por la oxidación de los lípidos.

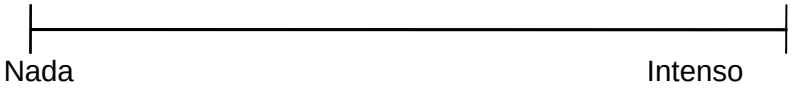


- Olor pútrido: *Olor producido por la descomposición del pescado.*

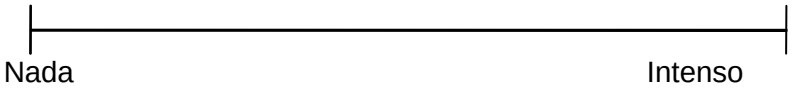


OLOR: Evalúe el producto cocido

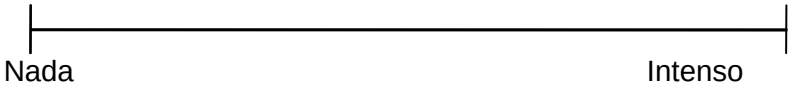
- Olor típico: *Olor a pescado cocido.*



- Olor rancio: *Olor producido por la oxidación de los lípidos.*



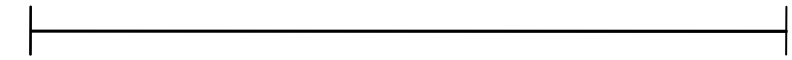
- Olor pútrido: *Olor producido por la descomposición del pescado.*



- Olores extraños: *Olores generados por la presencia de algún agente externo en el salmón. Marque con una "x" y a continuación evalúe su intensidad.*

Ninguno	:	_____	Químicos	:	_____
Desinfectante	:	_____	Otros	:	_____

- Intensidad del olor detectado:



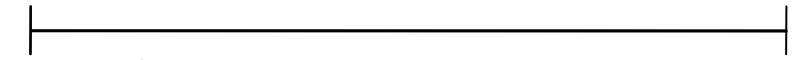
Nada Intenso

COLOR: Evalúe el color del producto crudo

- Escala colorimétrica de Roche:

Muestra cruda	Valor

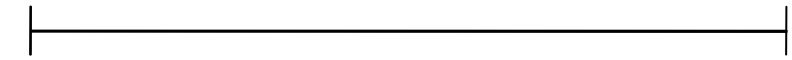
- Color típico



Naranja pálido Rojo intenso

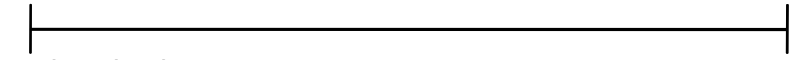
TEXTURA: Ejercer con el dedo índice una fuerza vertical a la muestra.

- Fuerza compresión o Dureza en producto crudo: *Dificultad para presionar con el dedo el producto.*



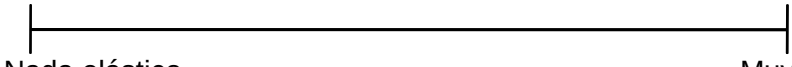
Blando Duro

- Cohesividad en producto crudo: *Deformación al presionar con el dedo el producto.*



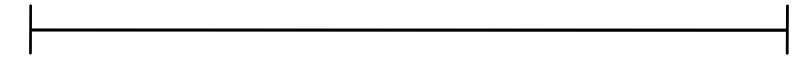
Nada cohesivo Muy cohesivo

- Elasticidad en producto crudo: *capacidad del músculo de volver a su estado original luego de retirar el dedo*



Nada elástico Muy elástico

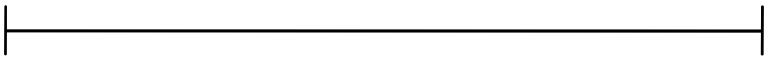
- Fuerza de cizalla o Firmeza en producto crudo: *Dificultad para cortar con el*



cuchillo el producto.

Blando Duro

- Fuerza de cizalla o Firmeza en producto cocido: *Dificultad para cortar con el cuchillo el producto.*



Blando Duro

CALIDAD ORGANOLÉPTICA EN PRODUCTO CRUDO

Califique el grado de calidad de cada atributo del producto crudo. Utilice una escala para cada atributo con el puntaje máximo indicado en la tabla.

Atributo	Muestra cruda
Apariencia (20)	
Olor (20)	
Color (30)	
Textura (30)	
Calidad Total	

OBSERVACIONES:

ANEXO 3

Resumen de datos obtenidos para cada parámetro estudiado.

Tabla 6. Resultados obtenidos en los análisis de los parámetros físicos realizados al belly de trucha arcoíris, conservado al estado refrigerado durante 29 días.

Tiempo (días)	Fuerza Máx. de Cizalla (N)	Cohesividad (mm)	%Exudado	Pérdida de agua (gr agua perdida/100gr mat. seca sin grasa)
0	$10,90^{a}$ (1,95)	$25,37^{a}$ (0,80)	$6,39^{a}$ (1,21)	$1,00^{a}$ (0,08)
4	$12,94^{a}$ (2,96)	$36,78^{bc}$ (0,15)	$7,36^{ab}$ (1,30)	$1,31^{b}$ (0,10)
8	$17,16^{ab}$ (2,53)	$36,15^{b}$ (0,32)	$10,49^{bc}$ (1,37)	$1,37^{bc}$ (0,08)
14	$19,92^{abc}$ (2,47)	$38,81^{e}$ (0,06)	$12,21^{cd}$ (1,38)	$1,63^{c}$ (0,14)
20	$26,78^{bcd}$ (3,50)	$37,88^{d}$ (0,48)	$13,03^{cde}$ (2,47)	$2,16^{d}$ (0,20)
25	$32,25^{cd}$ (8,03)	$37,13^{cd}$ (0,62)	$14,37^{de}$ (2,71)	$2,79^{e}$ (0,24)
29	$29,04^{d}$ (9,68)	$37,41^{cd}$ (0,17)	$15,98^{e}$ (3,01)	$3,08^{e}$ (0,20)

Las desviaciones estándar se indican en paréntesis. Promedios con superíndices diferentes a la derecha indican diferencias significativas entre tiempos de refrigeración ($p<0,05$).

Tabla 7. Resultados obtenidos en los ensayos de color realizados al belly de trucha arcoíris, conservado al estado refrigerado durante 29 días.

Tiempo (días)	L*	a*	b*	Hue	Croma
0	54,15^{a} (0,09)	30,95^{e} (0,08)	32,02^{f} (0,17)	45,99^{e} (0,16)	44,53^{e} (0,17)
4	57,01^{b} (0,09)	30,33^{d} (0,07)	32,18^{f} (0,14)	46,67^{f} (0,22)	44,22^{e} (0,13)
8	63,60^{c} (0,12)	29,08^{c} (0,18)	29,06^{e} (0,32)	44,93^{d} (0,15)	41,11^{d} (0,35)
14	59,64^{c} (0,09)	29,98^{d} (0,06)	28,25^{d} (0,11)	43,31^{b} (0,15)	41,19^{d} (0,11)
20	59,46^{c} (0,41)	29,85^{d} (0,41)	26,62^{c} (0,41)	43,31^{a} (0,15)	40,00^{c} (0,56)
25	60,43^{d} (0,08)	26,22^{b} (0,10)	25,23^{b} (0,11)	41,83^{c} (0,18)	36,38^{b} (0,09)
29	59,83^{e} (0,08)	25,23^{a} (0,49)	24,17^{a} (0,16)	43,98^{b} (0,17)	34,93^{a} (0,39)

Las desviaciones estándar se indican en paréntesis. Promedios con superíndices diferentes a la derecha indican diferencias significativas entre tiempos de refrigeración ($p<0,05$).

Tabla 8. Resultados obtenidos en los análisis químicos, para composición centesimal, realizados al belly de trucha arcoíris, conservado al estado refrigerado durante 29 días.

TIEMPO (días)	% PROTEINAS	% LIPIDOS	% HUMEDAD	% CENIZAS
0	$9,50^{d}$ (0,33)	$32,86^{a}$ (1,77)	$37,62^{c}$ (3,62)	$0,84^{c}$ (0,03)
4	$8,46^{cd}$ (0,49)	$37,99^{b}$ (0,69)	$34,04^{c}$ (1,15)	$0,65^{ab}$ (0,05)
8	$8,19^{cd}$ (0,84)	$38,27^{b}$ (0,23)	$32,94^{bc}$ (1,44)	$0,63^{a}$ (0,04)
14	$7,60^{c}$ (0,20)	$42,55^{c}$ (1,01)	$28,76^{ab}$ (0,65)	$0,68^{ab}$ (0,03)
20	$6,99^{bc}$ (0,80)	$46,76^{d}$ (0,61)	$27,24^{a}$ (0,75)	$0,65^{a}$ (0,01)
25	$5,69^{ab}$ (0,57)	$49,79^{e}$ (0,80)	$26,78^{a}$ (1,57)	$0,74^{b}$ (0,03)
29	$5,44^{a}$ (0,09)	$51,73^{f}$ (0,61)	$24,52^{a}$ (0,54)	$0,63^{a}$ (0,02)

Las desviaciones estándar se indican en paréntesis. Promedios con superíndices diferentes a la derecha indican diferencias significativas entre tiempos de refrigeración ($p<0,05$).

Tabla 9. Resultados obtenidos en los análisis de los parámetros químicos, pH y valor de anisidina, realizados al belly de trucha arcoíris, conservado al estado refrigerado durante 29 días.

TIEMPO (días)	pH	Anisidina
0	$6,62^{c}$ (0,05)	$2,28^{a}$ (0,36)
4	$6,60^{c}$ (0,08)	$2,53^{a}$ (0,28)
8	$6,46^{b}$ (0,04)	$4,10^{ab}$ (0,27)
14	$6,36^{ab}$ (0,01)	$6,32^{bc}$ (1,22)
20	$6,32^{a}$ (0,01)	$5,57^{bc}$ (1,22)
25	$6,30^{a}$ (0,01)	$6,04^{c}$ (0,51)
29	$6,29^{a}$ (0,02)	$8,82^{d}$ (0,92)

Las desviaciones estándar se indican en paréntesis. Promedios con superíndices diferentes a la derecha indican diferencias significativas entre tiempos de refrigeración ($p<0,05$).

ANEXO 4

Plan de Muestro Microbiológico

Tabla 10. Planes de muestreo y determinaciones microbiológicas establecidas por Sernapesca para pescado congelado.

Determinación microbiólogica	Límite		Categoría A		Categoría B		Categoría C		Categoría D	
	m	M	N	c	N	c	N	c	N	c
Recuento Total (UFC/g)	5x105	106	5	3	5	2	10	2	10	1
Coliformes fecales(NMP/g)	4	100	5	3	10	2	10	1	15	1
Salmonella (UFC/ 25g)	Ausencia		5	3	5	0	5	0	10	0
S.aureus (UFC/g)	100	500	5	3	10	2	15	1	20	1

N= tamaño de la muestra

c= número de aceptación

m=límite inferior

M=límite superior

ANEXO 5

Análisis estadísticos: Análisis de Varianza y Regresión Simple

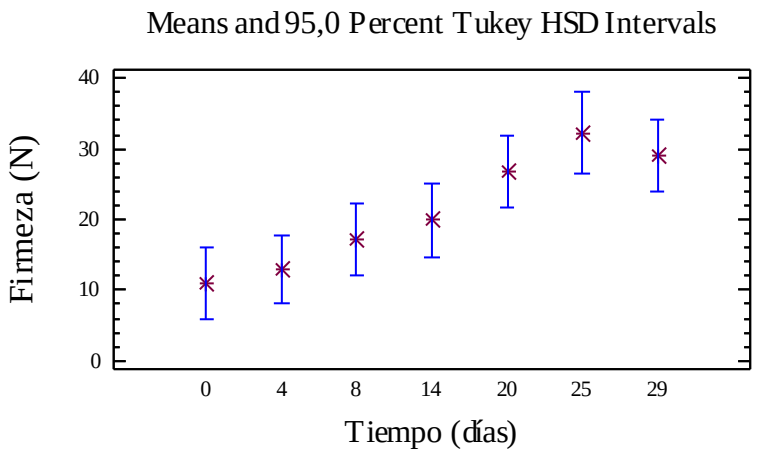
1.- PARAMETROS FISICOS

1.1 PARAMETROS TEXTURALES

1.1.1 FIRMEZA VERSUS TIEMPO

```
Analysis Summary
Dependent variable: Firmeza
Factor: Tiempo
Number of observations: 35
Number of levels: 7

The StatAdvisor
---------------
   This procedure performs a one-way analysis of variance for Firmeza. It constructs various tests and graphs to compare the mean
values of Firmeza for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
```



Summary Statistics for Firmeza

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	5	10,9	3,78455	1,94539	0,870006
4	6	12,935	11,4455	3,38312	1,38115
8	5	17,158	6,37817	2,5255	1,12944
14	5	19,918	6,09197	2,46819	1,10381
20	5	26,784	12,2672	3,50246	1,56635
25	4	32,245	64,4534	8,02829	4,01414
29	5	29,036	93,6605	9,67783	4,32806
Total	35	20,7306	79,7856	8,93228	1,50983

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	8,7	13,88	5,18	0,793637	0,450015
4	10,38	18,65	8,27	1,27615	0,085192
8	13,71	20,8	7,09	0,171667	0,799189
14	16,25	22,45	6,2	-0,754519	-0,0893563
20	21,73	30,28	8,55	-0,500864	-0,234957
25	25,59	41,87	16,28	0,377254	-1,38558
29	14,74	37,58	22,84	-0,811558	-0,296421
Total	8,7	41,87	33,17	1,646	-0,41131

The StatAdvisor

This table shows various statistics for Firmeza for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Firmeza to remove any dependence of the standard deviation on the mean.

ANOVA Table for Firmeza by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	1973,39	6	328,899	12,46	0,0000
Within groups	739,317	28	26,4042		
Total (Corr.)	2712,71	34			

The StatAdvisor

The ANOVA table decomposes the variance of Firmeza into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 12,4563, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Firmeza from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Firmeza by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	5	10,9	2,29801	5,74466	16,0553
4	6	12,935	2,09778	8,22884	17,6412
8	5	17,158	2,29801	12,0027	22,3133
14	5	19,918	2,29801	14,7627	25,0733
20	5	26,784	2,29801	21,6287	31,9393
25	4	32,245	2,56925	26,4812	38,0088
29	5	29,036	2,29801	23,8807	34,1913
Total	35	20,7306			

The StatAdvisor

This table shows the mean Firmeza for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Firmeza by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	5	10,9	X
4	6	12,935	X
8	5	17,158	XX
14	5	19,918	XXX
20	5	26,784	XXX
29	5	29,036	XX
25	4	32,245	X

Contrast	Difference	+/- Limits
0 - 4	-2,035	9,87172
0 - 8	-6,258	10,3107
0 - 14	-9,018	10,3107
0 - 20	*-15,884	10,3107
0 - 25	*-21,345	10,9361
0 - 29	*-18,136	10,3107
4 - 8	-4,223	9,87172
4 - 14	-6,983	9,87172
4 - 20	*-13,849	9,87172
4 - 25	*-19,31	10,5233
4 - 29	*-16,101	9,87172
8 - 14	-2,76	10,3107
8 - 20	-9,626	10,3107
8 - 25	*-15,087	10,9361
8 - 29	*-11,878	10,3107
14 - 20	-6,866	10,3107
14 - 25	*-12,327	10,9361
14 - 29	-9,118	10,3107
20 - 25	-5,461	10,9361
20 - 29	-2,252	10,3107
25 - 29	3,209	10,9361

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 9 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Variance Check

Cochran's C test: 0,472839 P-Value = 0,0215185
Bartlett's test: 1,95866 P-Value = 0,00872168
Hartley's test: 24,7481

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Firmeza within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests. Since the standard deviations differ by more than a factor 3 to 1 and the sample sizes are not equal, the P-values and significance levels of the tests may be off significantly.

Kruskal-Wallis Test for Firmeza by Tiempo

Tiempo	Sample Size	Average Rank
0	5	4,8
4	6	8,5
8	5	14,8
14	5	18,8
20	5	27,2
25	4	29,5
29	5	26,6

Test statistic = 26,5666 P-Value = 0,000174539

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Firmeza within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Firmeza vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Firmeza
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	10,7942	1,44263	7,48231	0,0000
Slope	0,726037	0,0849196	8,5497	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	1868,96	1	1868,96	73,10	0,0000
Residual	843,748	33	25,5681		
Total (Corr.)	2712,71	34			

Correlation Coefficient = 0,830039
R-squared = 68,8965 percent
Standard Error of Est. = 5,05649

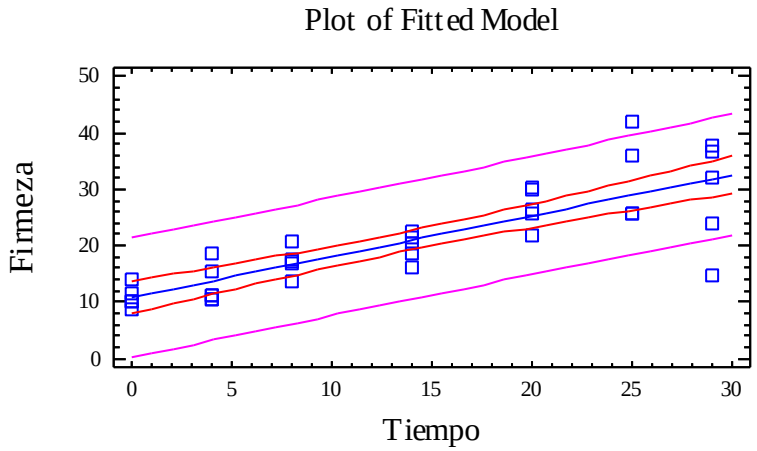
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Firmeza and Tiempo. The equation of the fitted model is

Firmeza = 10,7942 + 0,726037*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Firmeza and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 68,8965% of the variability in Firmeza. The correlation coefficient equals 0,830039, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 5,05649. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	1868,96	1	1868,96	73,10	0,0000
Residual	843,748	33	25,5681		
Lack-of-Fit	104,43	5	20,8861	0,79	0,5651
Pure Error	739,317	28	26,4042		
Total (Corr.)	2712,71	34			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

1.1.2 COHESIVIDAD VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Cohesividad
Factor: Tiempo
Number of observations: 39
Number of levels: 7

The StatAdvisor
---------------
   This procedure performs a one-way analysis of variance for
Cohesividad.  It constructs various tests and graphs to compare the
mean values of Cohesividad for the 7 different levels of Tiempo.  The
F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests
will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the
Kruskal-Wallis Test which compares medians instead of means.  The
various plots will help you judge the practical significance of the
results, as well as allow you to look for possible violations of the
assumptions underlying the analysis of variance.
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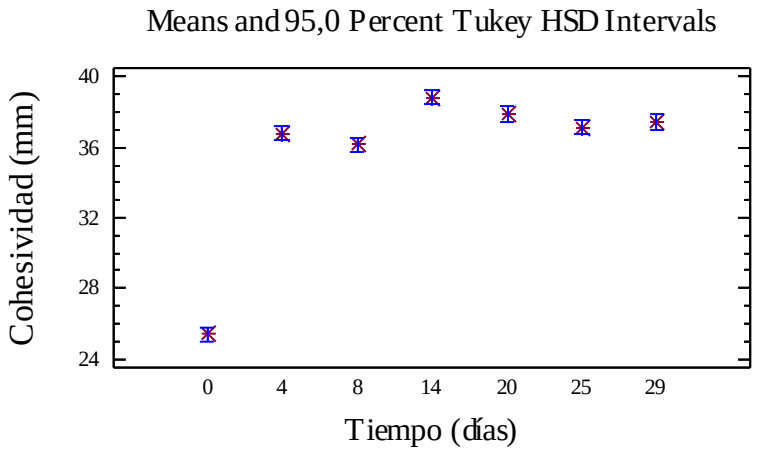


Summary Statistics for Cohesividad

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	5	25,372	0,64017	0,800106	0,357818
4	6	36,775	0,02223	0,149097	0,0608687
8	6	36,15	0,1004	0,31686	0,129357
14	6	38,8083	0,00393667	0,0627429	0,0256147
20	5	37,876	0,23053	0,480135	0,214723
25	6	37,1333	0,389187	0,623848	0,254685
29	5	37,412	0,03007	0,173407	0,07755
Total	39	35,8077	17,259	4,1544	0,665236

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	24,04	26,07	2,03	-1,41937	1,1254
4	36,63	36,98	0,35	0,505878	-0,999959
8	35,66	36,5	0,84	-0,534692	-0,252711
14	38,7	38,88	0,18	-1,03307	0,664942
20	37,15	38,45	1,3	-0,616681	0,534851
25	36,46	38,2	1,74	0,967808	0,526468
29	37,2	37,61	0,41	0,0918587	-0,964053
Total	24,04	38,88	14,84	-5,42691	3,99797

The StatAdvisor

This table shows various statistics for Cohesividad for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Cohesividad to remove any dependence of the standard deviation on the mean.

ANOVA Table for Cohesividad by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	649,661	6	108,277	560,49	0,0000
Within groups	6,18185	32	0,193183		
Total (Corr.)	655,843	38			

The StatAdvisor

The ANOVA table decomposes the variance of Cohesividad into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 560,489, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Cohesividad from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Cohesividad by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	5	25,372	0,196562	24,9351	25,8089
4	6	36,775	0,179436	36,3761	37,1739
8	6	36,15	0,179436	35,7511	36,5489
14	6	38,8083	0,179436	38,4095	39,2072
20	5	37,876	0,196562	37,4391	38,3129
25	6	37,1333	0,179436	36,7345	37,5322
29	5	37,412	0,196562	36,9751	37,8489
Total	39	35,8077			

The StatAdvisor

This table shows the mean Cohesividad for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Cohesividad by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	5	25,372	X
8	6	36,15	X
4	6	36,775	XX
25	6	37,1333	XX
29	5	37,412	XX
20	5	37,876	X
14	6	38,8083	X

Contrast	Difference	+/- Limits
0 - 4	*-11,403	0,836645
0 - 8	*-10,778	0,836645
0 - 14	*-13,4363	0,836645
0 - 20	*-12,504	0,873847
0 - 25	*-11,7613	0,836645
0 - 29	*-12,04	0,873847
4 - 8	0,625	0,79771
4 - 14	*-2,03333	0,79771
4 - 20	*-1,101	0,836645
4 - 25	-0,358333	0,79771
4 - 29	-0,637	0,836645
8 - 14	*-2,65833	0,79771
8 - 20	*-1,726	0,836645
8 - 25	*-0,983333	0,79771
8 - 29	*-1,262	0,836645
14 - 20	*0,932333	0,836645
14 - 25	*1,675	0,79771
14 - 29	*1,39633	0,836645
20 - 25	0,742667	0,836645
20 - 29	0,464	0,873847
25 - 29	-0,278667	0,836645

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 15 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Variance Check

Cochran's C test: 0,45193 P-Value = 0,0203241
Bartlett's test: 2,71733 P-Value = 0,0000489193
Hartley's test: 162,617

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Cohesividad within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests. Since the standard deviations differ by more than a factor 3 to 1 and the sample sizes are not equal, the P-values and significance levels of the tests may be off significantly.

Kruskal-Wallis Test for Cohesividad by Tiempo

Tiempo	Sample Size	Average Rank
0	5	3,0
4	6	16,5
8	6	8,66667
14	6	36,5
20	5	29,0
25	6	20,5
29	5	25,4

Test statistic = 34,4298 P-Value = 0,00000555644

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Cohesividad within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Cohesividad vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Cohesividad
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	32,3738	0,950702	34,0525	0,0000
Slope	0,243051	0,0550988	4,41119	0,0001

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	226,038	1	226,038	19,46	0,0001
Residual	429,805	37	11,6163		
Total (Corr.)	655,843	38			

Correlation Coefficient = 0,587071
R-squared = 34,4653 percent
Standard Error of Est. = 3,40828

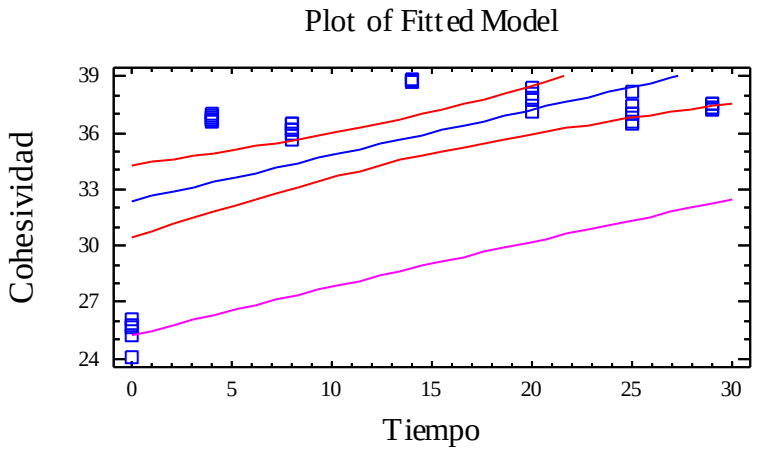
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Cohesividad and Tiempo. The equation of the fitted model is

Cohesividad = 32,3738 + 0,243051*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Cohesividad and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 34,4653% of the variability in Cohesividad. The correlation coefficient equals 0,587071, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 3,40828. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	226,038	1	226,038	19,46	0,0001
Residual	429,805	37	11,6163		
Lack-of-Fit	423,623	5	84,7246	438,57	0,0000
Pure Error	6,18185	32	0,193183		
Total (Corr.)	655,843	38			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

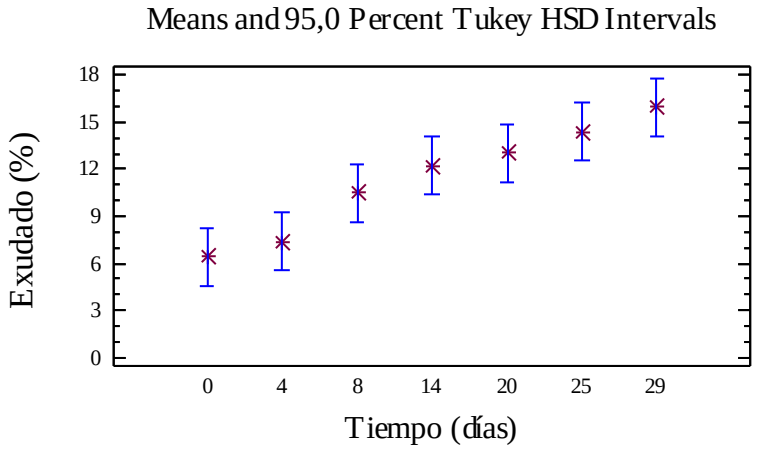
1.1.3 DRIPING VERSUS TIEMPO

Analysis Summary

Dependent variable: Driping
Factor: Tiempo
Number of observations: 42
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for Driping. It constructs various tests and graphs to compare the mean values of Driping for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for Driping

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	6	6,38747	1,47596	1,21489	0,495976
4	6	7,35965	1,6909	1,30035	0,530864
8	6	10,4915	1,87811	1,37044	0,55948
14	6	12,2088	1,91563	1,38406	0,565041
20	6	13,0332	6,10506	2,47084	1,00872
25	6	14,3737	7,33967	2,70918	1,10602
29	6	15,9797	9,0513	3,00854	1,22823
Total	42	11,4049	14,6283	3,8247	0,590164

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	4,424	7,6487	3,2247	-0,685769	-0,021103
4	5,2731	8,6786	3,4055	-0,764547	-0,136849
8	8,431	11,9745	3,5435	-0,331001	-0,388267
14	10,3149	14,1851	3,8702	0,00415753	-0,260837
20	10,3173	16,5392	6,2219	0,584306	-0,72244
25	11,4241	18,9513	7,5272	1,07068	0,319252
29	11,6395	19,5461	7,9066	-0,611957	-0,548331
Total	4,424	19,5461	15,1221	0,62248	-0,718591

The StatAdvisor

This table shows various statistics for Driping for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

ANOVA Table for Driping by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	452,478	6	75,4129	17,92	0,0000
Within groups	147,283	35	4,20809		
Total (Corr.)	599,761	41			

The StatAdvisor

The ANOVA table decomposes the variance of Driping into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 17,9209, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Driping from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple

Range Tests from the list of Tabular Options.

Table of Means for Driping by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	6	6,38747	0,837465	4,53617	8,23876
4	6	7,35965	0,837465	5,50836	9,21094
8	6	10,4915	0,837465	8,64024	12,3428
14	6	12,2088	0,837465	10,3575	14,06
20	6	13,0332	0,837465	11,1819	14,8845
25	6	14,3737	0,837465	12,5224	16,225
29	6	15,9797	0,837465	14,1284	17,831
Total	42	11,4049			

The StatAdvisor

This table shows the mean Driping for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Driping by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	6	6,38747	X
4	6	7,35965	XX
8	6	10,4915	XX
14	6	12,2088	XX
20	6	13,0332	XXX
25	6	14,3737	XX
29	6	15,9797	X

Contrast	Difference	+/- Limits
0 - 4	-0,972183	3,70259
0 - 8	*-4,10407	3,70259
0 - 14	*-5,82128	3,70259
0 - 20	*-6,64573	3,70259
0 - 25	*-7,98622	3,70259
0 - 29	*-9,59223	3,70259
4 - 8	-3,13188	3,70259
4 - 14	*-4,8491	3,70259
4 - 20	*-5,67355	3,70259
4 - 25	*-7,01403	3,70259
4 - 29	*-8,62005	3,70259
8 - 14	-1,71722	3,70259
8 - 20	-2,54167	3,70259
8 - 25	*-3,88215	3,70259
8 - 29	*-5,48817	3,70259
14 - 20	-0,82445	3,70259
14 - 25	-2,16493	3,70259
14 - 29	*-3,77095	3,70259
20 - 25	-1,34048	3,70259
20 - 29	-2,9465	3,70259
25 - 29	-1,60602	3,70259

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 12 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,307276   P-Value = 0,291955
Bartlett's test: 1,30415   P-Value = 0,195089
Hartley's test: 6,1325

The StatAdvisor

   The three statistics displayed in this table test the null hypothesis that the standard deviations of Driping within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Driping by Tiempo

Tiempo	Sample Size	Average Rank
0	6	5,16667
4	6	8,16667
8	6	17,6667
14	6	25,1667
20	6	26,8333
25	6	32,3333
29	6	35,1667

Test statistic = 32,1041   P-Value = 0,0000155847

The StatAdvisor

   The Kruskal-Wallis test tests the null hypothesis that the medians of Driping within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Driping vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Driping
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,85489	0,54391	12,603	0,0000
Slope	0,318498	0,0310932	10,2433	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	434,224	1	434,224	104,93	0,0000
Residual	165,536	40	4,13841		
Total (Corr.)	599,761	41			

Correlation Coefficient = 0,850879
R-squared = 72,3996 percent
Standard Error of Est. = 2,03431

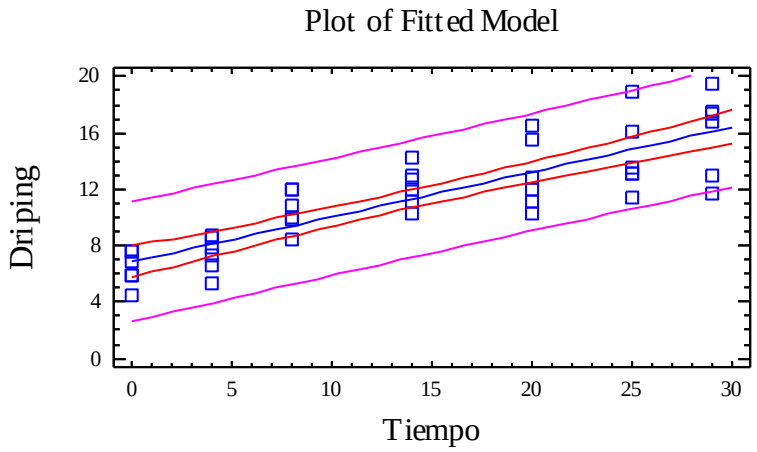
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Driping and Tiempo. The equation of the fitted model is

Driping = 6,85489 + 0,318498*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Driping and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 72,3996% of the variability in Driping. The correlation coefficient equals 0,850879, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,03431. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	434,224	1	434,224	104,93	0,0000
Residual	165,536	40	4,13841		
Lack-of-Fit	18,2534	5	3,65067	0,87	0,5126
Pure Error	147,283	35	4,20809		
Total (Corr.)	599,761	41			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

1.1.4 CAPACIDAD DE RETENCION DE AGUA VERSUS TIEMPO

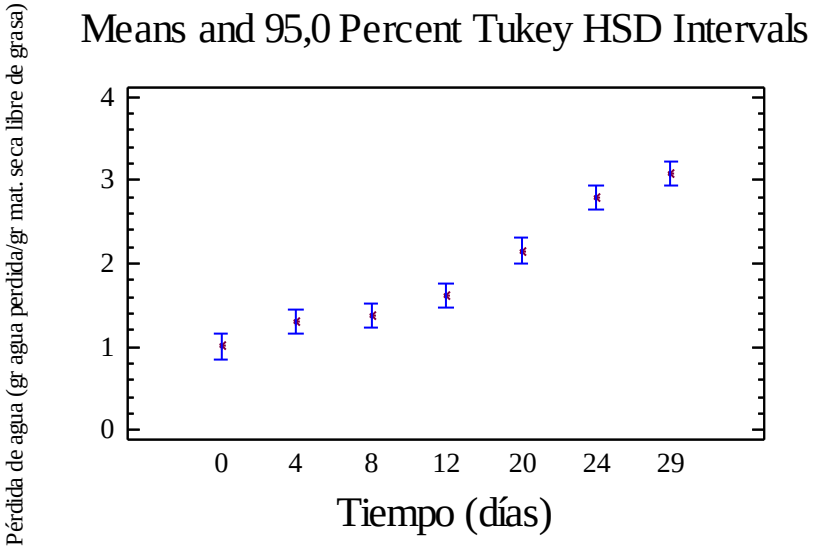
Analysis Summary

Dependent variable: CRA
Factor: Tiempo

Number of observations: 42
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for CRA. It constructs various tests and graphs to compare the mean values of CRA for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for CRA

Tiempo	Count	Average	Mode	Variance	Standard deviation	Standard error	Minimum
0	6	1,0044		0,00638038	0,0798773	0,0326098	0,8813
4	6	1,31412		0,0102152	0,10107	0,0412618	1,1609
8	6	1,37023		0,00616055	0,0784892	0,0320431	1,2766
12	6	1,62687		0,0189252	0,137569	0,0561622	1,4849
20	6	2,15577		0,0405286	0,201317	0,0821874	1,849
24	6	2,78768		0,0587808	0,242448	0,0989788	2,5176
29	6	3,07678		0,0392037	0,197999	0,0808328	2,7959
Total	42	1,90512		0,569094	0,754383	0,116404	0,8813

Tiempo	Maximum	Range	Stnd. skewness	Kurtosis	Stnd. kurtosis
0	1,0707	0,1894	-0,941696	-1,05027	-0,525137
4	1,4427	0,2818	-0,378535	-0,390936	-0,195468
8	1,4797	0,2031	-0,0605094	-1,04864	-0,52432
12	1,8808	0,3959	1,47135	2,8018	1,4009
20	2,442	0,593	-0,181618	0,470019	0,235009
24	3,2111	0,6935	1,01106	1,67508	0,837542
29	3,3224	0,5265	-0,402298	-1,06247	-0,531235
Total	3,3224	2,4411	1,35037	-1,15888	-1,53306

The StatAdvisor

This table shows various statistics for CRA for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.
WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of CRA to remove any dependence of the standard deviation on the mean.

ANOVA Table for CRA by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	22,4319	6	3,73865	145,23	0,0000
Within groups	0,900972	35	0,0257421		
Total (Corr.)	23,3329	41			

The StatAdvisor

The ANOVA table decomposes the variance of CRA into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 145,235, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean CRA from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for CRA by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	6	1,0044	0,0655007	0,859605	1,1492
4	6	1,31412	0,0655007	1,16932	1,45891
8	6	1,37023	0,0655007	1,22544	1,51503
12	6	1,62687	0,0655007	1,48207	1,77166
20	6	2,15577	0,0655007	2,01097	2,30056
24	6	2,78768	0,0655007	2,64289	2,93248
29	6	3,07678	0,0655007	2,93199	3,22158
Total	42	1,90512			

The StatAdvisor

This table shows the mean CRA for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which
others.

Multiple Range Tests for CRA by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	6	1,0044	X
4	6	1,31412	X
8	6	1,37023	XX
12	6	1,62687	X
20	6	2,15577	X
24	6	2,78768	X
29	6	3,07678	X

Contrast	Difference	+/- Limits
0 - 4	*-0,309717	0,289591
0 - 8	*-0,365833	0,289591
0 - 12	*-0,622467	0,289591
0 - 20	*-1,15137	0,289591
0 - 24	*-1,78328	0,289591
0 - 29	*-2,07238	0,289591
4 - 8	-0,0561167	0,289591
4 - 12	*-0,31275	0,289591
4 - 20	*-0,84165	0,289591
4 - 24	*-1,47357	0,289591
4 - 29	*-1,76267	0,289591
8 - 12	-0,256633	0,289591
8 - 20	*-0,785533	0,289591
8 - 24	*-1,41745	0,289591
8 - 29	*-1,70655	0,289591
12 - 20	*-0,5289	0,289591
12 - 24	*-1,16082	0,289591
12 - 29	*-1,44992	0,289591
20 - 24	*-0,631917	0,289591
20 - 29	*-0,921017	0,289591
24 - 29	-0,2891	0,289591

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 18 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's

honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,326208   P-Value = 0,207335
Bartlett's test: 1,40024   P-Value = 0,0899829
Hartley's test: 9,54149

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of CRA within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for CRA by Tiempo

Tiempo	Sample Size	Average Rank
0	6	3,5
4	6	11,5
8	6	13,5
12	6	21,6667
20	6	27,3333
24	6	34,5
29	6	38,5

Test statistic = 39,072   P-Value = 6,92879E-7

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of CRA within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - CRA vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: CRA
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	0,907075	0,053526	16,9464	0,0000
Slope	0,072024	0,00313467	22,9765	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	21,6895	1	21,6895	527,92	0,0000
Residual	1,64339	40	0,0410846		
Total (Corr.)	23,3329	41			

Correlation Coefficient = 0,964141
R-squared = 92,9568 percent
Standard Error of Est. = 0,202693

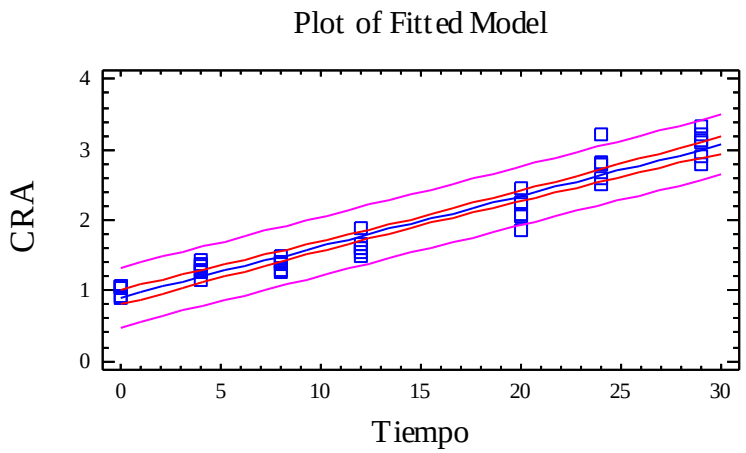
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between CRA and Tiempo. The equation of the fitted model is

CRA = 0,907075 + 0,072024*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between CRA and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 92,9568% of the variability in CRA. The correlation coefficient equals 0,964141, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,202693. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	21,6895	1	21,6895	527,92	0,0000
Residual	1,64339	40	0,0410846		
Lack-of-Fit	0,742414	5	0,148483	5,77	0,0006
Pure Error	0,900972	35	0,0257421		
Total (Corr.)	23,3329	41			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99%

confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Exponential	0,9758	95,21%
Square root-Y	0,9731	94,70%
Linear	0,9641	92,96%
Reciprocal-Y	-0,9575	91,69%
Square root-X	0,8935	79,84%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the exponential model yields the highest R-Squared value with 95,2107%. This is 2,25388% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

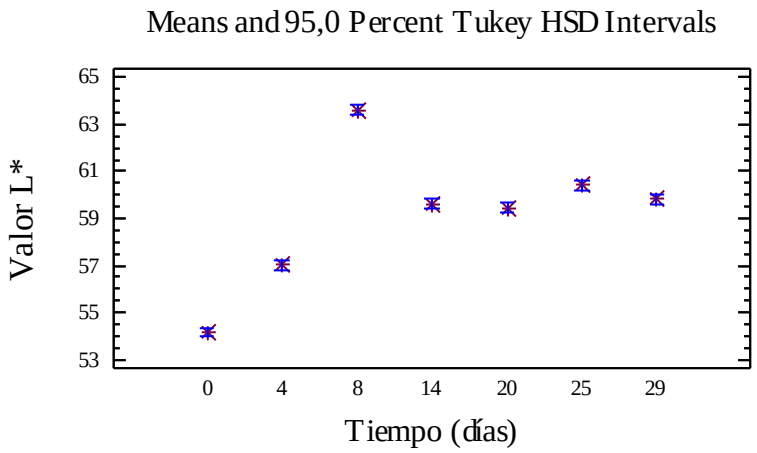
1.2 COLOR

1.2.1 VALOR L* VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Valor L
Factor: Tiempo
Number of observations: 28
Number of levels: 7

The StatAdvisor
---------------
   This procedure performs a one-way analysis of variance for Valor L. It constructs various tests and graphs to compare the mean
values of Valor L for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
```



Summary Statistics for Valor L

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	4	54,1525	0,008025	0,0895824	0,0447912
4	4	57,01	0,009	0,0948683	0,0474342
8	4	63,6025	0,0150917	0,122848	0,0614241
14	4	59,6375	0,008625	0,0928709	0,0464354
20	4	59,4575	0,169492	0,411694	0,205847
25	4	60,4325	0,00689167	0,0830161	0,041508
29	4	59,825	0,00683333	0,082664	0,041332
Total	28	59,1596	7,70064	2,775	0,524426

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	54,09	54,28	0,19	1,19965	0,717613
4	56,88	57,09	0,21	-0,937166	0,193036
8	63,44	63,72	0,28	-0,696605	-0,0806802
14	59,53	59,72	0,19	-0,276494	-1,62243
20	59,03	60,02	0,99	0,7738	0,815419
25	60,32	60,5	0,18	-0,883046	-0,0131584
29	59,73	59,92	0,19	0,0	-0,676415
Total	54,09	63,72	9,63	-0,727177	-0,111301

The StatAdvisor

This table shows various statistics for Valor L for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.
WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Valor L to remove any dependence of the standard deviation on the mean.

ANOVA Table for Valor L by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	207,245	6	34,5409	1079,60	0,0000
Within groups	0,671875	21	0,031994		
Total (Corr.)	207,917	27			

The StatAdvisor

The ANOVA table decomposes the variance of Valor L into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 1079,6, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Valor L from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Valor L by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	4	54,1525	0,0894344	53,9469	54,3581
4	4	57,01	0,0894344	56,8044	57,2156
8	4	63,6025	0,0894344	63,3969	63,8081
14	4	59,6375	0,0894344	59,4319	59,8431
20	4	59,4575	0,0894344	59,2519	59,6631
25	4	60,4325	0,0894344	60,2269	60,6381
29	4	59,825	0,0894344	59,6194	60,0306
Total	28	59,1596			

The StatAdvisor

This table shows the mean Valor L for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Valor L by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	4	54,1525	X
4	4	57,01	X
20	4	59,4575	X
14	4	59,6375	X
29	4	59,825	X
25	4	60,4325	X
8	4	63,6025	X

Contrast	Difference	+/- Limits
0 - 4	*-2,8575	0,411262
0 - 8	*-9,45	0,411262
0 - 14	*-5,485	0,411262
0 - 20	*-5,305	0,411262
0 - 25	*-6,28	0,411262
0 - 29	*-5,6725	0,411262
4 - 8	*-6,5925	0,411262
4 - 14	*-2,6275	0,411262
4 - 20	*-2,4475	0,411262
4 - 25	*-3,4225	0,411262
4 - 29	*-2,815	0,411262
8 - 14	*3,965	0,411262
8 - 20	*4,145	0,411262
8 - 25	*3,17	0,411262
8 - 29	*3,7775	0,411262
14 - 20	0,18	0,411262
14 - 25	*-0,795	0,411262
14 - 29	-0,1875	0,411262
20 - 25	*-0,975	0,411262
20 - 29	-0,3675	0,411262
25 - 29	*0,6075	0,411262

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 18 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,7568 P-Value = 0,0000648807
Bartlett's test: 2,39899 P-Value = 0,0122051
Hartley's test: 24,8037

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Valor L within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests.

Kruskal-Wallis Test for Valor L by Tiempo

Tiempo	Sample Size	Average Rank
0	4	2,5
4	4	6,5
8	4	26,5
14	4	13,5
20	4	12,5
25	4	22,5
29	4	17,5

Test statistic = 25,4257 P-Value = 0,000284717

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Valor L within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Valor L vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Valor L
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	57,3433	0,816842	70,2012	0,0000
Slope	0,127144	0,0466958	2,72282	0,0114

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	46,132	1	46,132	7,41	0,0114
Residual	161,785	26	6,22251		
Total (Corr.)	207,917	27			

Correlation Coefficient = 0,471038
R-squared = 22,1877 percent
Standard Error of Est. = 2,4945

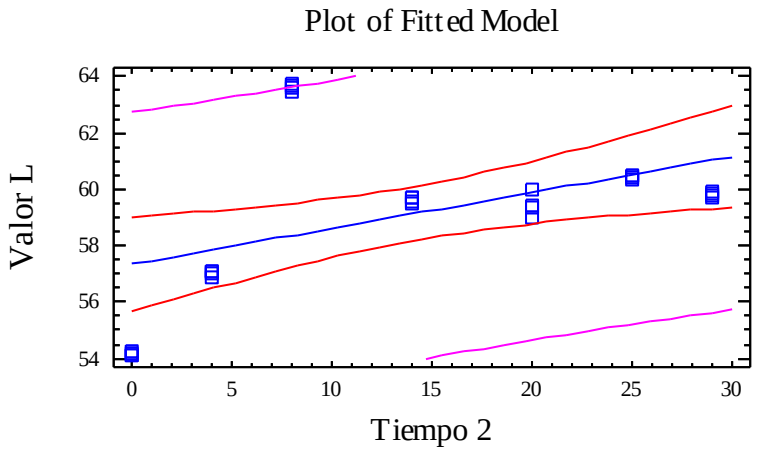
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Valor L and Tiempo. The equation of the fitted model is

Valor L = 57,3433 + 0,127144*Tiempo

Since the P-value in the ANOVA table is less than 0.05, there is a statistically significant relationship between Valor L and Tiempo at the 95% confidence level.

The R-Squared statistic indicates that the model as fitted explains 22,1877% of the variability in Valor L. The correlation coefficient equals 0,471038, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,4945. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	46,132	1	46,132	7,41	0,0114
Residual	161,785	26	6,22251		
Lack-of-Fit	161,113	5	32,2227	1007,15	0,0000
Pure Error	0,671875	21	0,031994		
Total (Corr.)	207,917	27			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

1.2.2 VALOR a* VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Valor a
Factor: Tiempo
Number of observations: 28
Number of levels: 7

The StatAdvisor
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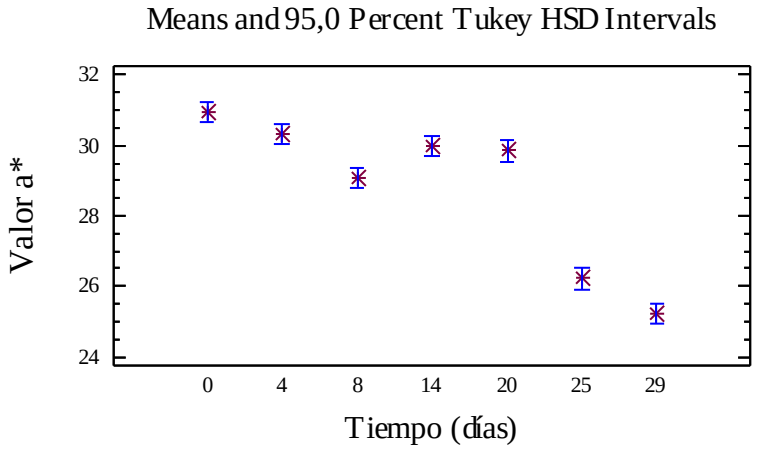
   This procedure performs a one-way analysis of variance for Valor a. It constructs various tests and graphs to compare the mean
values of Valor a for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
```



Summary Statistics for Valor a

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	4	30,9475	0,00589167	0,0767572	0,0383786
4	4	30,33	0,00533333	0,0730297	0,0365148
8	4	29,0775	0,0338917	0,184097	0,0920484
14	4	29,9825	0,004025	0,0634429	0,0317214
20	4	29,85	0,171	0,413521	0,206761
25	4	26,215	0,0101667	0,10083	0,0504149
29	4	25,225	0,235633	0,485421	0,24271
Total	28	28,8039	4,34706	2,08496	0,394021

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	30,89	31,06	0,17	1,41506	1,27807
4	30,25	30,41	0,16	0,0	-1,34722
8	28,92	29,32	0,4	0,729133	-0,368401
14	29,91	30,06	0,15	0,167067	-0,130975
20	29,37	30,36	0,99	0,162117	0,120213
25	26,07	26,3	0,23	-1,24254	1,0505
29	24,78	25,73	0,95	0,0853178	-2,1443
Total	24,78	31,06	6,28	-1,8425	-0,951128

The StatAdvisor

This table shows various statistics for Valor a for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Valor a to remove any dependence of the standard deviation on the mean.

WARNING: The standardized skewness and/or kurtosis is outside the range of -2 to +2 for 1 levels of Tiempo. This indicates some significant nonnormality in the data, which violates the assumption that the data come from normal distributions. You may wish to transform the data or use the Kruskal-Wallis test to compare the medians instead of the means.

ANOVA Table for Valor a by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	115,973	6	19,3288	290,38	0,0000
Within groups	1,39782	21	0,0665631		
Total (Corr.)	117,371	27			

The StatAdvisor

The ANOVA table decomposes the variance of Valor a into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 290,383, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Valor a from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Valor a by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	4	30,9475	0,128999	30,6509	31,2441
4	4	30,33	0,128999	30,0334	30,6266
8	4	29,0775	0,128999	28,7809	29,3741
14	4	29,9825	0,128999	29,6859	30,2791
20	4	29,85	0,128999	29,5534	30,1466
25	4	26,215	0,128999	25,9184	26,5116
29	4	25,225	0,128999	24,9284	25,5216
Total	28	28,8039			

The StatAdvisor

This table shows the mean Valor a for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Valor a by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
29	4	25,225	X
25	4	26,215	X
8	4	29,0775	X
20	4	29,85	X
14	4	29,9825	X
4	4	30,33	X
0	4	30,9475	X

Contrast	Difference	+/- Limits
0 - 4	*0,6175	0,593199
0 - 8	*1,87	0,593199
0 - 14	*0,965	0,593199
0 - 20	*1,0975	0,593199
0 - 25	*4,7325	0,593199
0 - 29	*5,7225	0,593199
4 - 8	*1,2525	0,593199
4 - 14	0,3475	0,593199
4 - 20	0,48	0,593199
4 - 25	*4,115	0,593199
4 - 29	*5,105	0,593199
8 - 14	*-0,905	0,593199
8 - 20	*-0,7725	0,593199
8 - 25	*2,8625	0,593199
8 - 29	*3,8525	0,593199
14 - 20	0,1325	0,593199
14 - 25	*3,7675	0,593199
14 - 29	*4,7575	0,593199
20 - 25	*3,635	0,593199
20 - 29	*4,625	0,593199
25 - 29	*0,99	0,593199

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 18 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,505714   P-Value = 0,0323443
Bartlett's test: 3,18119   P-Value = 0,00145195
Hartley's test: 58,5424

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Valor a within each of the 7 levels of Tiempo is the same. Of particular interest are th two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests.

Kruskal-Wallis Test for Valor a by Tiempo

Tiempo	Sample Size	Average Rank
0	4	26,5
4	4	22,0
8	4	10,5
14	4	17,25
20	4	16,25
25	4	6,5
29	4	2,5

Test statistic = 25,7069   P-Value = 0,000252442

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Valor a within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Valor a vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Valor a
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	31,2628	0,367935	84,9683	0,0000
Slope	-0,172124	0,0210335	-8,18332	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	84,5456	1	84,5456	66,97	0,0000
Residual	32,8251	26	1,2625		
Total (Corr.)	117,371	27			

Correlation Coefficient = -0,848723
R-squared = 72,033 percent
Standard Error of Est. = 1,12361

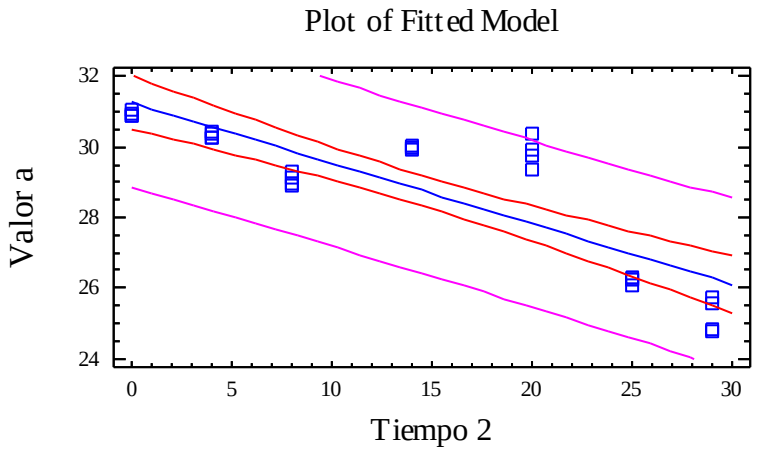
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Valor a and Tiempo. The equation of the fitted model is

Valor a = 31,2628 - 0,172124*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Valor a and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 72,033% of the variability in Valor a. The correlation coefficient equals -0,848723, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,12361. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	84,5456	1	84,5456	66,97	0,0000
Residual	32,8251	26	1,2625		
Lack-of-Fit	31,4272	5	6,28545	94,43	0,0000
Pure Error	1,39783	21	0,0665631		
Total (Corr.)	117,371	27			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

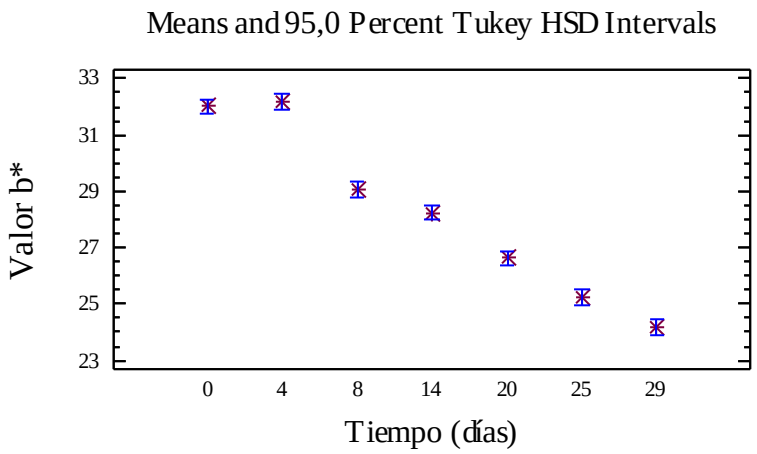
1.2.3 VALOR b* VERSUS TIEMPO

Analysis Summary

Dependent variable: Valor b
Factor: Tiempo
Number of observations: 28
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for Valor b. It constructs various tests and graphs to compare the mean values of Valor b for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for Valor b

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	4	32,0225	0,0289583	0,170171	0,0850857
4	4	32,1825	0,0208917	0,144539	0,0722697
8	4	29,055	0,0995	0,315436	0,157718
14	4	28,245	0,0116333	0,107858	0,053929
20	4	26,62	0,166667	0,408248	0,204124
25	4	25,2275	0,012025	0,109659	0,0548293
29	4	24,1675	0,027025	0,164393	0,0821964
Total	28	28,2171	8,75127	2,95825	0,559057

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	31,84	32,22	0,38	0,143528	-1,06485
4	32,07	32,39	0,32	1,25226	0,912601
8	28,7	29,46	0,76	0,366288	0,3772
14	28,13	28,36	0,23	0,0	-1,63501
20	26,02	26,92	0,9	-1,44	1,31783
25	25,13	25,38	0,25	1,00294	0,531913
29	23,98	24,38	0,4	0,365499	0,591957
Total	23,98	32,39	8,41	0,27287	-1,4907

The StatAdvisor

This table shows various statistics for Valor b for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Valor b to remove any dependence of the standard deviation on the mean.

ANOVA Table for Valor b by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	235,184	6	39,1973	748,24	0,0000
Within groups	1,1001	21	0,0523857		
Total (Corr.)	236,284	27			

The StatAdvisor

The ANOVA table decomposes the variance of Valor b into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 748,245, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Valor b from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Valor b by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	4	32,0225	0,11444	31,7594	32,2856
4	4	32,1825	0,11444	31,9194	32,4456
8	4	29,055	0,11444	28,7919	29,3181
14	4	28,245	0,11444	27,9819	28,5081
20	4	26,62	0,11444	26,3569	26,8831
25	4	25,2275	0,11444	24,9644	25,4906
29	4	24,1675	0,11444	23,9044	24,4306
Total	28	28,2171			

The StatAdvisor

This table shows the mean Valor b for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Valor b by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
29	4	24,1675	X
25	4	25,2275	X
20	4	26,62	X
14	4	28,245	X
8	4	29,055	X
0	4	32,0225	X
4	4	32,1825	X

Contrast	Difference	+/- Limits
0 - 4	-0,16	0,526248
0 - 8	*2,9675	0,526248
0 - 14	*3,7775	0,526248
0 - 20	*5,4025	0,526248
0 - 25	*6,795	0,526248
0 - 29	*7,855	0,526248
4 - 8	*3,1275	0,526248
4 - 14	*3,9375	0,526248
4 - 20	*5,5625	0,526248
4 - 25	*6,955	0,526248
4 - 29	*8,015	0,526248
8 - 14	*0,81	0,526248
8 - 20	*2,435	0,526248
8 - 25	*3,8275	0,526248
8 - 29	*4,8875	0,526248
14 - 20	*1,625	0,526248
14 - 25	*3,0175	0,526248
14 - 29	*4,0775	0,526248
20 - 25	*1,3925	0,526248
20 - 29	*2,4525	0,526248
25 - 29	*1,06	0,526248

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 20 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 6 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,454504 P-Value = 0,0751884
Bartlett's test: 1,6141 P-Value = 0,178043
Hartley's test: 14,3266

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Valor b within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Valor b by Tiempo

Tiempo	Sample Size	Average Rank
0	4	23,625
4	4	25,375
8	4	18,5
14	4	14,5
20	4	10,5
25	4	6,5
29	4	2,5

Test statistic = 26,1075 P-Value = 0,000212605

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Valor b within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Valor b vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Valor b
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	32,2454	0,196737	163,901	0,0000
Slope	-0,281975	0,0112467	-25,0718	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	226,899	1	226,899	628,59	0,0000
Residual	9,38504	26	0,360963		
Total (Corr.)	236,284	27			

Correlation Coefficient = -0,979939
R-squared = 96,0281 percent
Standard Error of Est. = 0,600802

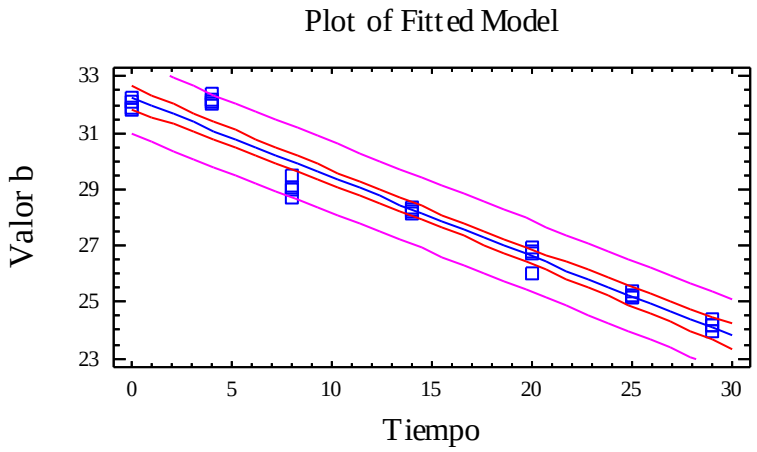
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Valor b and Tiempo. The equation of the fitted model is

Valor b = 32,2454 - 0,281975*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Valor b and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 96,0281% of the variability in Valor b. The correlation coefficient equals -0,979939, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,600802. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	226,899	1	226,899	628,59	0,0000
Residual	9,38504	26	0,360963		
Lack-of-Fit	8,28494	5	1,65699	31,63	0,0000
Pure Error	1,1001	21	0,0523857		
Total (Corr.)	236,284	27			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

1.2.4 VALOR HUE VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Hue
Factor: Tiempo
Number of observations: 28
Number of levels: 7

The StatAdvisor
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   This procedure performs a one-way analysis of variance for Hue.  It constructs various tests and graphs to compare the mean values
of Hue for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant differences
amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which others.  If
you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.  The various
plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the
assumptions underlying the analysis of variance.
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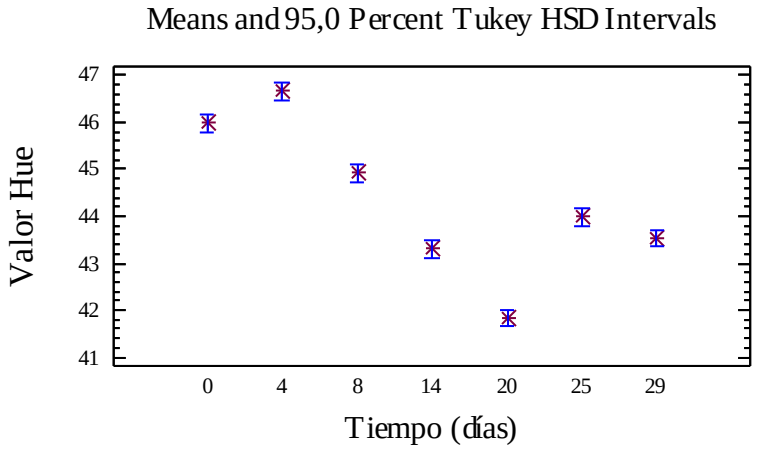


Summary Statistics for Hue

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	4	45,985	0,0243	0,155885	0,0779423
4	4	46,67	0,0486	0,220454	0,110227
8	4	44,9275	0,021025	0,145	0,0725
14	4	43,305	0,0225	0,15	0,075
20	4	41,83	0,0341333	0,184752	0,092376
25	4	43,98	0,03	0,173205	0,0866025
29	4	43,53	0,0	0,0	0,0
Total	28	44,3182	2,48433	1,57617	0,297869

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	45,85	46,12	0,27	0,0	-2,44949
4	46,4	46,94	0,54	0,0	0,612372
8	44,71	45,0	0,29	-1,63299	1,63299
14	43,23	43,53	0,3	1,63299	1,63299
20	41,67	41,99	0,32	0,0	-2,44949
25	43,83	44,13	0,3	0,0	-2,44949
29	43,53	43,53	0,0		
Total	41,67	46,94	5,27	0,0882661	-1,01591

The StatAdvisor

This table shows various statistics for Hue for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed her under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Hue to remove any dependence of the standard deviation on the mean.
WARNING: The standardized skewness and/or kurtosis is outside the range of -2 to +2 for 3 levels of Tiempo. This indicates some significant nonnormality in the data, which violates the assumption that the data come from normal distributions. You may wish to transform the data or use the Kruskal-Wallis test to compare the medians instead of the means.

ANOVA Table for Hue by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	66,5351	6	11,0892	429,91	0,0000
Within groups	0,541675	21	0,025794		
Total (Corr.)	67,0768	27			

The StatAdvisor

The ANOVA table decomposes the variance of Hue into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 429,913, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Hue from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Hue by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	4	45,985	0,0803026	45,8004	46,1696
4	4	46,67	0,0803026	46,4854	46,8546
8	4	44,9275	0,0803026	44,7429	45,1121
14	4	43,305	0,0803026	43,1204	43,4896
20	4	41,83	0,0803026	41,6454	42,0146
25	4	43,98	0,0803026	43,7954	44,1646
29	4	43,53	0,0803026	43,3454	43,7146
Total	28	44,3182			

The StatAdvisor

This table shows the mean Hue for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Hue by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
20	4	41,83	X
14	4	43,305	X
29	4	43,53	X
25	4	43,98	X
8	4	44,9275	X
0	4	45,985	X
4	4	46,67	X

Contrast	Difference	+/- Limits
0 - 4	*-0,685	0,36927
0 - 8	*1,0575	0,36927
0 - 14	*2,68	0,36927
0 - 20	*4,155	0,36927
0 - 25	*2,005	0,36927
0 - 29	*2,455	0,36927
4 - 8	*1,7425	0,36927
4 - 14	*3,365	0,36927
4 - 20	*4,84	0,36927
4 - 25	*2,69	0,36927
4 - 29	*3,14	0,36927
8 - 14	*1,6225	0,36927
8 - 20	*3,0975	0,36927
8 - 25	*0,9475	0,36927
8 - 29	*1,3975	0,36927
14 - 20	*1,475	0,36927
14 - 25	*-0,675	0,36927
14 - 29	-0,225	0,36927
20 - 25	*-2,15	0,36927
20 - 29	*-1,7	0,36927
25 - 29	*0,45	0,36927

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 20 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 6 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,269165   P-Value = 1,0
Bartlett's test: 1,04445   P-Value = 0,983347
Hartley's test: 2,31153

The StatAdvisor

   The three statistics displayed in this table test the null hypothesis that the standard deviations of Hue within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Hue by Tiempo

Tiempo	Sample Size	Average Rank
0	4	22,5
4	4	26,5
8	4	18,5
14	4	7,0
20	4	2,5
25	4	14,5
29	4	10,0

Test statistic = 26,53   P-Value = 0,000177309

The StatAdvisor

   The Kruskal-Wallis test tests the null hypothesis that the medians of Hue within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Hue vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Hue
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	45,9398	0,353547	129,94	0,0000
Slope	-0,11351	0,0202109	-5,61628	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	36,7689	1	36,7689	31,54	0,0000
Residual	30,3079	26	1,16569		
Total (Corr.)	67,0768	27			

Correlation Coefficient = -0,740379
R-squared = 54,8161 percent
Standard Error of Est. = 1,07967

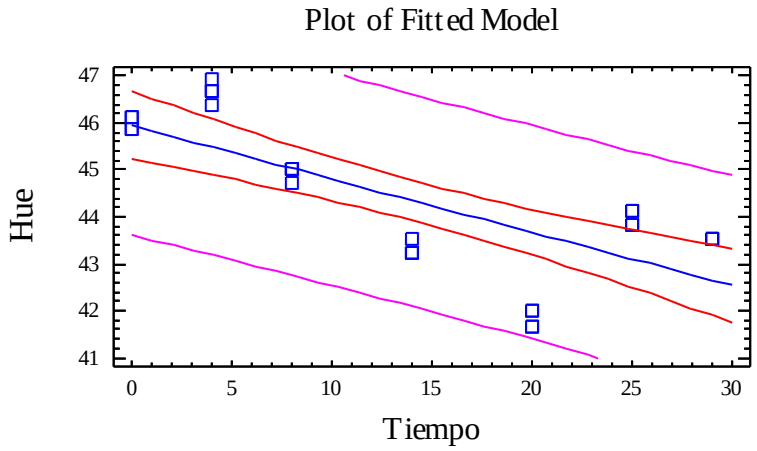
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Hue and Tiempo. The equation of the fitted model is

Hue = 45,9398 - 0,11351*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Hue and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 54,8161% of the variability in Hue. The correlation coefficient equals -0,740379, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,07967. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	36,7689	1	36,7689	31,54	0,0000
Residual	30,3079	26	1,16569		
Lack-of-Fit	29,7663	5	5,95325	230,80	0,0000
Pure Error	0,541675	21	0,025794		
Total (Corr.)	67,0768	27			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

1.2.5 VALOR CROMA VERSUS TIEMPO

One-Way ANOVA - Croma by Tiempo

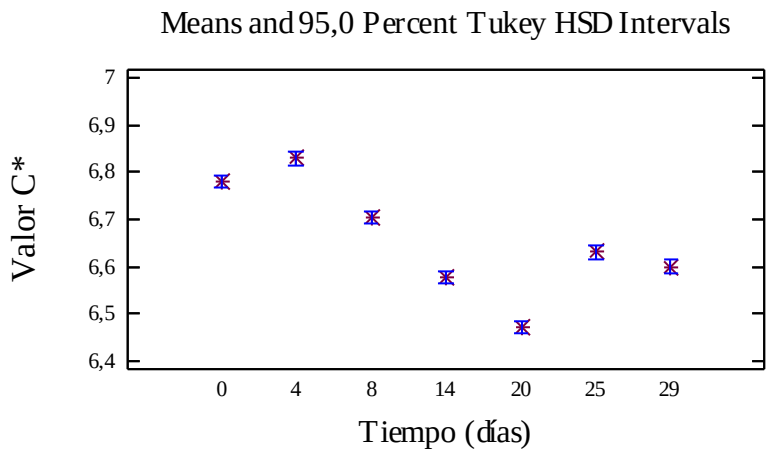
Analysis Summary

Dependent variable: Croma
Factor: Tiempo

Number of observations: 28
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for Croma. It constructs various tests and graphs to compare the mean values of Croma for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for Croma

Tiempo	Count	Average	Variance	Standard deviation	Standard error
0	4	6,78	0,000133333	0,011547	0,0057735
4	4	6,83	0,000266667	0,0163299	0,00816497
8	4	6,705	0,0001	0,01	0,005
14	4	6,5775	0,000225	0,015	0,0075
20	4	6,47	0,000133333	0,011547	0,0057735
25	4	6,63	0,000133333	0,011547	0,0057735
29	4	6,6	0,0	0,0	0,0
Total	28	6,65607	0,0138321	0,11761	0,0222262

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
0	6,77	6,79	0,02	0,0	-2,44949
4	6,81	6,85	0,04	0,0	0,612372
8	6,69	6,71	0,02	-1,63299	1,63299
14	6,57	6,6	0,03	1,63299	1,63299
20	6,46	6,48	0,02	0,0	-2,44949
25	6,62	6,64	0,02	0,0	-2,44949
29	6,6	6,6	0,0		
Total	6,46	6,85	0,39	0,0448235	-1,04603

The StatAdvisor

This table shows various statistics for Croma for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.
WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Croma to remove any dependence of the standard deviation on the mean.
WARNING: The standardized skewness and/or kurtosis is outside the range of -2 to +2 for 3 levels of Tiempo. This indicates some significant nonnormality in the data, which violates the assumption that the data come from normal distributions. You may wish to transform the data or use the Kruskal-Wallis test to compare the medians instead of the means.

ANOVA Table for Croma by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0,370493	6	0,0617488	435,87	0,0000
Within groups	0,002975	21	0,000141667		
Total (Corr.)	0,373468	27			

The StatAdvisor

The ANOVA table decomposes the variance of Croma into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 435,874, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Croma from one level of Tiempo 2 to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Croma by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	4	6,78	0,00595119	6,76632	6,79368
4	4	6,83	0,00595119	6,81632	6,84368
8	4	6,705	0,00595119	6,69132	6,71868
14	4	6,5775	0,00595119	6,56382	6,59118
20	4	6,47	0,00595119	6,45632	6,48368
25	4	6,63	0,00595119	6,61632	6,64368
29	4	6,6	0,00595119	6,58632	6,61368
Total	28	6,65607			

The StatAdvisor

This table shows the mean Croma for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Croma by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
20	4	6,47	X
14	4	6,5775	X
29	4	6,6	X
25	4	6,63	X
8	4	6,705	X
0	4	6,78	X
4	4	6,83	X

Contrast	Difference	+/- Limits
0 - 4	*-0,05	0,0273664
0 - 8	*0,075	0,0273664
0 - 14	*0,2025	0,0273664
0 - 20	*0,31	0,0273664
0 - 25	*0,15	0,0273664
0 - 29	*0,18	0,0273664
4 - 8	*0,125	0,0273664
4 - 14	*0,2525	0,0273664
4 - 20	*0,36	0,0273664
4 - 25	*0,2	0,0273664
4 - 29	*0,23	0,0273664
8 - 14	*0,1275	0,0273664
8 - 20	*0,235	0,0273664
8 - 25	*0,075	0,0273664
8 - 29	*0,105	0,0273664
14 - 20	*0,1075	0,0273664
14 - 25	*-0,0525	0,0273664
14 - 29	-0,0225	0,0273664
20 - 25	*-0,16	0,0273664
20 - 29	*-0,13	0,0273664
25 - 29	*0,03	0,0273664

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 20 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 6 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual
difference equals 0.

Variance Check

Cochran's C test: 0,268908 P-Value = 1,0
Bartlett's test: 1,06183 P-Value = 0,966044
Hartley's test: 2,66667

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Croma within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Croma by Tiempo

Tiempo	Sample Size	Average Rank
0	4	22,5
4	4	26,5
8	4	18,5
14	4	7,0
20	4	2,5
25	4	14,5
29	4	10,0

Test statistic = 26,53 P-Value = 0,000177309

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Croma within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Croma vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Croma
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,77646	0,0265413	255,317	0,0000
Slope	-0,00842711	0,00151727	-5,55414	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,20266	1	0,20266	30,85	0,0000
Residual	0,170808	26	0,00656953		
Total (Corr.)	0,373468	27			

Correlation Coefficient = -0,736644
R-squared = 54,2644 percent
Standard Error of Est. = 0,0810527

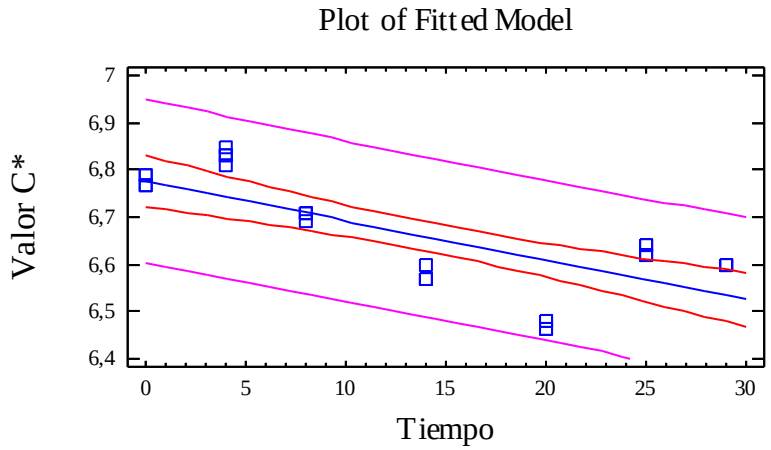
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Croma and Tiempo. The equation of the fitted model is

Croma = 6,77646 - 0,00842711*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Croma and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 54,2644% of the variability in Croma. The correlation coefficient equals -0,736644, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,0810527. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,20266	1	0,20266	30,85	0,0000
Residual	0,170808	26	0,00656953		
Lack-of-Fit	0,167833	5	0,0335666	236,94	0,0000
Pure Error	0,002975	21	0,000141667		
Total (Corr.)	0,373468	27			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

1.2.6 COLOR VISUAL VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Color Roche
Factor: Tiempo
Number of observations: 60
Number of levels: 7

The StatAdvisor
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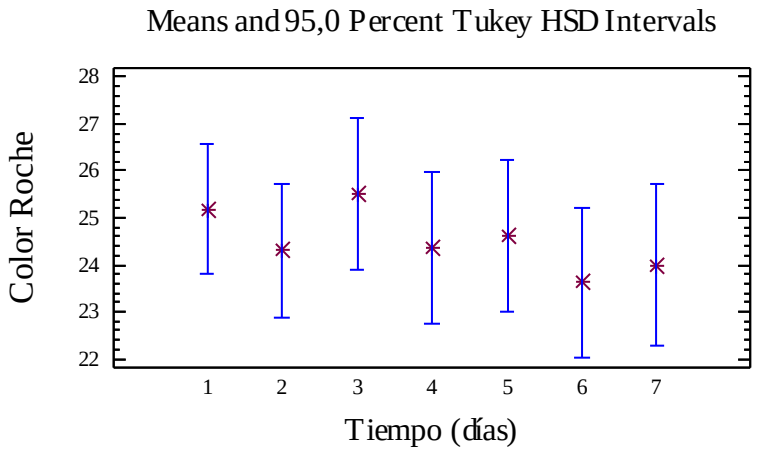
   This procedure performs a one-way analysis of variance for Color
Roche.  It constructs various tests and graphs to compare the mean
values of Color Roche for the 7 different levels of Tiempo.  The
F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests
will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the
Kruskal-Wallis Test which compares medians instead of means.  The
various plots will help you judge the practical significance of the
results, as well as allow you to look for possible violations of the
assumptions underlying the analysis of variance.
```



Summary Statistics for Color Roche

Tiempo	Count	Average	Variance	Standard deviation	Standard error
1	11	25,1818	3,76364	1,94001	0,584935
2	10	24,3	2,01111	1,41814	0,448454
3	8	25,5	2,28571	1,51186	0,534522
4	8	24,375	5,69643	2,38672	0,843833
5	8	24,625	5,98214	2,44584	0,864736
6	8	23,625	4,55357	2,13391	0,754451
7	7	24,0	8,0	2,82843	1,06904
Total	60	24,55	4,31949	2,07834	0,268312

Tiempo	Minimum	Maximum	Range	Stnd. skewness	Stnd. kurtosis
1	21,0	27,0	6,0	-1,3734	0,461432
2	22,0	26,0	4,0	-0,0980759	-0,745288
3	23,0	27,0	4,0	-0,572822	-0,574644
4	20,0	28,0	8,0	-0,586933	0,548196
5	21,0	28,0	7,0	-0,232531	-0,658992
6	20,0	26,0	6,0	-1,01221	-0,319512
7	20,0	27,0	7,0	-0,334146	-0,884351
Total	20,0	28,0	8,0	-1,67675	-0,634029

The StatAdvisor

This table shows various statistics for Color Roche for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

ANOVA Table for Color Roche by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	21,4886	6	3,58144	0,81	0,5643
Within groups	233,361	53	4,40304		
Total (Corr.)	254,85	59			

The StatAdvisor

The ANOVA table decomposes the variance of Color Roche into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 0,813401, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is greater than or equal to 0,05, there is not a statistically significant difference between the mean Color Roche from one level of Tiempo to another at the 95,0% confidence level.

Table of Means for Color Roche by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
1	11	25,1818	0,632674	23,8109	26,5527
2	10	24,3	0,663554	22,8622	25,7378
3	8	25,5	0,741876	23,8925	27,1075
4	8	24,375	0,741876	22,7675	25,9825
5	8	24,625	0,741876	23,0175	26,2325
6	8	23,625	0,741876	22,0175	25,2325
7	7	24,0	0,793099	22,2815	25,7185
Total	60	24,55			

The StatAdvisor

This table shows the mean Color Roche for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Color Roche by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
6	8	23,625	X
7	7	24,0	X
2	10	24,3	X
4	8	24,375	X
5	8	24,625	X
1	11	25,1818	X
3	8	25,5	X

Contrast	Difference	+/- Limits
1 - 2	0,881818	2,80954
1 - 3	-0,318182	2,98785
1 - 4	0,806818	2,98785
1 - 5	0,556818	2,98785
1 - 6	1,55682	2,98785
1 - 7	1,18182	3,10895
2 - 3	-1,2	3,0501
2 - 4	-0,075	3,0501
2 - 5	-0,325	3,0501
2 - 6	0,675	3,0501
2 - 7	0,3	3,16882
3 - 4	1,125	3,21509
3 - 5	0,875	3,21509
3 - 6	1,875	3,21509
3 - 7	1,5	3,32793
4 - 5	-0,25	3,21509
4 - 6	0,75	3,21509
4 - 7	0,375	3,32793
5 - 6	1,0	3,21509
5 - 7	0,625	3,32793
6 - 7	-0,375	3,32793

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Variance Check

Cochran's C test: 0,247735 P-Value = 0,522584
Bartlett's test: 1,10819 P-Value = 0,521324
Hartley's test: 3,9779

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Color Roche within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Color Roche by Tiempo

Tiempo	Sample Size	Average Rank
1	11	36,0909
2	10	26,7
3	8	38,1875
4	8	28,875
5	8	31,25
6	8	23,125
7	7	27,7857

Test statistic = 4,95905   P-Value = 0,549076

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Color Roche within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is greater than or equal to 0,05, there is not a statistically significant difference amongst the medians at the 95,0% confidence level.

Simple Regression - Color Roche vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Color Roche
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	25,2975	0,556768	45,4363	0,0000
Slope	-0,200217	0,13111	-1,52709	0,1322

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,85068	1	9,85068	2,33	0,1322
Residual	244,999	58	4,22413		
Total (Corr.)	254,85	59			

Correlation Coefficient = -0,196603
R-squared = 3,86528 percent
Standard Error of Est. = 2,05527

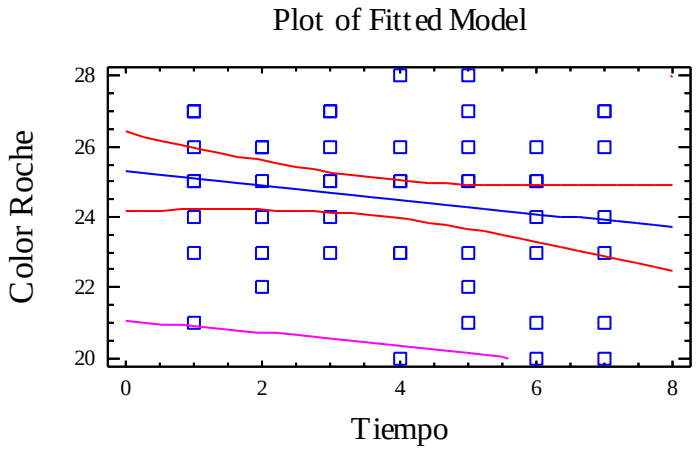
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Color Roche and Tiempo. The equation of the fitted model is

Color Roche = 25,2975 - 0,200217*Tiempo

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Color Roche and Tiempo at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 3,86528% of the variability in Color Roche. The correlation coefficient equals -0,196603, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,05527. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,85068	1	9,85068	2,33	0,1322
Residual	244,999	58	4,22413		
Lack-of-Fit	11,638	5	2,32759	0,53	0,7536
Pure Error	233,361	53	4,40304		
Total (Corr.)	254,85	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

2. PARAMETROS QUÍMICOS

2.1 PROTEINAS VERSUS TIEMPO

One-Way ANOVA - Proteinas by Tiempo

```
Analysis Summary

Dependent variable: Proteinas
Factor: Tiempo

Number of observations: 21
Number of levels: 7


The StatAdvisor
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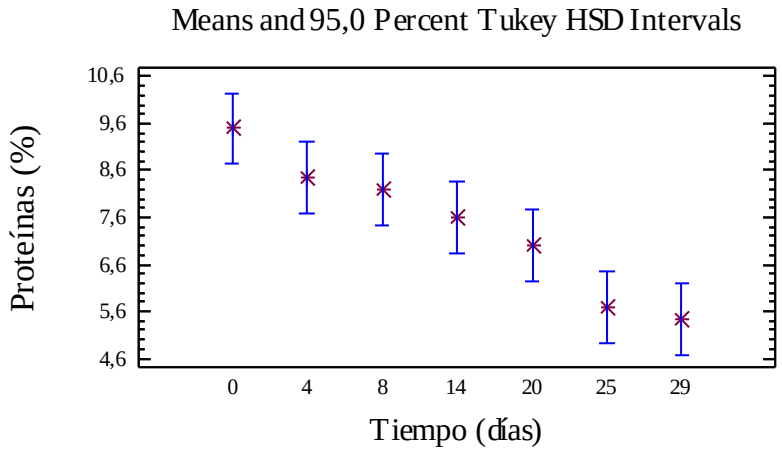
   This procedure performs a one-way analysis of variance for Proteinas.  It constructs various tests and graphs to compare the mean
values of Proteinas for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
```



Summary Statistics for Proteinas

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	9,49803	9,3313	0,106934	0,327007
4	3	8,4644	8,4181	0,243721	0,493681
8	3	8,1927	8,6716	0,702066	0,837894
14	3	7,59577	7,6359	0,0399776	0,199944
20	3	6,99137	6,7301	0,647797	0,804858
25	3	5,6907	5,8088	0,320431	0,566066
29	3	5,4366	5,4757	0,00749073	0,086549
Total	21	7,40994	7,6359	2,17849	1,47597

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,188798	9,288	9,8748	0,5868	1,20063
4	0,285027	7,9955	8,9796	0,9841	0,295798
8	0,483758	7,2252	8,6813	1,4561	-1,22456
14	0,115438	7,3788	7,7726	0,3938	-0,612963
20	0,464685	6,3496	7,8944	1,5448	0,924068
25	0,326819	5,0749	6,1884	1,1135	-0,634969
29	0,0499691	5,3374	5,4967	0,1593	-1,14413
Total	0,322083	5,0749	9,8748	4,7999	-0,170175

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-1,21344	-1,13507

The StatAdvisor

This table shows various statistics for Proteinas for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Proteinas to remove any dependence of the standard deviation on the mean.

ANOVA Table for Proteinas by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	39,433	6	6,57216	22,24	0,0000
Within groups	4,13683	14	0,295488		
Total (Corr.)	43,5698	20			

The StatAdvisor

The ANOVA table decomposes the variance of Proteinas into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 22,2417, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Proteinas from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Proteinas by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	9,49803	0,313841	8,73985	10,2562
4	3	8,4644	0,313841	7,70621	9,22259
8	3	8,1927	0,313841	7,43451	8,95089
14	3	7,59577	0,313841	6,83758	8,35395
20	3	6,99137	0,313841	6,23318	7,74955
25	3	5,6907	0,313841	4,93251	6,44889
29	3	5,4366	0,313841	4,67841	6,19479
Total	21	7,40994			

The StatAdvisor

This table shows the mean Proteinas for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the Intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Proteinas by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
29	3	5,4366	X
25	3	5,6907	XX
20	3	6,99137	XX
14	3	7,59577	X
8	3	8,1927	XX
4	3	8,4644	XX
0	3	9,49803	X

Contrast	Difference	+/- Limits
0 - 4	1,03363	1,51637
0 - 8	1,30533	1,51637
0 - 14	*1,90227	1,51637
0 - 20	*2,50667	1,51637
0 - 25	*3,80733	1,51637
0 - 29	*4,06143	1,51637
4 - 8	0,2717	1,51637
4 - 14	0,868633	1,51637
4 - 20	1,47303	1,51637
4 - 25	*2,7737	1,51637
4 - 29	*3,0278	1,51637
8 - 14	0,596933	1,51637
8 - 20	1,20133	1,51637
8 - 25	*2,502	1,51637
8 - 29	*2,7561	1,51637
14 - 20	0,6044	1,51637
14 - 25	*1,90507	1,51637
14 - 29	*2,15917	1,51637
20 - 25	1,30067	1,51637
20 - 29	*1,55477	1,51637
25 - 29	0,2541	1,51637

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 11 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,339422 P-Value = 0,581626
Bartlett's test: 2,08784 P-Value = 0,193814
Hartley's test: 93,7246

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Proteinas within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Proteinas by Tiempo

Tiempo	Sample Size	Average Rank
0	3	20,0
4	3	15,6667
8	3	14,0
14	3	11,0
20	3	9,33333
25	3	4,0
29	3	3,0

Test statistic = 17,7316 P-Value = 0,00693914

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Proteinas within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Proteinas vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Proteinas
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,32219	0,198203	47,0336	0,0000
Slope	-0,133857	0,0113305	-11,8139	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	38,3492	1	38,3492	139,57	0,0000
Residual	5,22063	19	0,27477		
Total (Corr.)	43,5698	20			

Correlation Coefficient = -0,938178
R-squared = 88,0178 percent
Standard Error of Est. = 0,524185

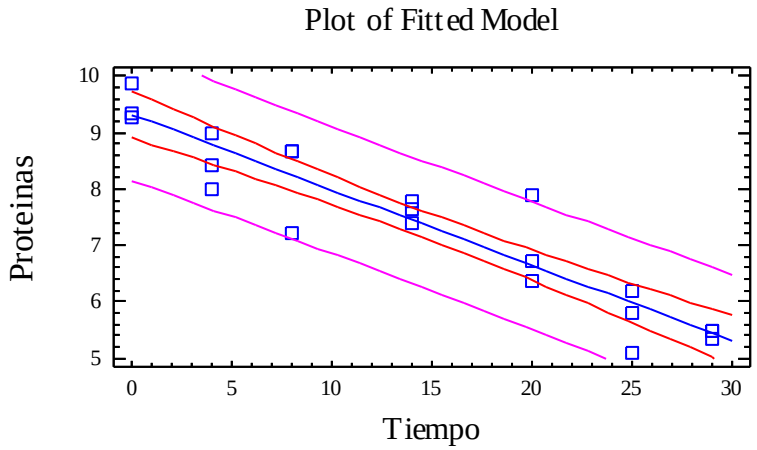
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Proteinas and Tiempo. The equation of the fitted model is

Proteinas = 9,32219 - 0,133857*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Proteinas and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 88,0178% of the variability in Proteinas. The correlation coefficient equals -0,938178, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,524185. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	38,3492	1	38,3492	139,57	0,0000
Residual	5,22063	19	0,27477		
Lack-of-Fit	1,0838	5	0,216759	0,73	0,6103
Pure Error	4,13683	14	0,295488		
Total (Corr.)	43,5698	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Comparison of Alternative Models

Model	Correlation	R-Squared
Linear	-0,9382	88,02%
Square root-Y	-0,9371	87,81%
Exponential	-0,9341	87,26%
Reciprocal-Y	0,9228	85,16%
Square root-X	-0,9078	82,41%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the linear model yields the highest R-Squared value with 88,0178%. This is the currently selected model.

2.2 LIPIDOS VERSUS TIEMPO

One-Way ANOVA - Lipidos by Tiempo

```
Analysis Summary

Dependent variable: Lipidos
Factor: Tiempo

Number of observations: 21
Number of levels: 7

The StatAdvisor
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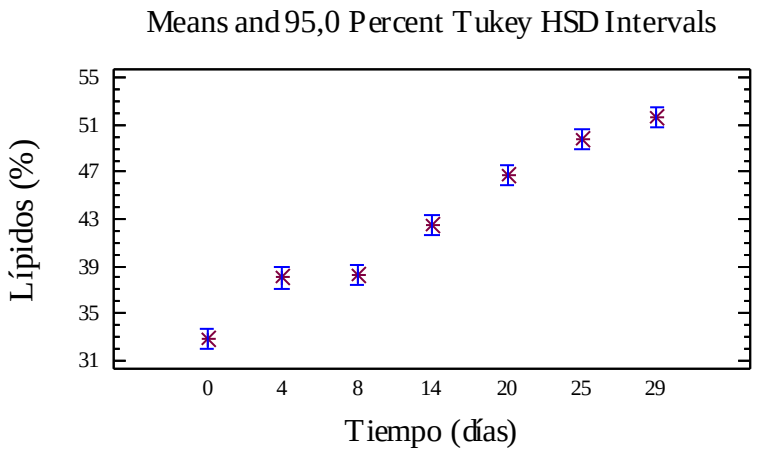
   This procedure performs a one-way analysis of variance for Lipidos. It constructs various tests and graphs to compare the mean
values of Lipidos for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
```



Summary Statistics for Lipidos

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	32,82	33,38	1,2153	1,10241
4	3	37,9933	37,73	0,208033	0,456107
8	3	38,27	38,36	0,0243	0,155885
14	3	42,5533	42,46	0,510633	0,714586
20	3	46,7633	46,86	0,196233	0,442982
25	3	49,79	49,79	0,3481	0,59
29	3	51,73	51,63	0,21	0,458258
Total	21	42,8457	42,46	43,4089	6,58855

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,636475	31,55	33,53	1,98	-1,19928
4	0,263333	37,73	38,52	0,79	1,22474
8	0,09	38,09	38,36	0,27	-1,22474
14	0,412566	41,89	43,31	1,42	0,408514
20	0,255756	46,28	47,15	0,87	-0,6613
25	0,340637	49,2	50,38	1,18	0,0
29	0,264575	51,33	52,23	0,9	0,6613
Total	1,43774	31,55	52,23	20,68	-0,150523

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-1,2974	-1,21361

The StatAdvisor

This table shows various statistics for Lipidos for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Lipidos to remove any dependence of the standard deviation on the mean.

ANOVA Table for Lipidos by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	862,754	6	143,792	371,06	0,0000
Within groups	5,4252	14	0,387514		
Total (Corr.)	868,179	20			

The StatAdvisor

The ANOVA table decomposes the variance of Lipidos into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 371,063, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Lipidos from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Lipidos by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	32,82	0,359404	31,9517	33,6883
4	3	37,9933	0,359404	37,1251	38,8616
8	3	38,27	0,359404	37,4017	39,1383
14	3	42,5533	0,359404	41,6851	43,4216
20	3	46,7633	0,359404	45,8951	47,6316
25	3	49,79	0,359404	48,9217	50,6583
29	3	51,73	0,359404	50,8617	52,5983
Total	21	42,8457			

The StatAdvisor

This table shows the mean Lipidos for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Lipidos by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	3	32,82	X
4	3	37,9933	X
8	3	38,27	X
14	3	42,5533	X
20	3	46,7633	X
25	3	49,79	X
29	3	51,73	X

Contrast	Difference	+/- Limits
0 - 4	*-5,17333	1,73652
0 - 8	*-5,45	1,73652
0 - 14	*-9,73333	1,73652
0 - 20	*-13,9433	1,73652
0 - 25	*-16,97	1,73652
0 - 29	*-18,91	1,73652
4 - 8	-0,276667	1,73652
4 - 14	*-4,56	1,73652
4 - 20	*-8,77	1,73652
4 - 25	*-11,7967	1,73652
4 - 29	*-13,7367	1,73652
8 - 14	*-4,28333	1,73652
8 - 20	*-8,49333	1,73652
8 - 25	*-11,52	1,73652
8 - 29	*-13,46	1,73652
14 - 20	*-4,21	1,73652
14 - 25	*-7,23667	1,73652
14 - 29	*-9,17667	1,73652
20 - 25	*-3,02667	1,73652
20 - 29	*-4,96667	1,73652
25 - 29	*-1,94	1,73652

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 20 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 6 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,44802 P-Value = 0,197987
Bartlett's test: 1,61903 P-Value = 0,46159
Hartley's test: 50,0123

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Lipidos within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Lipidos by Tiempo

Tiempo	Sample Size	Average Rank
0	3	2,0
4	3	6,0
8	3	7,0
14	3	11,0
20	3	14,0
25	3	17,0
29	3	20,0

Test statistic = 19,3498 P-Value = 0,0036119

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Lipidos within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Lipidos vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Lipidos
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	33,845	0,373775	90,549	0,0000
Slope	0,630049	0,0213673	29,4866	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	849,613	1	849,613	869,46	0,0000
Residual	18,5663	19	0,977174		
Total (Corr.)	868,179	20			

Correlation Coefficient = 0,98925
R-squared = 97,8615 percent
Standard Error of Est. = 0,988521

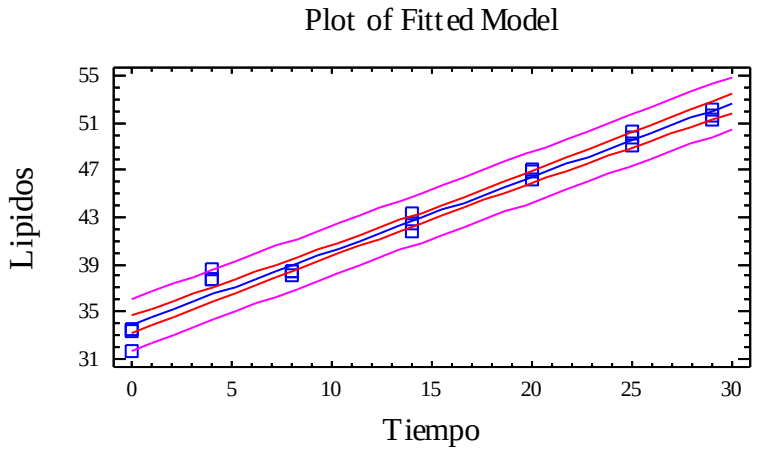
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Lipidos and Tiempo. The equation of the fitted model is

Lipidos = 33,845 + 0,630049*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Lipidos and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 97,8615% of the variability in Lipidos. The correlation coefficient equals 0,98925, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,988521. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	849,613	1	849,613	869,46	0,0000
Residual	18,5663	19	0,977174		
Lack-of-Fit	13,1411	5	2,62822	6,78	0,0021
Pure Error	5,4252	14	0,387514		
Total (Corr.)	868,179	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Linear	0,9892	97,86%
Square root-Y	0,9864	97,30%
Exponential	0,9823	96,49%
Reciprocal-Y	-0,9701	94,12%
Square root-X	0,9658	93,27%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the linear model yields the highest R-Squared value with 97,8615%. This is the currently selected model.

2.3 HUMEDAD VERSUS TIEMPO

```
One-Way ANOVA - Humedad by Tiempo

Analysis Summary

Dependent variable: Humedad
Factor: Tiempo

Number of observations: 21
Number of levels: 7

The StatAdvisor
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   This procedure performs a one-way analysis of variance for Humedad. It constructs various tests and graphs to compare the mean
values of Humedad for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
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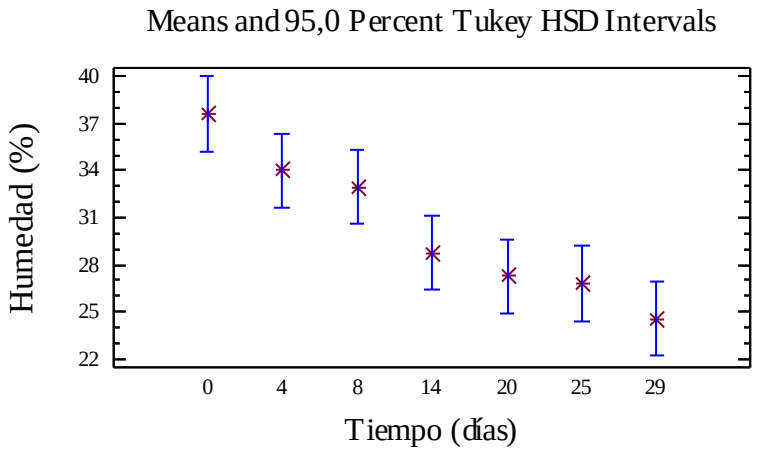


Summary Statistics for Humedad

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	37,6205	39,5917	13,1225	3,62249
4	3	34,0393	33,5304	1,31214	1,14549
8	3	32,9424	33,7034	2,0812	1,44264
14	3	28,7617	28,4152	0,419505	0,647692
20	3	27,2433	27,4919	0,557636	0,74675
25	3	26,7793	27,2847	2,47487	1,57317
29	3	24,5239	24,6835	0,288421	0,537049
Total	21	30,2729	28,4152	21,8285	4,67209

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	2,09145	33,4399	39,83	6,3901	-1,21879
4	0,661348	33,2365	35,3511	2,1146	1,13467
8	0,832906	31,2786	33,8452	2,5666	-1,21145
14	0,373945	28,3609	29,5089	1,148	1,21507
20	0,431136	26,404	27,8341	1,4301	-0,941814
25	0,908271	25,0155	28,0376	3,0221	-0,91679
29	0,310065	23,9251	24,963	1,0379	-0,862252
Total	1,01953	23,9251	39,83	15,9049	1,13682

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-0,425635	-0,398145

The StatAdvisor

This table shows various statistics for Humedad for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.
WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Humedad to remove any dependence of the standard deviation on the mean.

ANOVA Table for Humedad by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	396,057	6	66,0095	22,81	0,0000
Within groups	40,5125	14	2,89375		
Total (Corr.)	436,569	20			

The StatAdvisor

The ANOVA table decomposes the variance of Humedad into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 22,8111, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Humedad from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Humedad by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	37,6205	0,982132	35,2479	39,9932
4	3	34,0393	0,982132	31,6667	36,412
8	3	32,9424	0,982132	30,5697	35,3151
14	3	28,7617	0,982132	26,389	31,1343
20	3	27,2433	0,982132	24,8707	29,616
25	3	26,7793	0,982132	24,4066	29,1519
29	3	24,5239	0,982132	22,1512	26,8965
Total	21	30,2729			

The StatAdvisor

This table shows the mean Humedad for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Humedad by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
29	3	24,5239	X
25	3	26,7793	X
20	3	27,2433	X
14	3	28,7617	XX
8	3	32,9424	XX
4	3	34,0393	X
0	3	37,6205	X

Contrast	Difference	+/- Limits
0 - 4	3,5812	4,74533
0 - 8	4,67813	4,74533
0 - 14	*8,85887	4,74533
0 - 20	*10,3772	4,74533
0 - 25	*10,8413	4,74533
0 - 29	*13,0967	4,74533
4 - 8	1,09693	4,74533
4 - 14	*5,27767	4,74533
4 - 20	*6,796	4,74533
4 - 25	*7,26007	4,74533
4 - 29	*9,51547	4,74533
8 - 14	4,18073	4,74533
8 - 20	*5,69907	4,74533
8 - 25	*6,16313	4,74533
8 - 29	*8,41853	4,74533
14 - 20	1,51833	4,74533
14 - 25	1,9824	4,74533
14 - 29	4,2378	4,74533
20 - 25	0,464067	4,74533
20 - 29	2,71947	4,74533
25 - 29	2,2554	4,74533

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 11 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,647823 P-Value = 0,0133555
Bartlett's test: 2,24111 P-Value = 0,147838
Hartley's test: 45,4976

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Humedad within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests.

Kruskal-Wallis Test for Humedad by Tiempo

Tiempo	Sample Size	Average Rank
0	3	18,6667
4	3	16,3333
8	3	16,0
14	3	11,0
20	3	6,66667
25	3	6,33333
29	3	2,0

Test statistic = 18,2165 P-Value = 0,00571345

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Humedad within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Humedad vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Humedad
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	36,2679	0,669966	54,134	0,0000
Slope	-0,419651	0,0382994	-10,9571	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	376,919	1	376,919	120,06	0,0000
Residual	59,6498	19	3,13947		
Total (Corr.)	436,569	20			

Correlation Coefficient = -0,929175
R-squared = 86,3367 percent
Standard Error of Est. = 1,77185

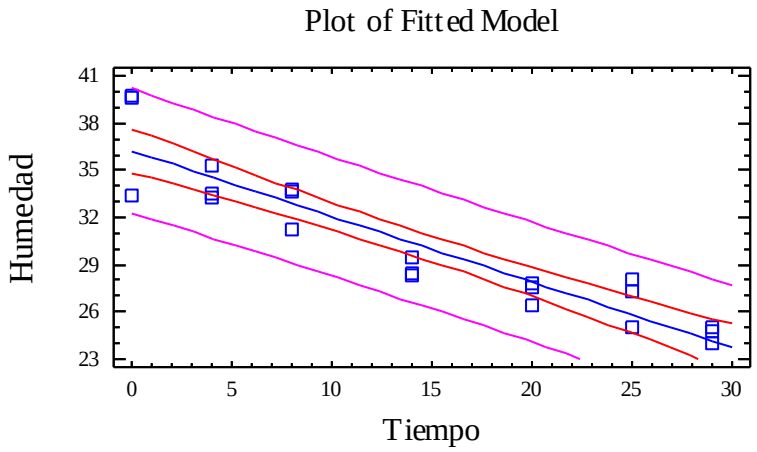
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Humedad and Tiempo. The equation of the fitted model is

Humedad = 36,2679 - 0,419651*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Humedad and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 86,3367% of the variability in Humedad. The correlation coefficient equals -0,929175, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,77185. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	376,919	1	376,919	120,06	0,0000
Residual	59,6498	19	3,13947		
Lack-of-Fit	19,1374	5	3,82747	1,32	0,3105
Pure Error	40,5125	14	2,89375		
Total (Corr.)	436,569	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Comparison of Alternative Models

Model	Correlation	R-Squared
Reciprocal-Y	0,9516	90,55%
Exponential	-0,9434	89,00%
Square root-X	-0,9374	87,87%
Square root-Y	-0,9370	87,81%
Linear	-0,9292	86,34%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the reciprocal-Y model yields the highest R-Squared value with 90,5531%. This is 4,21644% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

2.4 CENIZAS VERSUS TIEMPO

One-Way ANOVA - Cenizas by Tiempo

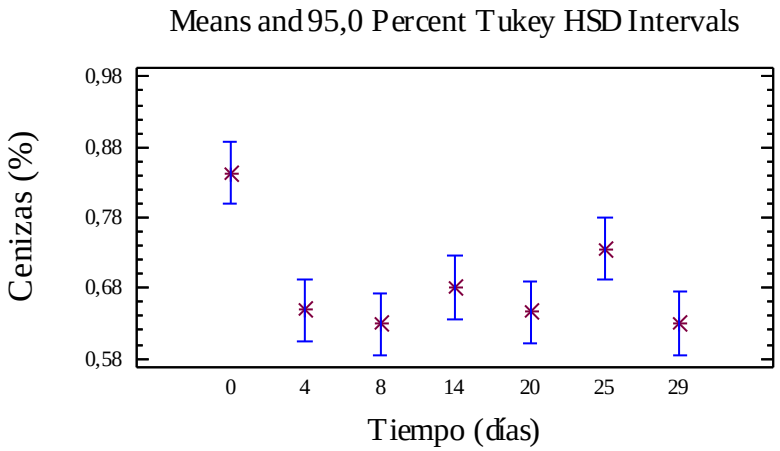
Analysis Summary

Dependent variable: Cenizas
Factor: Tiempo

Number of observations: 21
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for Cenizas. It constructs various tests and graphs to compare the mean values of Cenizas for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for Cenizas

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	0,843733	0,8611	0,000968763	0,031125
4	3	0,648367	0,6282	0,00204808	0,0452558
8	3	0,628867	0,6081	0,00158724	0,0398402
14	3	0,681233	0,6811	0,0010433	0,0323002
20	3	0,6461	0,6453	0,00014689	0,0121198
25	3	0,735633	0,7221	0,000850253	0,0291591
29	3	0,6299	0,6364	0,00046641	0,0215965
Total	21	0,68769	0,6586	0,00622595	0,0789047

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,01797	0,8078	0,8623	0,0545	-1,2227
4	0,0261284	0,6167	0,7002	0,0835	1,13638
8	0,0230018	0,6037	0,6748	0,0711	1,20796
14	0,0186485	0,649	0,7136	0,0646	0,0131348
20	0,00699738	0,6344	0,6586	0,0242	0,20912
25	0,016835	0,7157	0,7691	0,0534	1,1587
29	0,0124688	0,6058	0,6475	0,0417	-0,870941
Total	0,0172184	0,6037	0,8623	0,2586	2,1395

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	0,472747	0,442215

The StatAdvisor

This table shows various statistics for Cenizas for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Cenizas to remove any dependence of the standard deviation on the mean.

ANOVA Table for Cenizas by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0,110297	6	0,0183828	18,10	0,0000
Within groups	0,0142219	14	0,00101585		
Total (Corr.)	0,124519	20			

The StatAdvisor

The ANOVA table decomposes the variance of Cenizas into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 18,096, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Cenizas from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Cenizas by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	0,843733	0,0184015	0,799278	0,888188
4	3	0,648367	0,0184015	0,603912	0,692822
8	3	0,628867	0,0184015	0,584412	0,673322
14	3	0,681233	0,0184015	0,636778	0,725688
20	3	0,6461	0,0184015	0,601645	0,690555
25	3	0,735633	0,0184015	0,691178	0,780088
29	3	0,6299	0,0184015	0,585445	0,674355
Total	21	0,68769			

The StatAdvisor

This table shows the mean Cenizas for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Cenizas by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
8	3	0,628867	X
29	3	0,6299	X
20	3	0,6461	X
4	3	0,648367	XX
14	3	0,681233	XX
25	3	0,735633	X
0	3	0,843733	X

Contrast	Difference	+/- Limits
0 - 4	*0,195367	0,0889101
0 - 8	*0,214867	0,0889101
0 - 14	*0,1625	0,0889101
0 - 20	*0,197633	0,0889101
0 - 25	*0,1081	0,0889101
0 - 29	*0,213833	0,0889101
4 - 8	0,0195	0,0889101
4 - 14	-0,0328667	0,0889101
4 - 20	0,00226667	0,0889101
4 - 25	-0,0872667	0,0889101
4 - 29	0,0184667	0,0889101
8 - 14	-0,0523667	0,0889101
8 - 20	-0,0172333	0,0889101
8 - 25	*-0,106767	0,0889101
8 - 29	-0,00103333	0,0889101
14 - 20	0,0351333	0,0889101
14 - 25	-0,0544	0,0889101
14 - 29	0,0513333	0,0889101
20 - 25	*-0,0895333	0,0889101
20 - 29	0,0162	0,0889101
25 - 29	*0,105733	0,0889101

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 9 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,288018 P-Value = 0,911823
Bartlett's test: 1,2865 P-Value = 0,813517
Hartley's test: 13,943

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Cenizas within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Cenizas by Tiempo

Tiempo	Sample Size	Average Rank
0	3	20,0
4	3	7,66667
8	3	5,33333
14	3	12,6667
20	3	8,33333
25	3	17,0
29	3	6,0

Test statistic = 15,2035 P-Value = 0,0187319

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Cenizas within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Cenizas vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Cenizas
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	0,728288	0,0284063	25,6383	0,0000
Slope	-0,00284184	0,00162388	-1,75003	0,0962

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,017285	1	0,017285	3,06	0,0962
Residual	0,107234	19	0,00564389		
Total (Corr.)	0,124519	20			

Correlation Coefficient = -0,372578
R-squared = 13,8814 percent
Standard Error of Est. = 0,0751258

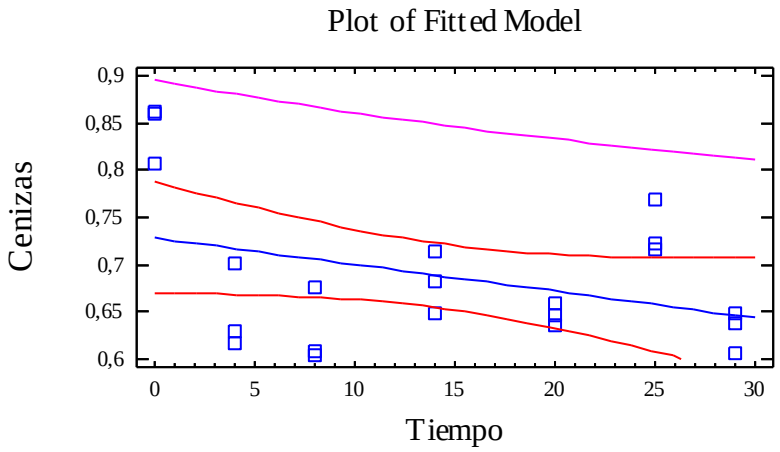
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Cenizas and Tiempo. The equation of the fitted model is

Cenizas = 0,728288 - 0,00284184*Tiempo

Since the P-value in the ANOVA table is less than 0.10, there is a statistically significant relationship between Cenizas and Tiempo at the 90% confidence level.

The R-Squared statistic indicates that the model as fitted explains 13,8814% of the variability in Cenizas. The correlation coefficient equals -0,372578, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,0751258. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,017285	1	0,017285	3,06	0,0962
Residual	0,107234	19	0,00564389		
Lack-of-Fit	0,0930121	5	0,0186024	18,31	0,0000
Pure Error	0,0142219	14	0,00101585		
Total (Corr.)	0,124519	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Square root-X	-0,5563	30,95%
Logistic	-0,4067	16,54%
Linear	-0,3726	13,88%
Square root-Y	-0,3626	13,15%
Exponential	-0,3524	12,42%
Reciprocal-Y	0,3313	10,97%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the square root-X model yields the highest R-Squared value with 30,9493%. This is 17,0679% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

2.5 pH VERSUS TIEMPO

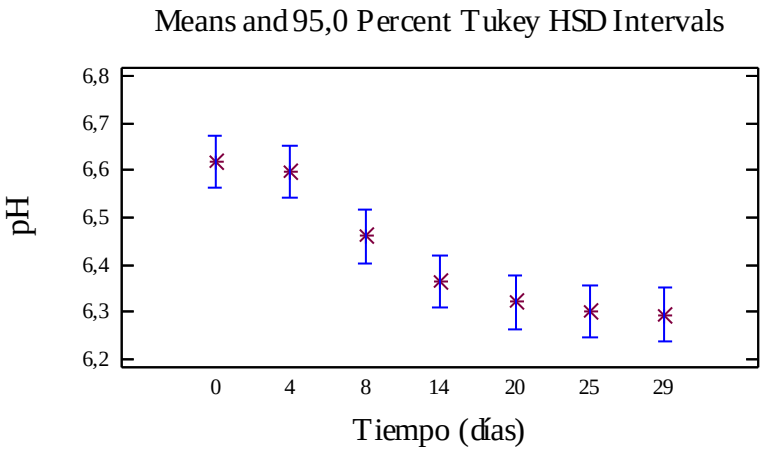
Analysis Summary

Dependent variable: pH
Factor: Tiempo

Number of observations: 21
Number of levels: 7

The StatAdvisor

This procedure performs a one-way analysis of variance for pH. It constructs various tests and graphs to compare the mean values of pH for the 7 different levels of Tiempo. The F-test in the ANOVA table will test whether there are any significant differences amongst the means. If there are, the Multiple Range Tests will tell you which means are significantly different from which others. If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means. The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations of the assumptions underlying the analysis of variance.



Summary Statistics for pH

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	6,62	6,64	0,0028	0,052915
4	3	6,59667	6,59	0,00643333	0,0802081
8	3	6,46	6,46	0,0016	0,04
14	3	6,36333	6,36	0,0000333333	0,0057735
20	3	6,32	6,32	0,0001	0,01
25	3	6,3	6,3	0,0001	0,01
29	3	6,29333	6,29	0,000233333	0,0152753
Total	21	6,4219	6,36	0,0185962	0,136368

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,0305505	6,56	6,66	0,1	-1,03086
4	0,0463081	6,52	6,68	0,16	0,26265
8	0,023094	6,42	6,5	0,08	0,0
14	0,00333333	6,36	6,37	0,01	1,22474
20	0,0057735	6,31	6,33	0,02	0,0
25	0,0057735	6,29	6,31	0,02	0,0
29	0,00881917	6,28	6,31	0,03	0,6613
Total	0,0297579	6,28	6,68	0,4	1,38659

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-0,945152	-0,884109

The StatAdvisor

This table shows various statistics for pH for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of pH to remove any dependence of the standard deviation on the mean.

ANOVA Table for pH by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	0,349324	6	0,0582206	36,07	0,0000
Within groups	0,0226	14	0,00161429		
Total (Corr.)	0,371924	20			

The StatAdvisor

The ANOVA table decomposes the variance of pH into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 36,0659, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean pH from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for pH by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	6,62	0,0231969	6,56396	6,67604
4	3	6,59667	0,0231969	6,54063	6,65271
8	3	6,46	0,0231969	6,40396	6,51604
14	3	6,36333	0,0231969	6,30729	6,41937
20	3	6,32	0,0231969	6,26396	6,37604
25	3	6,3	0,0231969	6,24396	6,35604
29	3	6,29333	0,0231969	6,23729	6,34937
Total	21	6,4219			

The StatAdvisor

This table shows the mean pH for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for pH by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
29	3	6,29333	X
25	3	6,3	X
20	3	6,32	X
14	3	6,36333	XX
8	3	6,46	X
4	3	6,59667	X
0	3	6,62	X

Contrast	Difference	+/- Limits
0 - 4	0,0233333	0,11208
0 - 8	*0,16	0,11208
0 - 14	*0,256667	0,11208
0 - 20	*0,3	0,11208
0 - 25	*0,32	0,11208
0 - 29	*0,326667	0,11208
4 - 8	*0,136667	0,11208
4 - 14	*0,233333	0,11208
4 - 20	*0,276667	0,11208
4 - 25	*0,296667	0,11208
4 - 29	*0,303333	0,11208
8 - 14	0,0966667	0,11208
8 - 20	*0,14	0,11208
8 - 25	*0,16	0,11208
8 - 29	*0,166667	0,11208
14 - 20	0,0433333	0,11208
14 - 25	0,0633333	0,11208
14 - 29	0,07	0,11208
20 - 25	0,02	0,11208
20 - 29	0,0266667	0,11208
25 - 29	0,00666667	0,11208

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 13 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,569322 P-Value = 0,0446701
Bartlett's test: 3,85896 P-Value = 0,0144089
Hartley's test: 193,0

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of pH within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests.

Kruskal-Wallis Test for pH by Tiempo

Tiempo	Sample Size	Average Rank
0	3	18,6667
4	3	18,3333
8	3	14,0
14	3	11,0
20	3	7,66667
25	3	4,16667
29	3	3,16667

Test statistic = 18,8309 P-Value = 0,00445888

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of pH within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - pH vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: pH
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,59472	0,0210187	313,755	0,0000
Slope	-0,0120972	0,00120156	-10,0679	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,313213	1	0,313213	101,36	0,0000
Residual	0,0587105	19	0,00309002		
Total (Corr.)	0,371924	20			

Correlation Coefficient = -0,917684
R-squared = 84,2144 percent
Standard Error of Est. = 0,055588

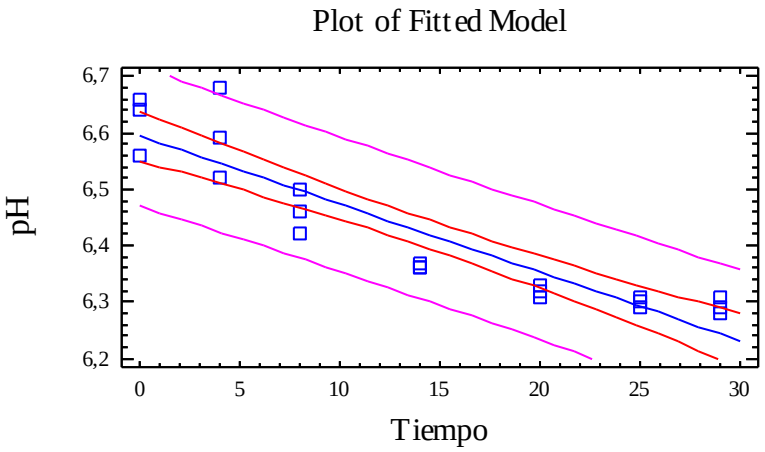
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between pH and Tiempo. The equation of the fitted model is

pH = 6,59472 - 0,0120972*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between pH and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 84,2144% of the variability in pH. The correlation coefficient equals -0,917684, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,055588. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,313213	1	0,313213	101,36	0,0000
Residual	0,0587105	19	0,00309002		
Lack-of-Fit	0,0361105	5	0,00722209	4,47	0,0121
Pure Error	0,0226	14	0,00161429		
Total (Corr.)	0,371924	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.05, there is statistically significant lack-of-fit at the 95% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Square root-X	-0,9287	86,25%
Reciprocal-Y	0,9224	85,08%
Exponential	-0,9201	84,65%
Square root-Y	-0,9189	84,43%
Linear	-0,9177	84,21%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the square root-X model yields the highest R-Squared value with 86,2472%. This is 2,03285% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

2.6 INDICE DE ANISIDINA VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Indice Anisidina
Factor: Tiempo

Number of observations: 21
Number of levels: 7

The StatAdvisor
---------------
   This procedure performs a one-way analysis of variance for Indice
Anisidina.  It constructs various tests and graphs to compare the mean
values of Indice Anisidina for the 7 different levels of Tiempo.  The
F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests
will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the
Kruskal-Wallis Test which compares medians instead of means.  The
various plots will help you judge the practical significance of the
results, as well as allow you to look for possible violations of the
assumptions underlying the analysis of variance.
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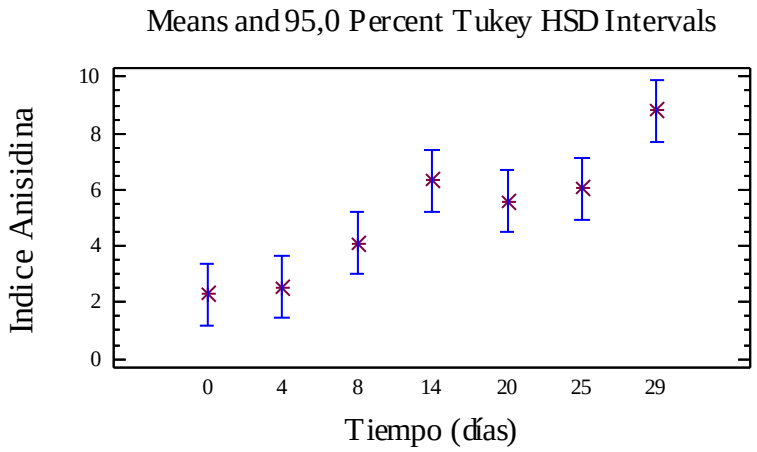


Summary Statistics for Indice Anisidina

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	2,28317	2,232	0,131024	0,361972
4	3	2,5275	2,5106	0,0762523	0,276138
8	3	4,10423	4,1496	0,0739853	0,272002
14	3	6,32383	6,4454	1,50009	1,22478
20	3	5,5721	6,1252	1,49293	1,22185
25	3	6,04203	6,2853	0,260237	0,510134
29	3	8,81897	9,008	0,842119	0,91767
Total	21	5,09598	5,0428	5,23504	2,28802

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,208985	1,9495	2,668	0,7185	0,440802
4	0,159428	2,2602	2,8117	0,5515	0,194012
8	0,157041	3,8124	4,3507	0,5383	-0,515952
14	0,707129	5,0428	7,4833	2,4405	-0,312718
20	0,705438	4,1715	6,4196	2,2481	-1,14524
25	0,294526	5,4558	6,385	0,9292	-1,17233
29	0,529817	7,8215	9,6274	1,8059	-0,627651
Total	0,499287	1,9495	9,6274	7,6779	0,616119

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-0,805181	-0,753178

The StatAdvisor

This table shows various statistics for Indice Anisidina for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Indice Anisidina to remove any dependence of the standard deviation on the mean.

ANOVA Table for Indice Anisidina by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	95,9476	6	15,9913	25,58	0,0000
Within groups	8,75328	14	0,625234		
Total (Corr.)	104,701	20			

The StatAdvisor

The ANOVA table decomposes the variance of Indice Anisidina into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 25,5764, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Indice Anisidina from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Indice Anisidina by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	2,28317	0,456521	1,18029	3,38605
4	3	2,5275	0,456521	1,42462	3,63038
8	3	4,10423	0,456521	3,00135	5,20711
14	3	6,32383	0,456521	5,22095	7,42671
20	3	5,5721	0,456521	4,46922	6,67498
25	3	6,04203	0,456521	4,93915	7,14491
29	3	8,81897	0,456521	7,71609	9,92185
Total	21	5,09598			

The StatAdvisor

This table shows the mean Indice Anisidina for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Indice Anisidina by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	3	2,28317	X
4	3	2,5275	X
8	3	4,10423	XX
20	3	5,5721	XX
25	3	6,04203	XX
14	3	6,32383	X
29	3	8,81897	X

Contrast	Difference	+/- Limits
0 - 4	-0,244333	2,20576
0 - 8	-1,82107	2,20576
0 - 14	*-4,04067	2,20576
0 - 20	*-3,28893	2,20576
0 - 25	*-3,75887	2,20576
0 - 29	*-6,5358	2,20576
4 - 8	-1,57673	2,20576
4 - 14	*-3,79633	2,20576
4 - 20	*-3,0446	2,20576
4 - 25	*-3,51453	2,20576
4 - 29	*-6,29147	2,20576
8 - 14	*-2,2196	2,20576
8 - 20	-1,46787	2,20576
8 - 25	-1,9378	2,20576
8 - 29	*-4,71473	2,20576
14 - 20	0,751733	2,20576
14 - 25	0,2818	2,20576
14 - 29	*-2,49513	2,20576
20 - 25	-0,469933	2,20576
20 - 29	*-3,24687	2,20576
25 - 29	*-2,77693	2,20576

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 13 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,34275 P-Value = 0,564262
Bartlett's test: 1,93875 P-Value = 0,254234
Hartley's test: 20,2756

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Indice Anisidina within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is greater than or equal to 0,05, there is not a statistically significant difference amongst the standard deviations at the 95,0% confidence level.

Kruskal-Wallis Test for Indice Anisidina by Tiempo

Tiempo	Sample Size	Average Rank
0	3	2,66667
4	3	4,33333
8	3	8,33333
14	3	15,3333
20	3	12,6667
25	3	13,6667
29	3	20,0

Test statistic = 17,974 P-Value = 0,00629744

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Indice Anisidina within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Indice Anisidina vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Indice Anisidina
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	2,29015	0,408142	5,61118	0,0000
Slope	0,196408	0,0233319	8,41799	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	82,5635	1	82,5635	70,86	0,0000
Residual	22,1373	19	1,16512		
Total (Corr.)	104,701	20			

Correlation Coefficient = 0,888012
R-squared = 78,8566 percent
Standard Error of Est. = 1,07941

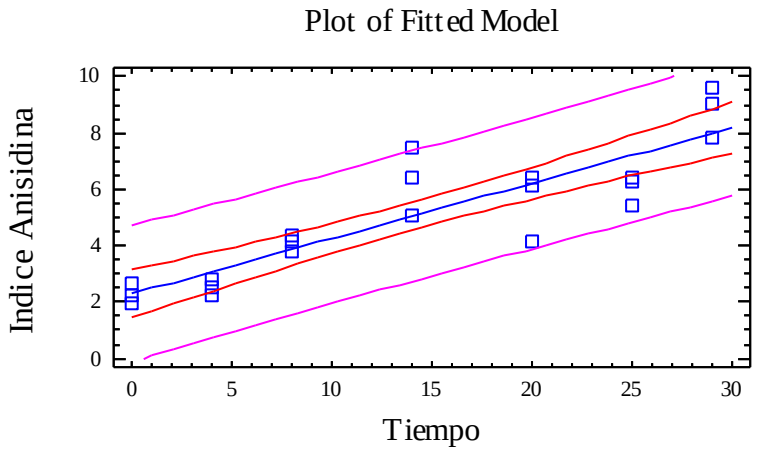
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Indice Anisidina and Tiempo. The equation of the fitted model is

Indice Anisidina = 2,29015 + 0,196408*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Indice Anisidina and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 78,8566% of the variability in Indice Anisidina. The correlation coefficient equals 0,888012, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,07941. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	82,5635	1	82,5635	70,86	0,0000
Residual	22,1373	19	1,16512		
Lack-of-Fit	13,3841	5	2,67681	4,28	0,0143
Pure Error	8,75328	14	0,625234		
Total (Corr.)	104,701	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.05, there is statistically significant lack-of-fit at the 95% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Exponential	0,8997	80,94%
Square root-Y	0,8993	80,87%
Linear	0,8880	78,86%
Reciprocal-Y	-0,8713	75,92%
Square root-X	0,8582	73,66%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the exponential model yields the highest R-Squared value with 80,9385%. This is 2,08187% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

3. PARAMETROS SENSORIALES

3.1 ANOVA BRILLO

```
Analysis Summary

Dependent variable: Brillo
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60

The StatAdvisor
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   This procedure performs a multifactor analysis of variance for Brillo.  It constructs various tests and graphs to determine which
factors have a statistically significant effect on Brillo.  It also tests for significant interactions amongst the factors, given
sufficient data.  The F-tests in the ANOVA table will allow you to identify the significant factors.  For each significant factor, the
Multiple Range Tests will tell you which means are significantly different from which others.  The Means Plot and Interaction Plot will
help you interpret the significant effects.  The Residual Plots will help you judge whether the assumptions underlying the analysis of
variance are violated by the data.
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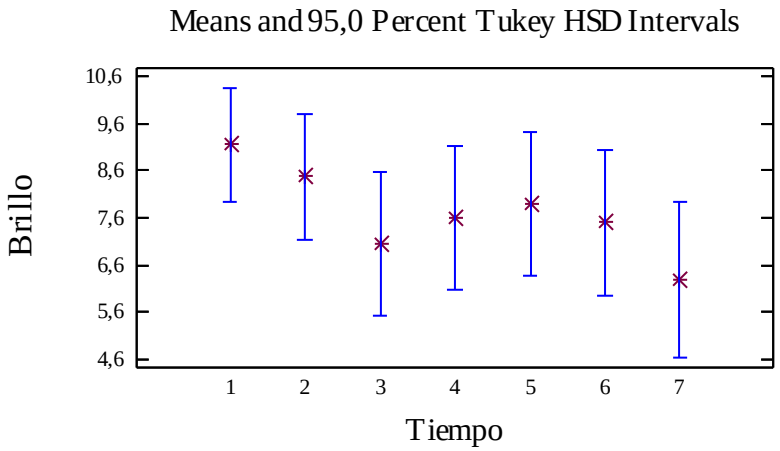


Analysis of Variance for Brillo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	39,9706	6	6,66177	1,97	0,0913
B:Panelistas	45,4849	10	4,54849	1,34	0,2387
RESIDUAL	145,494	43	3,38359		
TOTAL (CORRECTED)	237,25	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Brillo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Brillo at the 95,0% confidence level.

Table of Least Squares Means for Brillo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,70906			
Tiempo					
1	11	9,15455	0,554616	8,03605	10,273
2	10	8,47455	0,607552	7,2493	9,69979
3	8	7,03955	0,704275	5,61924	8,45985
4	8	7,60205	0,704275	6,18174	9,02235
5	8	7,90205	0,704275	6,48174	9,32235
6	8	7,50205	0,704275	6,08174	8,92235
7	7	6,28865	0,752659	4,77077	7,80654
Panelistas					
1	7	7,65714	0,695248	6,25504	9,05925
2	7	5,98571	0,695248	4,58361	7,38782
3	7	7,51429	0,695248	6,11218	8,91639
4	7	8,77143	0,695248	7,36932	10,1735
5	7	8,74286	0,695248	7,34075	10,145
6	7	8,2	0,695248	6,7979	9,6021
7	7	7,67143	0,695248	6,26932	9,07353
8	6	6,71327	0,758578	5,18344	8,24309
9	2	7,64452	1,35805	4,90575	10,3833
10	2	8,54452	1,35805	5,80575	11,2833
11	1	7,35452	1,92491	3,47257	11,2365

The StatAdvisor

This table shows the mean Brillo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Brillo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	6,28865	X
3	8	7,03955	XX
6	8	7,50205	XX
4	8	7,60205	XX
5	8	7,90205	XX
2	10	8,47455	XX
1	11	9,15455	X

Contrast	Difference	+/- Limits
1 - 2	0,68	2,48525
1 - 3	2,115	2,64297
1 - 4	1,5525	2,64297
1 - 5	1,2525	2,64297
1 - 6	1,6525	2,64297
1 - 7	*2,86589	2,7501
2 - 3	1,435	2,69804
2 - 4	0,8725	2,69804
2 - 5	0,5725	2,69804
2 - 6	0,9725	2,69804
2 - 7	2,18589	2,80306
3 - 4	-0,5625	2,84398
3 - 5	-0,8625	2,84398
3 - 6	-0,4625	2,84398
3 - 7	0,750893	2,9438
4 - 5	-0,3	2,84398
4 - 6	0,1	2,84398
4 - 7	1,31339	2,9438
5 - 6	0,4	2,84398
5 - 7	1,61339	2,9438
6 - 7	1,21339	2,9438

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 1 pair, indicating that this pair shows a statistically significant difference at the 95,0% confidence level. At the top of the page, 2 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Brillo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Brillo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,14475	0,510821	17,9021	0,0000
Slope	-0,35529	0,12029	-2,95361	0,0045

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	31,0192	1	31,0192	8,72	0,0045
Residual	206,231	58	3,5557		
Total (Corr.)	237,25	59			

Correlation Coefficient = -0,361587
R-squared = 13,0745 percent
Standard Error of Est. = 1,88566

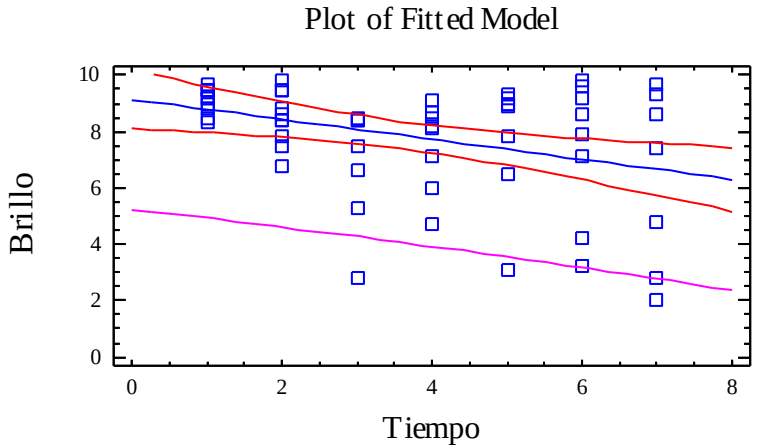
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Brillo and Tiempo. The equation of the fitted model is

Brillo = 9,14475 - 0,35529*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Brillo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 13,0745% of the variability in Brillo. The correlation coefficient equals -0,361587, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,88566. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	31,0192	1	31,0192	8,72	0,0045
Residual	206,231	58	3,5557		
Lack-of-Fit	15,2513	5	3,05026	0,85	0,5231
Pure Error	190,979	53	3,60338		
Total (Corr.)	237,25	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Brillo

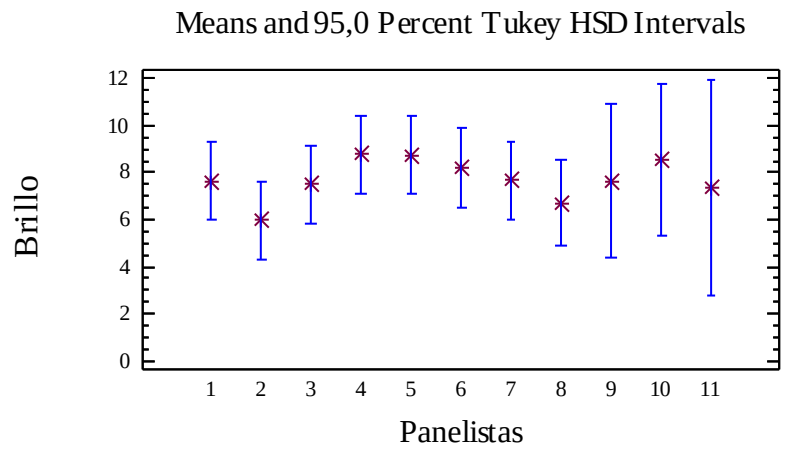
Analysis Summary

Dependent variable: Brillo
Factors:
        Panelistas
        Tiempo

Number of complete cases: 60

The StatAdvisor

   This procedure performs a multifactor analysis of variance for Brillo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Brillo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Brillo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	45,4849	10	4,54849	1,34	0,2387
B:Tiempo	39,9706	6	6,66177	1,97	0,0913
RESIDUAL	145,494	43	3,38359		
TOTAL (CORRECTED)	237,25	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Brillo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Brillo at the 95,0% confidence level.

Table of Least Squares Means for Brillo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,70906			
Panelistas					
1	7	7,65714	0,695248	6,25504	9,05925
2	7	5,98571	0,695248	4,58361	7,38782
3	7	7,51429	0,695248	6,11218	8,91639
4	7	8,77143	0,695248	7,36932	10,1735
5	7	8,74286	0,695248	7,34075	10,145
6	7	8,2	0,695248	6,7979	9,6021
7	7	7,67143	0,695248	6,26932	9,07353
8	6	6,71327	0,758578	5,18344	8,24309
9	2	7,64452	1,35805	4,90575	10,3833
10	2	8,54452	1,35805	5,80575	11,2833
11	1	7,35452	1,92491	3,47257	11,2365
Tiempo					
1	11	9,15455	0,554616	8,03605	10,273
2	10	8,47455	0,607552	7,2493	9,69979
3	8	7,03955	0,704275	5,61924	8,45985
4	8	7,60205	0,704275	6,18174	9,02235
5	8	7,90205	0,704275	6,48174	9,32235
6	8	7,50205	0,704275	6,08174	8,92235
7	7	6,28865	0,752659	4,77077	7,80654

The StatAdvisor

This table shows the mean Brillo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Brillo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
2	7	5,98571	X
8	6	6,71327	X
11	1	7,35452	X
3	7	7,51429	X
9	2	7,64452	X
1	7	7,65714	X
7	7	7,67143	X
6	7	8,2	X
10	2	8,54452	X
5	7	8,74286	X
4	7	8,77143	X

Contrast	Difference	+/- Limits
1 - 2	1,67143	3,34027
1 - 3	0,142857	3,34027
1 - 4	-1,11429	3,34027
1 - 5	-1,08571	3,34027
1 - 6	-0,542857	3,34027
1 - 7	-0,0142857	3,34027
1 - 8	0,943878	3,47667
1 - 9	0,0126276	5,01041
1 - 10	-0,887372	5,01041
1 - 11	0,302628	6,68054
2 - 3	-1,52857	3,34027
2 - 4	-2,78571	3,34027
2 - 5	-2,75714	3,34027
2 - 6	-2,21429	3,34027
2 - 7	-1,68571	3,34027
2 - 8	-0,727551	3,47667
2 - 9	-1,6588	5,01041
2 - 10	-2,5588	5,01041
2 - 11	-1,3688	6,68054
3 - 4	-1,25714	3,34027
3 - 5	-1,22857	3,34027
3 - 6	-0,685714	3,34027
3 - 7	-0,157143	3,34027
3 - 8	0,80102	3,47667
3 - 9	-0,13023	5,01041
3 - 10	-1,03023	5,01041
3 - 11	0,15977	6,68054
4 - 5	0,0285714	3,34027

4 - 6	0,571429	3,34027
4 - 7	1,1	3,34027
4 - 8	2,05816	3,47667
4 - 9	1,12691	5,01041
4 - 10	0,226913	5,01041
4 - 11	1,41691	6,68054
5 - 6	0,542857	3,34027
5 - 7	1,07143	3,34027
5 - 8	2,02959	3,47667
5 - 9	1,09834	5,01041
5 - 10	0,198342	5,01041
5 - 11	1,38834	6,68054
6 - 7	0,528571	3,34027
6 - 8	1,48673	3,47667
6 - 9	0,555485	5,01041
6 - 10	-0,344515	5,01041
6 - 11	0,845485	6,68054
7 - 8	0,958163	3,47667
7 - 9	0,0269133	5,01041
7 - 10	-0,873087	5,01041
7 - 11	0,316913	6,68054
8 - 9	-0,93125	5,10235
8 - 10	-1,83125	5,10235
8 - 11	-0,64125	6,74977
9 - 10	-0,9	6,24908
9 - 11	0,29	7,65353
10 - 11	1,19	7,65353

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Brillo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Brillo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	7,14684	0,540854	13,214	0,0000
Slope	0,137508	0,0974814	1,4106	0,1637

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	7,86933	1	7,86933	1,99	0,1637
Residual	229,381	58	3,95484		
Total (Corr.)	237,25	59			

Correlation Coefficient = 0,182123
R-squared = 3,31689 percent
Standard Error of Est. = 1,98868

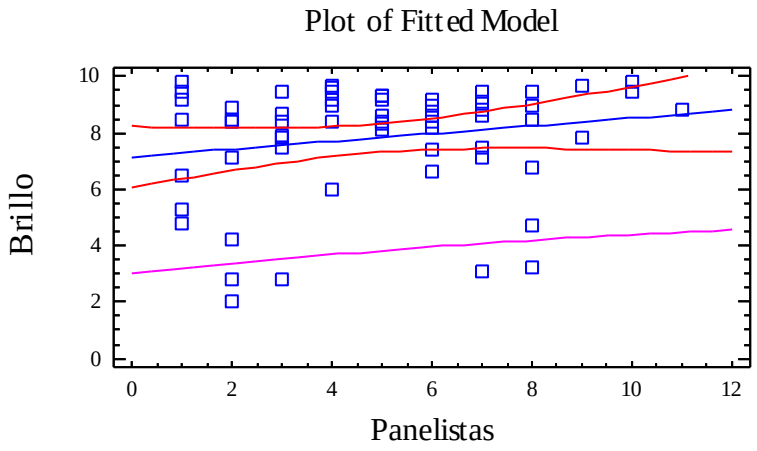
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Brillo and Panelistas. The equation of the fitted model is

Brillo = 7,14684 + 0,137508*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Brillo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 3,31689% of the variability in Brillo. The correlation coefficient equals 0,182123, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,98868. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	7,86933	1	7,86933	1,99	0,1637
Residual	229,381	58	3,95484		
Lack-of-Fit	43,9155	9	4,8795	1,29	0,2668
Pure Error	185,465	49	3,785		
Total (Corr.)	237,25	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

3.2 ANOVA HUMEDAD

Multifactor ANOVA - Humedad

```
Analysis Summary

Dependent variable: Humedad
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60

The StatAdvisor
---------------
   This procedure performs a multifactor analysis of variance for
Humedad.  It constructs various tests and graphs to determine which
factors have a statistically significant effect on Humedad.  It also
tests for significant interactions amongst the factors, given
sufficient data.  The F-tests in the ANOVA table will allow you to
identify the significant factors.  For each significant factor, the
Multiple Range Tests will tell you which means are significantly
different from which others.  The Means Plot and Interaction Plot will
help you interpret the significant effects.  The Residual Plots will
help you judge whether the assumptions underlying the analysis of
variance are violated by the data.
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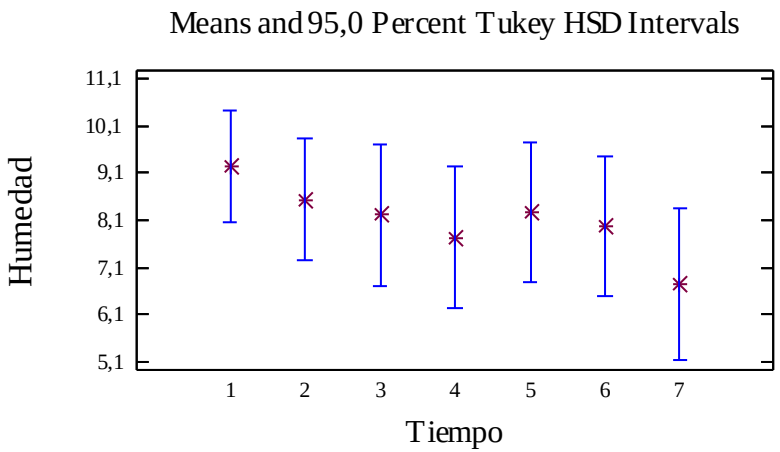


Analysis of Variance for Humedad - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	26,6925	6	4,44875	1,38	0,2455
B:Panelistas	40,4835	10	4,04835	1,25	0,2865
RESIDUAL	138,897	43	3,23017		
TOTAL (CORRECTED)	209,65	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Humedad into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Humedad at the 95,0% confidence level.

Table of Least Squares Means for Humedad
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	8,10237			
Tiempo					
1	11	9,25455	0,541896	8,1617	10,3474
2	10	8,53455	0,593618	7,3374	9,73169
3	8	8,20705	0,688123	6,81931	9,59478
4	8	7,73205	0,688123	6,34431	9,11978
5	8	8,26955	0,688123	6,88181	9,65728
6	8	7,96955	0,688123	6,58181	9,35728
7	7	6,74931	0,735397	5,26624	8,23238
Panelistas					
1	7	8,12857	0,679303	6,75862	9,49852
2	7	7,08571	0,679303	5,71577	8,45566
3	7	7,42857	0,679303	6,05862	8,79852
4	7	9,12857	0,679303	7,75862	10,4985
5	7	9,2	0,679303	7,83005	10,5699
6	7	8,7	0,679303	7,33005	10,0699
7	7	7,4	0,679303	6,03005	8,76995
8	6	6,99116	0,74118	5,49642	8,48589
9	2	7,95782	1,3269	5,28187	10,6338
10	2	8,85782	1,3269	6,18187	11,5338
11	1	8,24782	1,88076	4,4549	12,0407

The StatAdvisor

This table shows the mean Humedad for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Humedad by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	6,74931	X
4	8	7,73205	X
6	8	7,96955	X
3	8	8,20705	X
5	8	8,26955	X
2	10	8,53455	X
1	11	9,25455	X

Contrast	Difference	+/- Limits
1 - 2	0,72	2,42825
1 - 3	1,0475	2,58236
1 - 4	1,5225	2,58236
1 - 5	0,985	2,58236
1 - 6	1,285	2,58236
1 - 7	2,50524	2,68703
2 - 3	0,3275	2,63616
2 - 4	0,8025	2,63616
2 - 5	0,265	2,63616
2 - 6	0,565	2,63616
2 - 7	1,78524	2,73877
3 - 4	0,475	2,77876
3 - 5	-0,0625	2,77876
3 - 6	0,2375	2,77876
3 - 7	1,45774	2,87629
4 - 5	-0,5375	2,77876
4 - 6	-0,2375	2,77876
4 - 7	0,982738	2,87629
5 - 6	0,3	2,77876
5 - 7	1,52024	2,87629
6 - 7	1,22024	2,87629

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Humedad vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Humedad
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,30616	0,485227	19,179	0,0000
Slope	-0,309685	0,114263	-2,71027	0,0088

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	23,5671	1	23,5671	7,35	0,0088
Residual	186,083	58	3,20833		
Total (Corr.)	209,65	59			

Correlation Coefficient = -0,335278
R-squared = 11,2411 percent
Standard Error of Est. = 1,79118

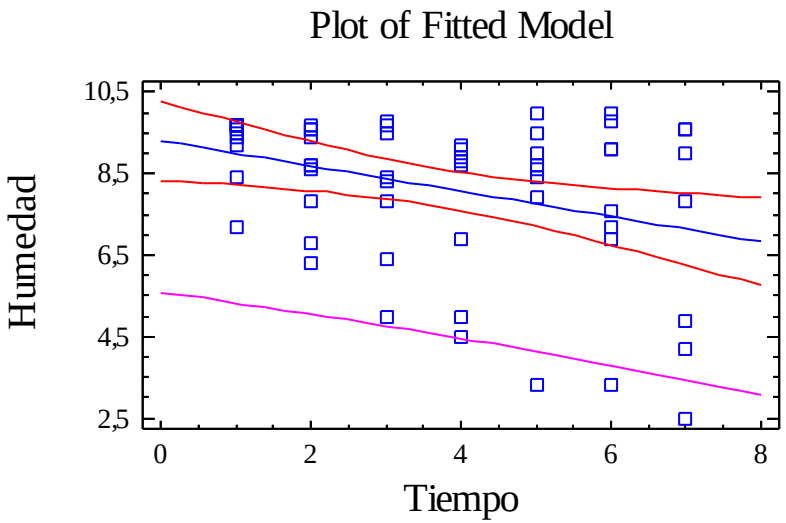
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Humedad and Tiempo. The equation of the fitted model is

Humedad = 9,30616 - 0,309685*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Humedad and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 11,2411% of the variability in Humedad. The correlation coefficient equals -0,335278, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,79118. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	23,5671	1	23,5671	7,35	0,0088
Residual	186,083	58	3,20833		
Lack-of-Fit	6,70218	5	1,34044	0,40	0,8494
Pure Error	179,381	53	3,38454		
Total (Corr.)	209,65	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Humedad

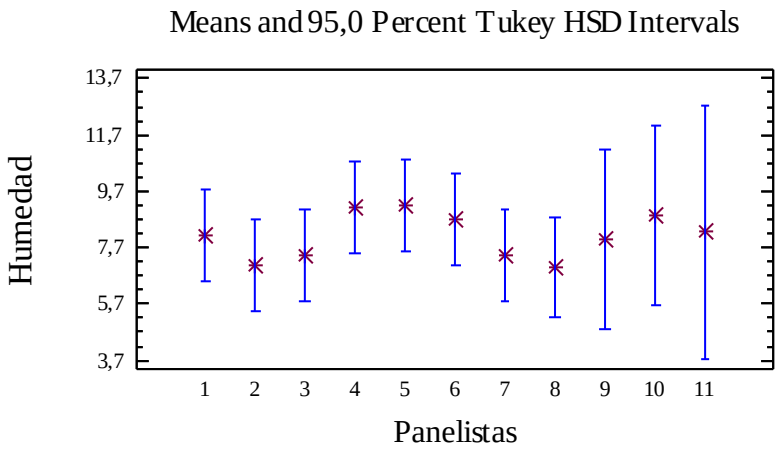
Analysis Summary

Dependent variable: Humedad
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Humedad. It constructs various tests and graphs to determine which factors have a statistically significant effect on Humedad. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Humedad - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	40,4835	10	4,04835	1,25	0,2865
B:Tiempo	26,6925	6	4,44875	1,38	0,2455
RESIDUAL	138,897	43	3,23017		
TOTAL (CORRECTED)	209,65	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Humedad into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Humedad at the 95,0% confidence level.

Table of Least Squares Means for Humedad
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	8,10237			
Panelistas					
1	7	8,12857	0,679303	6,75862	9,49852
2	7	7,08571	0,679303	5,71577	8,45566
3	7	7,42857	0,679303	6,05862	8,79852
4	7	9,12857	0,679303	7,75862	10,4985
5	7	9,2	0,679303	7,83005	10,5699
6	7	8,7	0,679303	7,33005	10,0699
7	7	7,4	0,679303	6,03005	8,76995
8	6	6,99116	0,74118	5,49642	8,48589
9	2	7,95782	1,3269	5,28187	10,6338
10	2	8,85782	1,3269	6,18187	11,5338
11	1	8,24782	1,88076	4,4549	12,0407
Tiempo					
1	11	9,25455	0,541896	8,1617	10,3474
2	10	8,53455	0,593618	7,3374	9,73169
3	8	8,20705	0,688123	6,81931	9,59478
4	8	7,73205	0,688123	6,34431	9,11978
5	8	8,26955	0,688123	6,88181	9,65728
6	8	7,96955	0,688123	6,58181	9,35728
7	7	6,74931	0,735397	5,26624	8,23238

The StatAdvisor

This table shows the mean Humedad for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Humedad by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
8	6	6,99116	X
2	7	7,08571	X
7	7	7,4	X
3	7	7,42857	X
9	2	7,95782	X
1	7	8,12857	X
11	1	8,24782	X
6	7	8,7	X
10	2	8,85782	X
4	7	9,12857	X
5	7	9,2	X

Contrast	Difference	+/- Limits
1 - 2	1,04286	3,26367
1 - 3	0,7	3,26367
1 - 4	-1,0	3,26367
1 - 5	-1,07143	3,26367
1 - 6	-0,571429	3,26367
1 - 7	0,728571	3,26367
1 - 8	1,13741	3,39693
1 - 9	0,170748	4,8955
1 - 10	-0,729252	4,8955
1 - 11	-0,119252	6,52733
2 - 3	-0,342857	3,26367
2 - 4	-2,04286	3,26367
2 - 5	-2,11429	3,26367
2 - 6	-1,61429	3,26367
2 - 7	-0,314286	3,26367
2 - 8	0,0945578	3,39693
2 - 9	-0,872109	4,8955
2 - 10	-1,77211	4,8955
2 - 11	-1,16211	6,52733
3 - 4	-1,7	3,26367
3 - 5	-1,77143	3,26367
3 - 6	-1,27143	3,26367
3 - 7	0,0285714	3,26367
3 - 8	0,437415	3,39693
3 - 9	-0,529252	4,8955
3 - 10	-1,42925	4,8955
3 - 11	-0,819252	6,52733
4 - 5	-0,0714286	3,26367

4 - 6	0,428571	3,26367
4 - 7	1,72857	3,26367
4 - 8	2,13741	3,39693
4 - 9	1,17075	4,8955
4 - 10	0,270748	4,8955
4 - 11	0,880748	6,52733
5 - 6	0,5	3,26367
5 - 7	1,8	3,26367
5 - 8	2,20884	3,39693
5 - 9	1,24218	4,8955
5 - 10	0,342177	4,8955
5 - 11	0,952177	6,52733
6 - 7	1,3	3,26367
6 - 8	1,70884	3,39693
6 - 9	0,742177	4,8955
6 - 10	-0,157823	4,8955
6 - 11	0,452177	6,52733
7 - 8	0,408844	3,39693
7 - 9	-0,557823	4,8955
7 - 10	-1,45782	4,8955
7 - 11	-0,847823	6,52733
8 - 9	-0,966667	4,98533
8 - 10	-1,86667	4,98533
8 - 11	-1,25667	6,59497
9 - 10	-0,9	6,10576
9 - 11	-0,29	7,478
10 - 11	0,61	7,478

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Humedad vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Humedad
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	7,7974	0,514387	15,1586	0,0000
Slope	0,0722038	0,0927112	0,778803	0,4393

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	2,16972	1	2,16972	0,61	0,4393
Residual	207,48	58	3,57725		
Total (Corr.)	209,65	59			

Correlation Coefficient = 0,101731
R-squared = 1,03493 percent
Standard Error of Est. = 1,89136

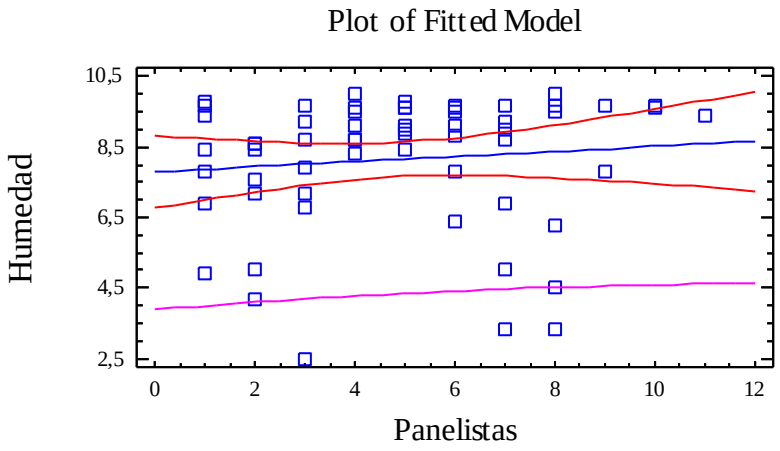
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Humedad and Panelistas. The equation of the fitted model is

Humedad = 7,7974 + 0,0722038*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Humedad and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,03493% of the variability in Humedad. The correlation coefficient equals 0,101731, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,89136. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	2,16972	1	2,16972	0,61	0,4393
Residual	207,48	58	3,57725		
Lack-of-Fit	41,8905	9	4,6545	1,38	0,2242
Pure Error	165,59	49	3,37938		
Total (Corr.)	209,65	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

3.3 ANOVA GOTEO

```
Analysis Summary

Dependent variable: Goteo
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for
Goteo.  It constructs various tests and graphs to determine which
factors have a statistically significant effect on Goteo.  It also
tests for significant interactions amongst the factors, given
sufficient data.  The F-tests in the ANOVA table will allow you to
identify the significant factors.  For each significant factor, the
Multiple Range Tests will tell you which means are significantly
different from which others.  The Means Plot and Interaction Plot will
help you interpret the significant effects.  The Residual Plots will
help you judge whether the assumptions underlying the analysis of
variance are violated by the data.
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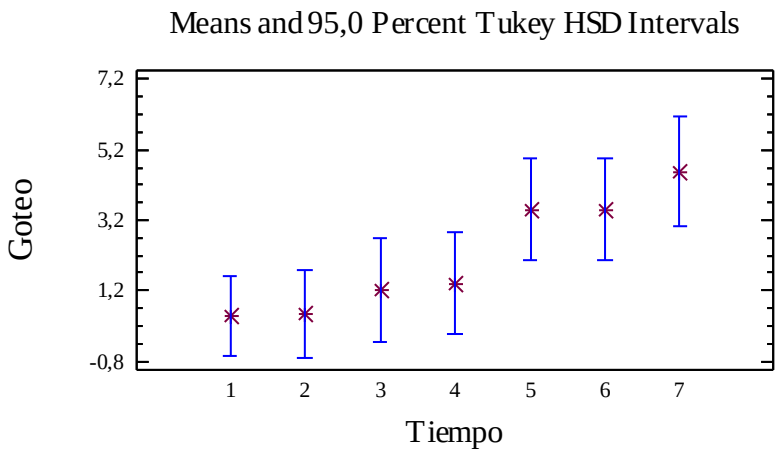


Analysis of Variance for Goteo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	124,168	6	20,6946	6,85	0,0000
B:Panelistas	33,9497	10	3,39497	1,12	0,3675
RESIDUAL	129,933	43	3,02169		
TOTAL (CORRECTED)	310,889	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Goteo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Goteo at the 95,0% confidence level.

Table of Least Squares Means for Goteo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	2,17617			
Tiempo					
1	11	0,481818	0,524118	-0,575168	1,5388
2	10	0,551818	0,574142	-0,606052	1,70969
3	8	1,21057	0,665547	-0,131638	2,55277
4	8	1,39807	0,665547	0,0558624	2,74027
5	8	3,49807	0,665547	2,15586	4,84027
6	8	3,51057	0,665547	2,16836	4,85277
7	7	4,58229	0,71127	3,14788	6,01671
Panelistas					
1	7	3,51429	0,657016	2,18928	4,83929
2	7	2,78571	0,657016	1,46071	4,11072
3	7	1,52857	0,657016	0,203569	2,85357
4	7	2,51429	0,657016	1,18928	3,83929
5	7	3,21429	0,657016	1,88928	4,53929
6	7	1,72857	0,657016	0,403569	3,05357
7	7	1,57143	0,657016	0,246426	2,89643
8	6	1,36769	0,716863	-0,0780087	2,81338
9	2	1,90935	1,28337	-0,678805	4,49751
10	2	2,10935	1,28337	-0,478805	4,69751
11	1	1,69435	1,81905	-1,97413	5,36283

The StatAdvisor

This table shows the mean Goteo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Goteo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
1	11	0,481818	X
2	10	0,551818	X
3	8	1,21057	XX
4	8	1,39807	XX
5	8	3,49807	XX
6	8	3,51057	XX
7	7	4,58229	X

Contrast	Difference	+/- Limits
1 - 2	-0,07	2,34859
1 - 3	-0,72875	2,49763
1 - 4	-0,91625	2,49763
1 - 5	*-3,01625	2,49763
1 - 6	*-3,02875	2,49763
1 - 7	*-4,10048	2,59887
2 - 3	-0,65875	2,54967
2 - 4	-0,84625	2,54967
2 - 5	*-2,94625	2,54967
2 - 6	*-2,95875	2,54967
2 - 7	*-4,03048	2,64892
3 - 4	-0,1875	2,68759
3 - 5	-2,2875	2,68759
3 - 6	-2,3	2,68759
3 - 7	*-3,37173	2,78192
4 - 5	-2,1	2,68759
4 - 6	-2,1125	2,68759
4 - 7	*-3,18423	2,78192
5 - 6	-0,0125	2,68759
5 - 7	-1,08423	2,78192
6 - 7	-1,07173	2,78192

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 8 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Goteo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Goteo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-0,688823	0,470655	-1,46354	0,1487
Slope	0,743435	0,110832	6,70777	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	135,816	1	135,816	44,99	0,0000
Residual	175,074	58	3,01851		
Total (Corr.)	310,889	59			

Correlation Coefficient = 0,660955
R-squared = 43,6862 percent
Standard Error of Est. = 1,73739

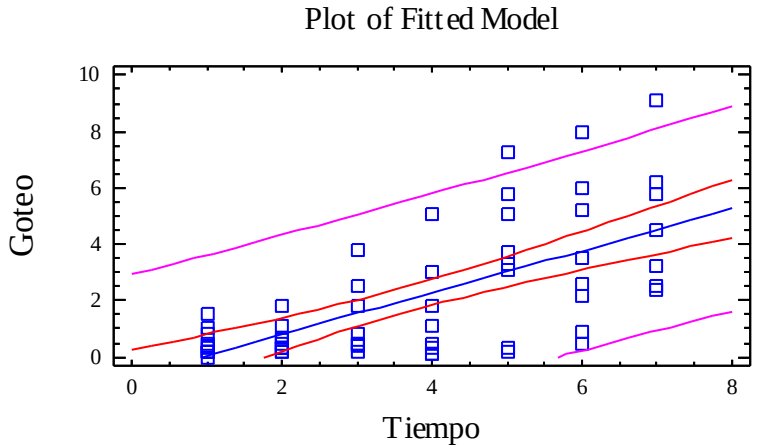
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Goteo and Tiempo. The equation of the fitted model is

Goteo = -0,688823 + 0,743435*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Goteo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 43,6862% of the variability in Goteo. The correlation coefficient equals 0,660955, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,73739. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	135,816	1	135,816	44,99	0,0000
Residual	175,074	58	3,01851		
Lack-of-Fit	11,1913	5	2,23826	0,72	0,6085
Pure Error	163,882	53	3,09212		
Total (Corr.)	310,889	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Goteo

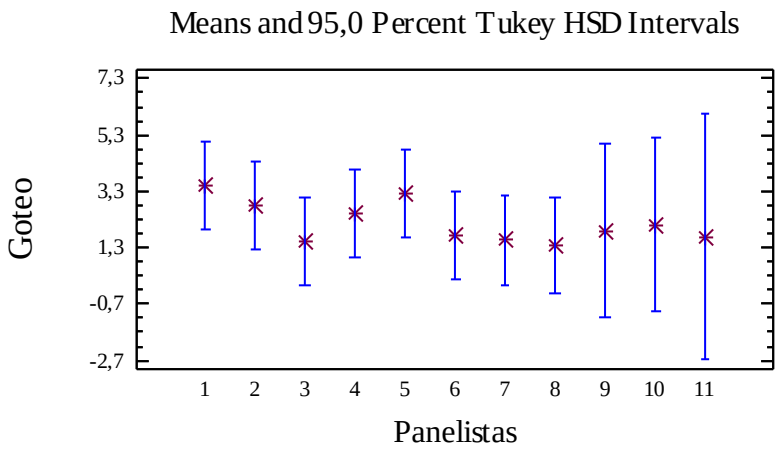
Analysis Summary

Dependent variable: Goteo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Goteo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Goteo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Goteo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	33,9497	10	3,39497	1,12	0,3675
B:Tiempo	124,168	6	20,6946	6,85	0,0000
RESIDUAL	129,933	43	3,02169		
TOTAL (CORRECTED)	310,889	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Goteo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Goteo at the 95,0% confidence level.

Table of Least Squares Means for Goteo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	2,17617			
Panelistas					
1	7	3,51429	0,657016	2,18928	4,83929
2	7	2,78571	0,657016	1,46071	4,11072
3	7	1,52857	0,657016	0,203569	2,85357
4	7	2,51429	0,657016	1,18928	3,83929
5	7	3,21429	0,657016	1,88928	4,53929
6	7	1,72857	0,657016	0,403569	3,05357
7	7	1,57143	0,657016	0,246426	2,89643
8	6	1,36769	0,716863	-0,0780087	2,81338
9	2	1,90935	1,28337	-0,678805	4,49751
10	2	2,10935	1,28337	-0,478805	4,69751
11	1	1,69435	1,81905	-1,97413	5,36283
Tiempo					
1	11	0,481818	0,524118	-0,575168	1,5388
2	10	0,551818	0,574142	-0,606052	1,70969
3	8	1,21057	0,665547	-0,131638	2,55277
4	8	1,39807	0,665547	0,0558624	2,74027
5	8	3,49807	0,665547	2,15586	4,84027
6	8	3,51057	0,665547	2,16836	4,85277
7	7	4,58229	0,71127	3,14788	6,01671

The StatAdvisor

This table shows the mean Goteo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Goteo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
8	6	1,36769	X
3	7	1,52857	X
7	7	1,57143	X
11	1	1,69435	X
6	7	1,72857	X
9	2	1,90935	X
10	2	2,10935	X
4	7	2,51429	X
2	7	2,78571	X
5	7	3,21429	X
1	7	3,51429	X

Contrast	Difference	+/- Limits
1 - 2	0,728571	3,15659
1 - 3	1,98571	3,15659
1 - 4	1,0	3,15659
1 - 5	0,3	3,15659
1 - 6	1,78571	3,15659
1 - 7	1,94286	3,15659
1 - 8	2,1466	3,28548
1 - 9	1,60493	4,73488
1 - 10	1,40493	4,73488
1 - 11	1,81993	6,31318
2 - 3	1,25714	3,15659
2 - 4	0,271429	3,15659
2 - 5	-0,428571	3,15659
2 - 6	1,05714	3,15659
2 - 7	1,21429	3,15659
2 - 8	1,41803	3,28548
2 - 9	0,876361	4,73488
2 - 10	0,676361	4,73488
2 - 11	1,09136	6,31318
3 - 4	-0,985714	3,15659
3 - 5	-1,68571	3,15659
3 - 6	-0,2	3,15659
3 - 7	-0,0428571	3,15659
3 - 8	0,160884	3,28548
3 - 9	-0,380782	4,73488
3 - 10	-0,580782	4,73488
3 - 11	-0,165782	6,31318
4 - 5	-0,7	3,15659

4 - 6	0,785714	3,15659
4 - 7	0,942857	3,15659
4 - 8	1,1466	3,28548
4 - 9	0,604932	4,73488
4 - 10	0,404932	4,73488
4 - 11	0,819932	6,31318
5 - 6	1,48571	3,15659
5 - 7	1,64286	3,15659
5 - 8	1,8466	3,28548
5 - 9	1,30493	4,73488
5 - 10	1,10493	4,73488
5 - 11	1,51993	6,31318
6 - 7	0,157143	3,15659
6 - 8	0,360884	3,28548
6 - 9	-0,180782	4,73488
6 - 10	-0,380782	4,73488
6 - 11	0,0342177	6,31318
7 - 8	0,203741	3,28548
7 - 9	-0,337925	4,73488
7 - 10	-0,537925	4,73488
7 - 11	-0,122925	6,31318
8 - 9	-0,541667	4,82177
8 - 10	-0,741667	4,82177
8 - 11	-0,326667	6,3786
9 - 10	-0,2	5,90544
9 - 11	0,215	7,23265
10 - 11	0,415	7,23265

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Goteo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Goteo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3,53334	0,591514	5,97339	0,0000
Slope	-0,296248	0,106612	-2,77874	0,0073

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	36,5254	1	36,5254	7,72	0,0073
Residual	274,364	58	4,73041		
Total (Corr.)	310,889	59			

Correlation Coefficient = -0,342763
R-squared = 11,7487 percent
Standard Error of Est. = 2,17495

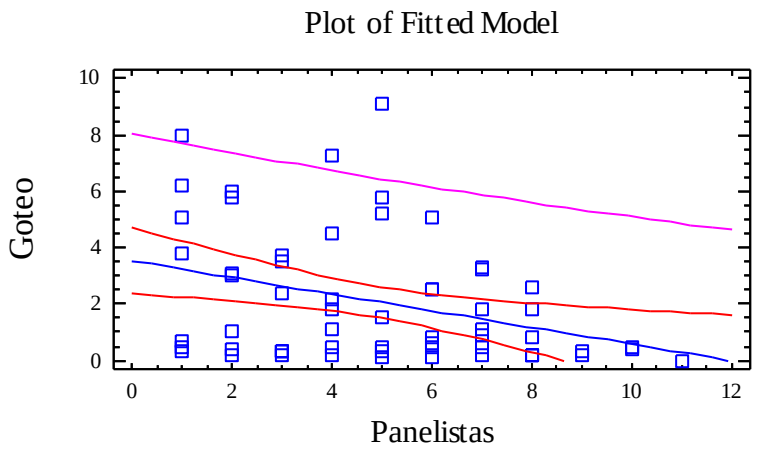
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Goteo and Panelistas. The equation of the fitted model is

Goteo = 3,53334 - 0,296248*Panelistas

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Goteo and Panelistas at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 11,7487% of the variability in Goteo. The correlation coefficient equals -0,342763, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,17495. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	36,5254	1	36,5254	7,72	0,0073
Residual	274,364	58	4,73041		
Lack-of-Fit	20,2635	9	2,2515	0,43	0,9100
Pure Error	254,1	49	5,18572		
Total (Corr.)	310,889	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

3.4 ANOVA OLOR TIPICO CRUDO

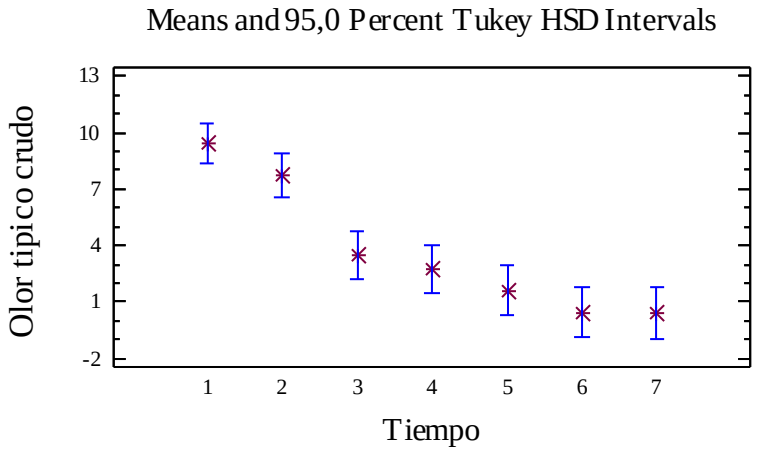
Analysis Summary

Dependent variable: Olor tipico crudo
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor tipico crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor tipico crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor tipico crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	598,459	6	99,7432	40,64	0,0000
B:Panelistas	52,6233	10	5,26233	2,14	0,0412
RESIDUAL	105,53	43	2,45419		
TOTAL (CORRECTED)	837,127	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor tipico crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since 2 P-values are less than 0,05, these factors have a statistically significant effect on Olor tipico crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor tipico crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	3,68296			
Tiempo					
1	11	9,41818	0,472343	8,46561	10,3708
2	10	7,72818	0,517426	6,68469	8,77167
3	8	3,49193	0,599801	2,28231	4,70155
4	8	2,72943	0,599801	1,51981	3,93905
5	8	1,61693	0,599801	0,407314	2,82655
6	8	0,429432	0,599801	-0,780186	1,63905
7	7	0,366634	0,641008	-0,926083	1,65935
Panelistas					
1	7	5,41429	0,592114	4,22017	6,6084
2	7	2,41429	0,592114	1,22017	3,6084
3	7	4,4	0,592114	3,20589	5,59411
4	7	4,81429	0,592114	3,62017	6,0084
5	7	3,32857	0,592114	2,13446	4,52268
6	7	3,95714	0,592114	2,76303	5,15126
7	7	3,18571	0,592114	1,9916	4,37983
8	6	3,11395	0,646049	1,81106	4,41683
9	2	2,45978	1,15659	0,127289	4,79227
10	2	3,15978	1,15659	0,827289	5,49227
11	1	4,26478	1,63936	0,958686	7,57087

The StatAdvisor

This table shows the mean Olor tipico crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor tipico crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	0,366634	X
6	8	0,429432	X
5	8	1,61693	XX
4	8	2,72943	XX
3	8	3,49193	X
2	10	7,72818	X
1	11	9,41818	X

Contrast	Difference	+/- Limits
1 - 2	1,69	2,11658
1 - 3	*5,92625	2,25091
1 - 4	*6,68875	2,25091
1 - 5	*7,80125	2,25091
1 - 6	*8,98875	2,25091
1 - 7	*9,05155	2,34214
2 - 3	*4,23625	2,29781
2 - 4	*4,99875	2,29781
2 - 5	*6,11125	2,29781
2 - 6	*7,29875	2,29781
2 - 7	*7,36155	2,38725
3 - 4	0,7625	2,4221
3 - 5	1,875	2,4221
3 - 6	*3,0625	2,4221
3 - 7	*3,1253	2,50711
4 - 5	1,1125	2,4221
4 - 6	2,3	2,4221
4 - 7	2,3628	2,50711
5 - 6	1,1875	2,4221
5 - 7	1,2503	2,50711
6 - 7	0,0627976	2,50711

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 12 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor tipico crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor tipico crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	10,1665	0,52922	19,2103	0,0000
Slope	-1,58299	0,124623	-12,7022	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	615,772	1	615,772	161,35	0,0000
Residual	221,355	58	3,81646		
Total (Corr.)	837,127	59			

Correlation Coefficient = -0,857658
R-squared = 73,5578 percent
Standard Error of Est. = 1,95358

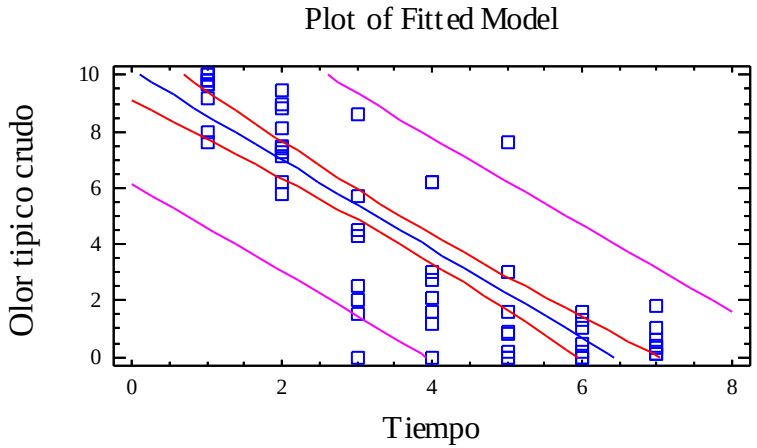
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor tipico crudo and Tiempo. The equation of the fitted model is

Olor tipico crudo = 10,1665 - 1,58299*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor tipico crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 73,5578% of the variability in Olor tipico crudo. The correlation coefficient equals -0,857658, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,95358. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	615,772	1	615,772	161,35	0,0000
Residual	221,355	58	3,81646		
Lack-of-Fit	63,2015	5	12,6403	4,24	0,0026
Pure Error	158,153	53	2,98403		
Total (Corr.)	837,127	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Multifactor ANOVA - Olor tipico crudo

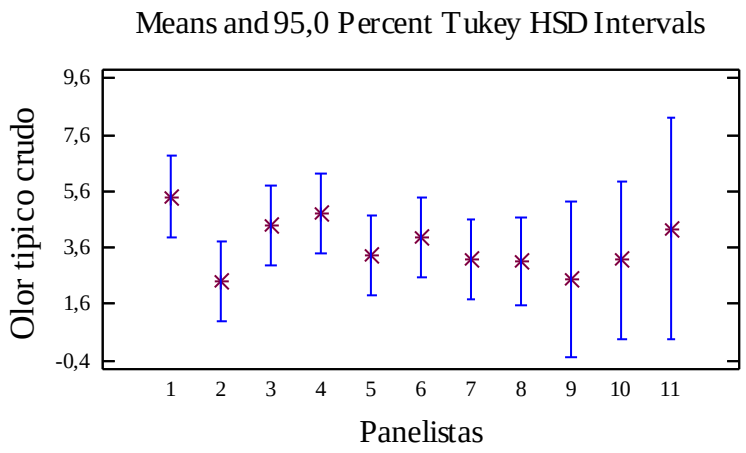
Analysis Summary

Dependent variable: Olor tipico crudo
Factors:
- Panelistas
- Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor tipico crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor tipico crudo. It67 also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor tipico crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	52,6233	10	5,26233	2,14	0,0412
B:Tiempo	598,459	6	99,7432	40,64	0,0000
RESIDUAL	105,53	43	2,45419		
TOTAL (CORRECTED)	837,127	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor tipico crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since 2 P-values are less than 0,05, these factors have a statistically significant effect on Olor tipico crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor tipico crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	3,68296			
Panelistas					
1	7	5,41429	0,592114	4,22017	6,6084
2	7	2,41429	0,592114	1,22017	3,6084
3	7	4,4	0,592114	3,20589	5,59411
4	7	4,81429	0,592114	3,62017	6,0084
5	7	3,32857	0,592114	2,13446	4,52268
6	7	3,95714	0,592114	2,76303	5,15126
7	7	3,18571	0,592114	1,9916	4,37983
8	6	3,11395	0,646049	1,81106	4,41683
9	2	2,45978	1,15659	0,127289	4,79227
10	2	3,15978	1,15659	0,827289	5,49227
11	1	4,26478	1,63936	0,958686	7,57087
Tiempo					
1	11	9,41818	0,472343	8,46561	10,3708
2	10	7,72818	0,517426	6,68469	8,77167
3	8	3,49193	0,599801	2,28231	4,70155
4	8	2,72943	0,599801	1,51981	3,93905
5	8	1,61693	0,599801	0,407314	2,82655
6	8	0,429432	0,599801	-0,780186	1,63905
7	7	0,366634	0,641008	-0,926083	1,65935

The StatAdvisor

This table shows the mean Olor tipico crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor tipico crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
2	7	2,41429	X
9	2	2,45978	XX
8	6	3,11395	XX
10	2	3,15978	XX
7	7	3,18571	XX
5	7	3,32857	XX
6	7	3,95714	XX
11	1	4,26478	XX
3	7	4,4	XX
4	7	4,81429	XX
1	7	5,41429	X

Contrast	Difference	+/- Limits
1 - 2	*3,0	2,84477
1 - 3	1,01429	2,84477
1 - 4	0,6	2,84477
1 - 5	2,08571	2,84477
1 - 6	1,45714	2,84477
1 - 7	2,22857	2,84477
1 - 8	2,30034	2,96093
1 - 9	2,95451	4,26715
1 - 10	2,25451	4,26715
1 - 11	1,14951	5,68954
2 - 3	-1,98571	2,84477
2 - 4	-2,4	2,84477
2 - 5	-0,914286	2,84477
2 - 6	-1,54286	2,84477
2 - 7	-0,771429	2,84477
2 - 8	-0,69966	2,96093
2 - 9	-0,0454932	4,26715
2 - 10	-0,745493	4,26715
2 - 11	-1,85049	5,68954
3 - 4	-0,414286	2,84477
3 - 5	1,07143	2,84477
3 - 6	0,442857	2,84477
3 - 7	1,21429	2,84477
3 - 8	1,28605	2,96093
3 - 9	1,94022	4,26715
3 - 10	1,24022	4,26715
3 - 11	0,135221	5,68954
4 - 5	1,48571	2,84477

4 - 6	0,857143	2,84477
4 - 7	1,62857	2,84477
4 - 8	1,70034	2,96093
4 - 9	2,35451	4,26715
4 - 10	1,65451	4,26715
4 - 11	0,549507	5,68954
5 - 6	-0,628571	2,84477
5 - 7	0,142857	2,84477
5 - 8	0,214626	2,96093
5 - 9	0,868793	4,26715
5 - 10	0,168793	4,26715
5 - 11	-0,936207	5,68954
6 - 7	0,771429	2,84477
6 - 8	0,843197	2,96093
6 - 9	1,49736	4,26715
6 - 10	0,797364	4,26715
6 - 11	-0,307636	5,68954
7 - 8	0,0717687	2,96093
7 - 9	0,725935	4,26715
7 - 10	0,0259354	4,26715
7 - 11	-1,07906	5,68954
8 - 9	0,654167	4,34546
8 - 10	-0,0458333	4,34546
8 - 11	-1,15083	5,7485
9 - 10	-0,7	5,32207
9 - 11	-1,805	6,51818
10 - 11	-1,105	6,51818

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 1 pair, indicating that this pair shows a statistically significant difference at the 95,0% confidence level. At the top of the page, 2 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor tipico crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor tipico crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3,4377	1,02598	3,35065	0,0014
Slope	0,167707	0,184919	0,906919	0,3682

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	11,7054	1	11,7054	0,82	0,3682
Residual	825,422	58	14,2314		
Total (Corr.)	837,127	59			

Correlation Coefficient = 0,118249
R-squared = 1,39828 percent
Standard Error of Est. = 3,77245

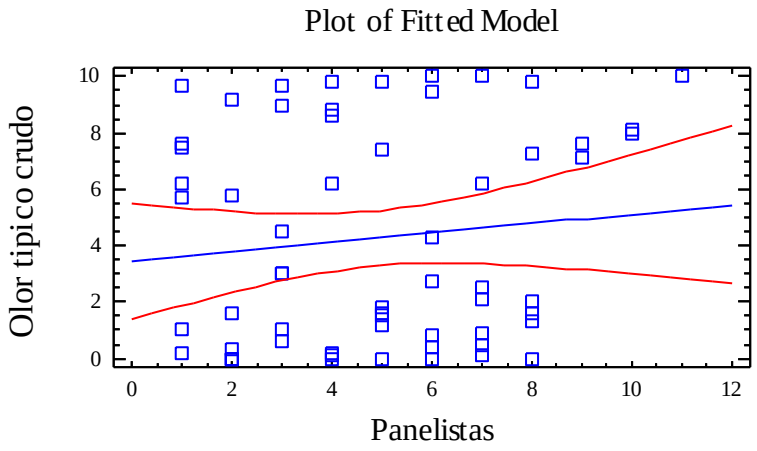
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor tipico crudo and Panelistas. The equation of the fitted model is

Olor tipico crudo = 3,4377 + 0,167707*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor tipico crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,39828% of the variability in Olor tipico crudo. The correlation coefficient equals 0,118249, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 3,77245. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	11,7054	1	11,7054	0,82	0,3682
Residual	825,422	58	14,2314		
Lack-of-Fit	121,433	9	13,4925	0,94	0,5005
Pure Error	703,989	49	14,3671		
Total (Corr.)	837,127	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

3.5 ANOVA OLOR RANCIO CRUDO

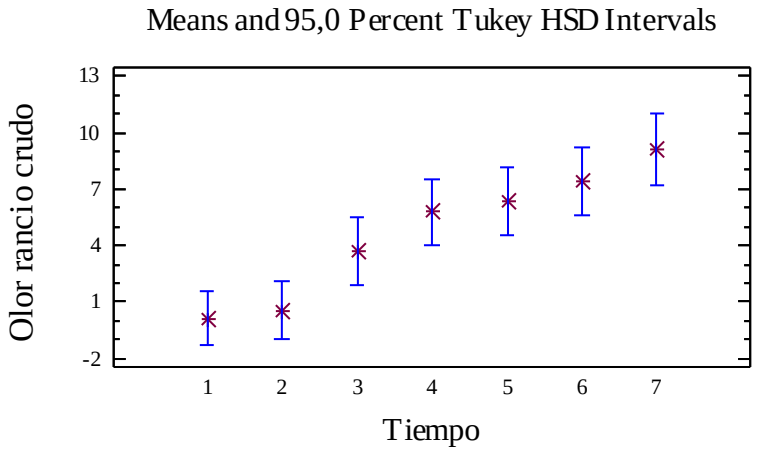
Analysis Summary

Dependent variable: Olor rancio crudo
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor rancio crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor rancio crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor rancio crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	542,819	6	90,4698	19,84	0,0000
B:Panelistas	30,4079	10	3,04079	0,67	0,7481
RESIDUAL	196,033	43	4,55891		
TOTAL (CORRECTED)	854,61	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor rancio crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor rancio crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor rancio crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	4,71173			
Tiempo					
1	11	0,109091	0,643775	-1,18921	1,40739
2	10	0,509091	0,705221	-0,913125	1,93131
3	8	3,68409	0,817493	2,03546	5,33273
4	8	5,78409	0,817493	4,13546	7,43273
5	8	6,32159	0,817493	4,67296	7,97023
6	8	7,42159	0,817493	5,77296	9,07023
7	7	9,15254	0,873655	7,39065	10,9144
Panelistas					
1	7	3,55714	0,807015	1,92964	5,18465
2	7	5,15714	0,807015	3,52964	6,78465
3	7	4,17143	0,807015	2,54392	5,79893
4	7	4,38571	0,807015	2,75821	6,01322
5	7	4,28571	0,807015	2,65821	5,91322
6	7	5,08571	0,807015	3,45821	6,71322
7	7	5,37143	0,807015	3,74392	6,99893
8	6	6,1068	0,880526	4,33105	7,88256
9	2	4,45264	1,57636	1,27359	7,63168
10	2	4,65264	1,57636	1,47359	7,83168
11	1	4,60264	2,23435	0,0966304	9,10864

The StatAdvisor

This table shows the mean Olor rancio crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor rancio crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
1	11	0,109091	X
2	10	0,509091	X
3	8	3,68409	X
4	8	5,78409	XX
5	8	6,32159	XX
6	8	7,42159	X
7	7	9,15254	X

Contrast	Difference	+/- Limits
1 - 2	-0,4	2,88478
1 - 3	*-3,575	3,06785
1 - 4	*-5,675	3,06785
1 - 5	*-6,2125	3,06785
1 - 6	*-7,3125	3,06785
1 - 7	*-9,04345	3,1922
2 - 3	*-3,175	3,13177
2 - 4	*-5,275	3,13177
2 - 5	*-5,8125	3,13177
2 - 6	*-6,9125	3,13177
2 - 7	*-8,64345	3,25368
3 - 4	-2,1	3,30118
3 - 5	-2,6375	3,30118
3 - 6	*-3,7375	3,30118
3 - 7	*-5,46845	3,41704
4 - 5	-0,5375	3,30118
4 - 6	-1,6375	3,30118
4 - 7	-3,36845	3,41704
5 - 6	-1,1	3,30118
5 - 7	-2,83095	3,41704
6 - 7	-1,73095	3,41704

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* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 12 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor rancio crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor rancio crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-1,56	0,565742	-2,75744	0,0078
Slope	1,56473	0,133223	11,7452	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	601,65	1	601,65	137,95	0,0000
Residual	252,96	58	4,36138		
Total (Corr.)	854,61	59			

Correlation Coefficient = 0,83905
R-squared = 70,4005 percent
Standard Error of Est. = 2,08839

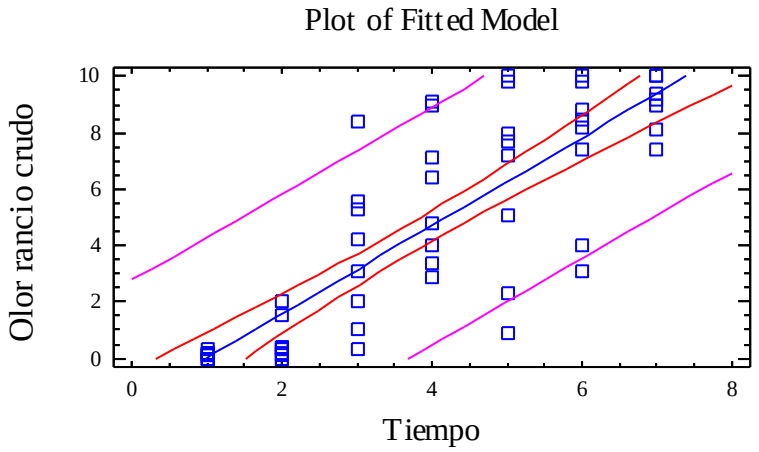
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor rancio crudo and Tiempo. The equation of the fitted model is

Olor rancio crudo = -1,56 + 1,56473*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor rancio crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 70,4005% of the variability in Olor rancio crudo. The correlation coefficient equals 0,83905, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,08839. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	601,65	1	601,65	137,95	0,0000
Residual	252,96	58	4,36138		
Lack-of-Fit	26,519	5	5,3038	1,24	0,3031
Pure Error	226,441	53	4,27247		
Total (Corr.)	854,61	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Olor rancio crudo

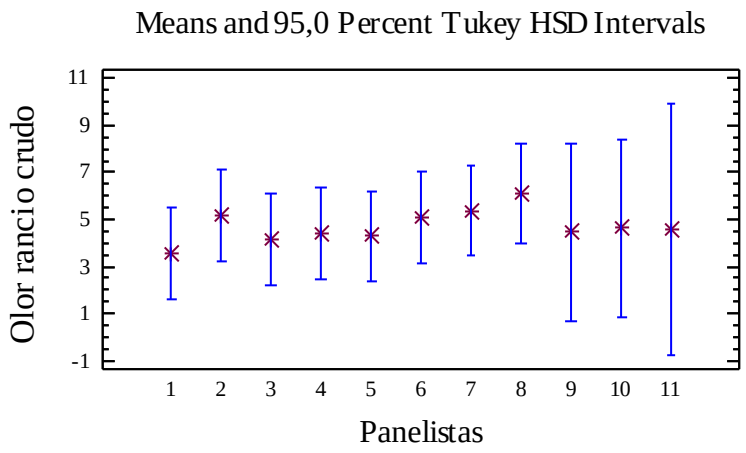
Analysis Summary

Dependent variable: Olor rancio crudo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor rancio crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor rancio crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor rancio crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	30,4079	10	3,04079	0,67	0,7481
B:Tiempo	542,819	6	90,4698	19,84	0,0000
RESIDUAL	196,033	43	4,55891		
TOTAL (CORRECTED)	854,61	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor rancio crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor rancio crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor rancio crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	4,71173			
Panelistas					
1	7	3,55714	0,807015	1,92964	5,18465
2	7	5,15714	0,807015	3,52964	6,78465
3	7	4,17143	0,807015	2,54392	5,79893
4	7	4,38571	0,807015	2,75821	6,01322
5	7	4,28571	0,807015	2,65821	5,91322
6	7	5,08571	0,807015	3,45821	6,71322
7	7	5,37143	0,807015	3,74392	6,99893
8	6	6,1068	0,880526	4,33105	7,88256
9	2	4,45264	1,57636	1,27359	7,63168
10	2	4,65264	1,57636	1,47359	7,83168
11	1	4,60264	2,23435	0,0966304	9,10864
Tiempo					
1	11	0,109091	0,643775	-1,18921	1,40739
2	10	0,509091	0,705221	-0,913125	1,93131
3	8	3,68409	0,817493	2,03546	5,33273
4	8	5,78409	0,817493	4,13546	7,43273
5	8	6,32159	0,817493	4,67296	7,97023
6	8	7,42159	0,817493	5,77296	9,07023
7	7	9,15254	0,873655	7,39065	10,9144

The StatAdvisor

This table shows the mean Olor rancio crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor rancio crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
1	7	3,55714	X
3	7	4,17143	X
5	7	4,28571	X
4	7	4,38571	X
9	2	4,45264	X
11	1	4,60264	X
10	2	4,65264	X
6	7	5,08571	X
2	7	5,15714	X
7	7	5,37143	X
8	6	6,1068	X

Contrast	Difference	+/- Limits
1 - 2	-1,6	3,87725
1 - 3	-0,614286	3,87725
1 - 4	-0,828571	3,87725
1 - 5	-0,728571	3,87725
1 - 6	-1,52857	3,87725
1 - 7	-1,81429	3,87725
1 - 8	-2,54966	4,03557
1 - 9	-0,895493	5,81587
1 - 10	-1,09549	5,81587
1 - 11	-1,04549	7,7545
2 - 3	0,985714	3,87725
2 - 4	0,771429	3,87725
2 - 5	0,871429	3,87725
2 - 6	0,0714286	3,87725
2 - 7	-0,214286	3,87725
2 - 8	-0,94966	4,03557
2 - 9	0,704507	5,81587
2 - 10	0,504507	5,81587
2 - 11	0,554507	7,7545
3 - 4	-0,214286	3,87725
3 - 5	-0,114286	3,87725
3 - 6	-0,914286	3,87725
3 - 7	-1,2	3,87725
3 - 8	-1,93537	4,03557
3 - 9	-0,281207	5,81587
3 - 10	-0,481207	5,81587
3 - 11	-0,431207	7,7545
4 - 5	0,1	3,87725

4 - 6	-0,7	3,87725
4 - 7	-0,985714	3,87725
4 - 8	-1,72109	4,03557
4 - 9	-0,0669218	5,81587
4 - 10	-0,266922	5,81587
4 - 11	-0,216922	7,7545
5 - 6	-0,8	3,87725
5 - 7	-1,08571	3,87725
5 - 8	-1,82109	4,03557
5 - 9	-0,166922	5,81587
5 - 10	-0,366922	5,81587
5 - 11	-0,316922	7,7545
6 - 7	-0,285714	3,87725
6 - 8	-1,02109	4,03557
6 - 9	0,633078	5,81587
6 - 10	0,433078	5,81587
6 - 11	0,483078	7,7545
7 - 8	-0,735374	4,03557
7 - 9	0,918793	5,81587
7 - 10	0,718793	5,81587
7 - 11	0,768793	7,7545
8 - 9	1,65417	5,9226
8 - 10	1,45417	5,9226
8 - 11	1,50417	7,83486
9 - 10	-0,2	7,25367
9 - 11	-0,15	8,88389
10 - 11	0,05	8,88389

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor rancio crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor rancio crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	4,94729	1,03923	4,76054	0,0000
Slope	-0,136306	0,187307	-0,727715	0,4697

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	7,73242	1	7,73242	0,53	0,4697
Residual	846,877	58	14,6013		
Total (Corr.)	854,61	59			

Correlation Coefficient = -0,0951204
R-squared = 0,904789 percent
Standard Error of Est. = 3,82117

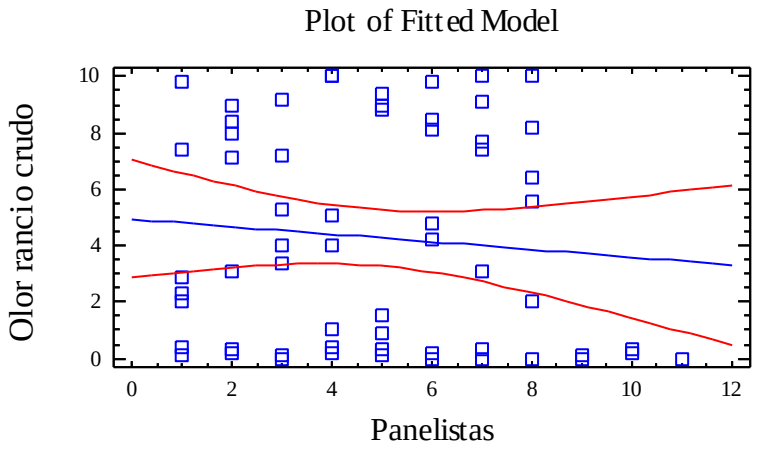
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor rancio crudo and Panelistas. The equation of the fitted model is

Olor rancio crudo = 4,94729 - 0,136306*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor rancio crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 0,904789% of the variability in Olor rancio crudo. The correlation coefficient equals -0,0951204, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 3,82117. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	7,73242	1	7,73242	0,53	0,4697
Residual	846,877	58	14,6013		
Lack-of-Fit	108,026	9	12,0028	0,80	0,6215
Pure Error	738,852	49	15,0786		
Total (Corr.)	854,61	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

3.6 ANOVA OLOR PUTRIDO CRUDO

```
Analysis Summary

Dependent variable: Olor putrido crudo
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for Olor
putrido crudo.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Olor putrido
crudo.  It also tests for significant interactions amongst the
factors, given sufficient data.  The F-tests in the ANOVA table will
allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are
significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
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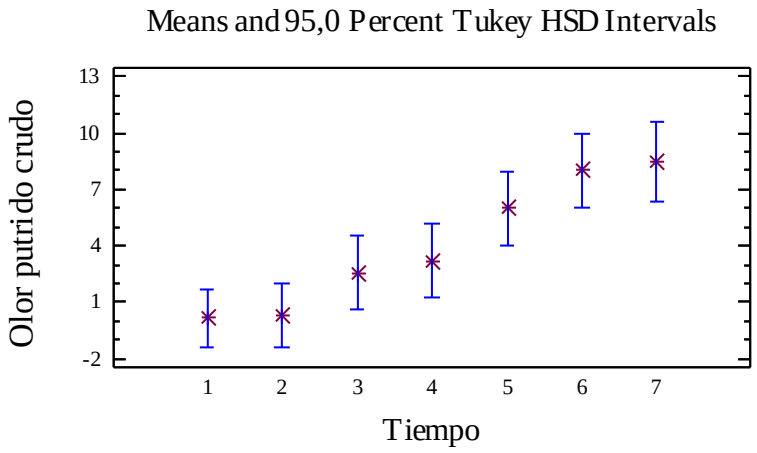


Analysis of Variance for Olor putrido crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	545,935	6	90,9891	16,14	0,0000
B:Panelistas	11,624	10	1,1624	0,21	0,9946
RESIDUAL	242,34	43	5,6358		
TOTAL (CORRECTED)	860,476	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor putrido crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor putrido crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor putrido crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	4,10123			
Tiempo					
1	11	0,145455	0,715783	-1,29806	1,58897
2	10	0,325455	0,784101	-1,25584	1,90675
3	8	2,56045	0,908932	0,727415	4,39349
4	8	3,19795	0,908932	1,36491	5,03099
5	8	6,01045	0,908932	4,17741	7,84349
6	8	8,01045	0,908932	6,17741	9,84349
7	7	8,45837	0,971375	6,4994	10,4173
Panelistas					
1	7	3,6	0,897282	1,79045	5,40955
2	7	3,95714	0,897282	2,1476	5,76669
3	7	3,3	0,897282	1,49045	5,10955
4	7	3,8	0,897282	1,99045	5,60955
5	7	4,42857	0,897282	2,61903	6,23812
6	7	4,58571	0,897282	2,77617	6,39526
7	7	4,52857	0,897282	2,71903	6,33812
8	6	4,32619	0,979015	2,35181	6,30057
9	2	3,96577	1,75268	0,431145	7,5004
10	2	4,66577	1,75268	1,13115	8,2004
11	1	3,95577	2,48427	-1,05424	8,96579

The StatAdvisor

This table shows the mean Olor putrido crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor putrido crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
1	11	0,145455	X
2	10	0,325455	X
3	8	2,56045	XX
4	8	3,19795	XX
5	8	6,01045	XX
6	8	8,01045	X
7	7	8,45837	X

Contrast	Difference	+/- Limits
1 - 2	-0,18	3,20745
1 - 3	-2,415	3,411
1 - 4	-3,0525	3,411
1 - 5	*-5,865	3,411
1 - 6	*-7,865	3,411
1 - 7	*-8,31292	3,54925
2 - 3	-2,235	3,48207
2 - 4	-2,8725	3,48207
2 - 5	*-5,685	3,48207
2 - 6	*-7,685	3,48207
2 - 7	*-8,13292	3,61761
3 - 4	-0,6375	3,67042
3 - 5	-3,45	3,67042
3 - 6	*-5,45	3,67042
3 - 7	*-5,89792	3,79925
4 - 5	-2,8125	3,67042
4 - 6	*-4,8125	3,67042
4 - 7	*-5,26042	3,79925
5 - 6	-2,0	3,67042
5 - 7	-2,44792	3,79925
6 - 7	-0,447917	3,79925

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 10 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor putrido crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor putrido crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-2,07162	0,59226	-3,49782	0,0009
Slope	1,54061	0,139468	11,0464	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	583,245	1	583,245	122,02	0,0000
Residual	277,231	58	4,77984		
Total (Corr.)	860,476	59			

Correlation Coefficient = 0,823296
R-squared = 67,7817 percent
Standard Error of Est. = 2,18628

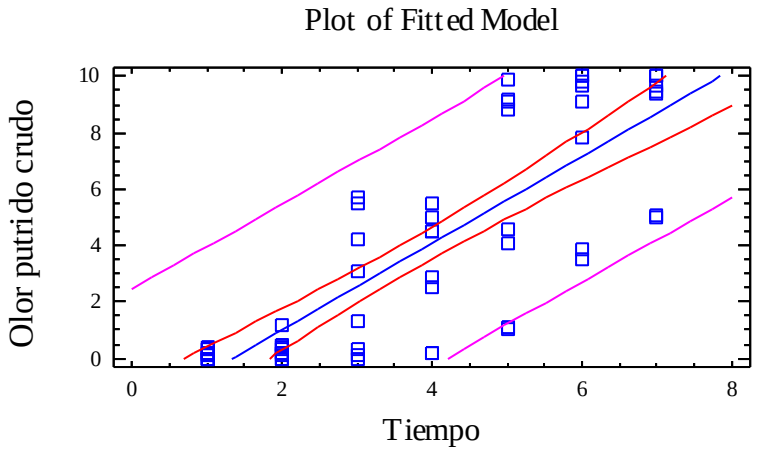
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor putrido crudo and Tiempo. The equation of the fitted model is

Olor putrido crudo = -2,07162 + 1,54061*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor putrido crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 67,7817% of the variability in Olor putrido crudo. The correlation coefficient equals 0,823296, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,18628. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	583,245	1	583,245	122,02	0,0000
Residual	277,231	58	4,77984		
Lack-of-Fit	23,2671	5	4,65342	0,97	0,4439
Pure Error	253,964	53	4,79177		
Total (Corr.)	860,476	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Olor putrido crudo

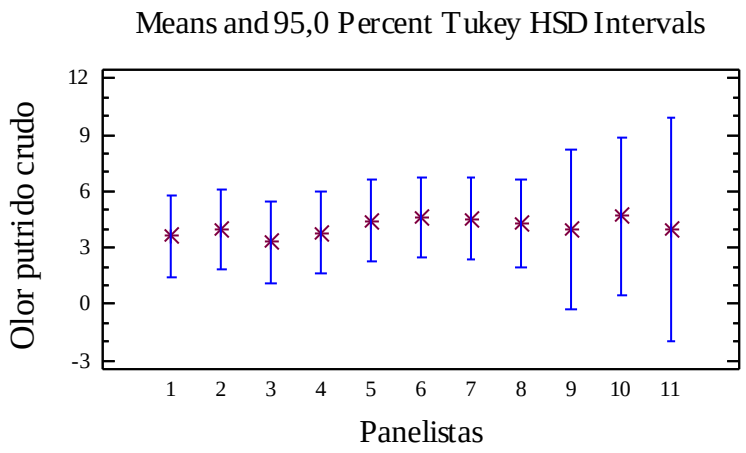
Analysis Summary

Dependent variable: Olor putrido crudo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor putrido crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor putrido crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor putrido crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	11,624	10	1,1624	0,21	0,9946
B:Tiempo	545,935	6	90,9891	16,14	0,0000
RESIDUAL	242,34	43	5,6358		
TOTAL (CORRECTED)	860,476	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor putrido crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor putrido crudo at the 95,0% confidence level.

Table of Least Squares Means for Olor putrido crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	4,10123			
Panelistas					
1	7	3,6	0,897282	1,79045	5,40955
2	7	3,95714	0,897282	2,1476	5,76669
3	7	3,3	0,897282	1,49045	5,10955
4	7	3,8	0,897282	1,99045	5,60955
5	7	4,42857	0,897282	2,61903	6,23812
6	7	4,58571	0,897282	2,77617	6,39526
7	7	4,52857	0,897282	2,71903	6,33812
8	6	4,32619	0,979015	2,35181	6,30057
9	2	3,96577	1,75268	0,431145	7,5004
10	2	4,66577	1,75268	1,13115	8,2004
11	1	3,95577	2,48427	-1,05424	8,96579
Tiempo					
1	11	0,145455	0,715783	-1,29806	1,58897
2	10	0,325455	0,784101	-1,25584	1,90675
3	8	2,56045	0,908932	0,727415	4,39349
4	8	3,19795	0,908932	1,36491	5,03099
5	8	6,01045	0,908932	4,17741	7,84349
6	8	8,01045	0,908932	6,17741	9,84349
7	7	8,45837	0,971375	6,4994	10,4173

The StatAdvisor

This table shows the mean Olor putrido crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor putrido crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
3	7	3,3	X
1	7	3,6	X
4	7	3,8	X
11	1	3,95577	X
2	7	3,95714	X
9	2	3,96577	X
8	6	4,32619	X
5	7	4,42857	X
7	7	4,52857	X
6	7	4,58571	X
10	2	4,66577	X

Contrast	Difference	+/- Limits
1 - 2	-0,357143	4,31093
1 - 3	0,3	4,31093
1 - 4	-0,2	4,31093
1 - 5	-0,828571	4,31093
1 - 6	-0,985714	4,31093
1 - 7	-0,928571	4,31093
1 - 8	-0,72619	4,48696
1 - 9	-0,365774	6,46639
1 - 10	-1,06577	6,46639
1 - 11	-0,355774	8,62186
2 - 3	0,657143	4,31093
2 - 4	0,157143	4,31093
2 - 5	-0,471429	4,31093
2 - 6	-0,628571	4,31093
2 - 7	-0,571429	4,31093
2 - 8	-0,369048	4,48696
2 - 9	-0,00863095	6,46639
2 - 10	-0,708631	6,46639
2 - 11	0,00136905	8,62186
3 - 4	-0,5	4,31093
3 - 5	-1,12857	4,31093
3 - 6	-1,28571	4,31093
3 - 7	-1,22857	4,31093
3 - 8	-1,02619	4,48696
3 - 9	-0,665774	6,46639
3 - 10	-1,36577	6,46639
3 - 11	-0,655774	8,62186
4 - 5	-0,628571	4,31093

4 - 6	-0,785714	4,31093
4 - 7	-0,728571	4,31093
4 - 8	-0,52619	4,48696
4 - 9	-0,165774	6,46639
4 - 10	-0,865774	6,46639
4 - 11	-0,155774	8,62186
5 - 6	-0,157143	4,31093
5 - 7	-0,1	4,31093
5 - 8	0,102381	4,48696
5 - 9	0,462798	6,46639
5 - 10	-0,237202	6,46639
5 - 11	0,472798	8,62186
6 - 7	0,0571429	4,31093
6 - 8	0,259524	4,48696
6 - 9	0,61994	6,46639
6 - 10	-0,0800595	6,46639
6 - 11	0,62994	8,62186
7 - 8	0,202381	4,48696
7 - 9	0,562798	6,46639
7 - 10	-0,137202	6,46639
7 - 11	0,572798	8,62186
8 - 9	0,360417	6,58505
8 - 10	-0,339583	6,58505
8 - 11	0,370417	8,71121
9 - 10	-0,7	8,06501
9 - 11	0,01	9,87758
10 - 11	0,71	9,87758

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor putrido crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor putrido crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	4,40561	1,04193	4,2283	0,0001
Slope	-0,148588	0,187794	-0,791231	0,4320

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,1887	1	9,1887	0,63	0,4320
Residual	851,287	58	14,6774		
Total (Corr.)	860,476	59			

Correlation Coefficient = -0,103337
R-squared = 1,06786 percent
Standard Error of Est. = 3,83111

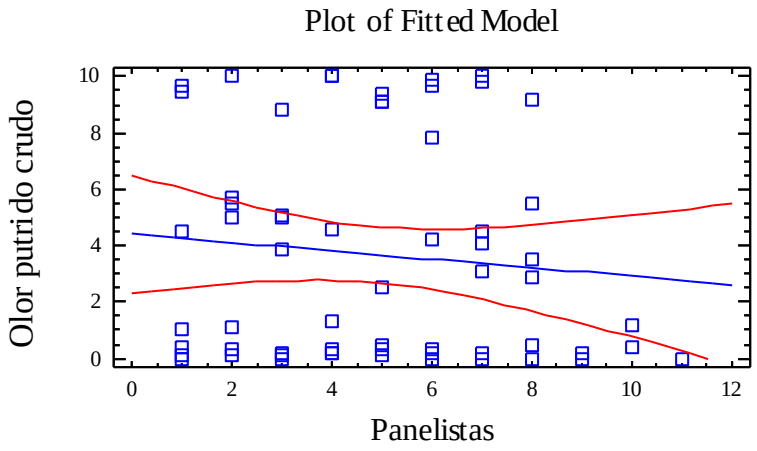
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor putrido crudo and Panelistas. The equation of the fitted model is

Olor putrido crudo = 4,40561 - 0,148588*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor putrido crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,06786% of the variability in Olor putrido crudo. The correlation coefficient equals -0,103337, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 3,83111. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,1887	1	9,1887	0,63	0,4320
Residual	851,287	58	14,6774		
Lack-of-Fit	63,013	9	7,00145	0,44	0,9094
Pure Error	788,274	49	16,0872		
Total (Corr.)	860,476	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.7 ANOVA OLOR TIPICO COCIDO

```
Analysis Summary

Dependent variable: Olor tipico cocido
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for Olor
tipico cocido.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Olor tipico
cocido.  It also tests for significant interactions amongst the
factors, given sufficient data.  The F-tests in the ANOVA table will
allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are
significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
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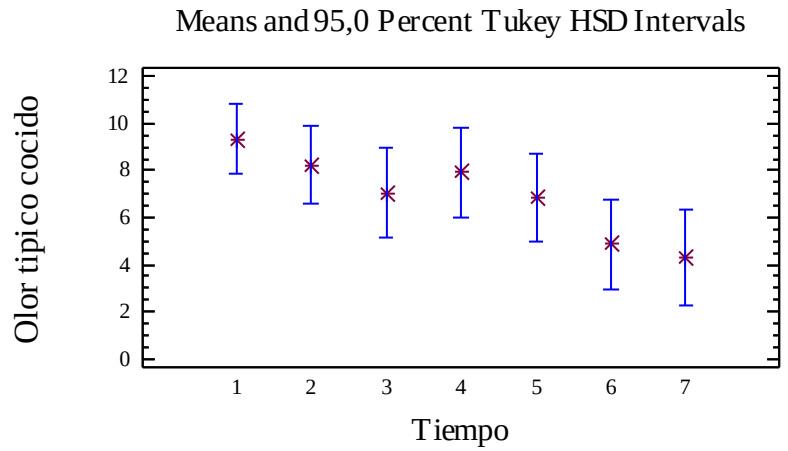


Analysis of Variance for Olor tipico cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	151,424	6	25,2374	4,88	0,0007
B:Panelistas	75,3169	10	7,53169	1,46	0,1896
RESIDUAL	222,511	43	5,17467		
TOTAL (CORRECTED)	461,048	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor tipico cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor tipico cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor tipico cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,94206			
Tiempo					
1	11	9,35455	0,685875	7,97134	10,7377
2	10	8,24455	0,751339	6,72932	9,75977
3	8	7,03705	0,870954	5,2806	8,79349
4	8	7,93705	0,870954	6,1806	9,69349
5	8	6,84955	0,870954	5,0931	8,60599
6	8	4,87455	0,870954	3,1181	6,63099
7	7	4,29716	0,930788	2,42005	6,17428
Panelistas					
1	7	8,24286	0,85979	6,50892	9,97679
2	7	6,88571	0,85979	5,15178	8,61965
3	7	7,84286	0,85979	6,10892	9,57679
4	7	8,31429	0,85979	6,58035	10,0482
5	7	6,38571	0,85979	4,65178	8,11965
6	7	4,64286	0,85979	2,90892	6,37679
7	7	6,6	0,85979	4,86606	8,33394
8	6	7,52585	0,938108	5,63397	9,41773
9	2	5,94252	1,67945	2,55558	9,32946
10	2	6,39252	1,67945	3,00558	9,77946
11	1	7,58752	2,38047	2,78684	12,3882

The StatAdvisor

This table shows the mean Olor tipico cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor tipico cocido by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	4,29716	X
6	8	4,87455	X
5	8	6,84955	XX
3	8	7,03705	XX
4	8	7,93705	XX
2	10	8,24455	X
1	11	9,35455	X

Contrast	Difference	+/- Limits
1 - 2	1,11	3,07343
1 - 3	2,3175	3,26848
1 - 4	1,4175	3,26848
1 - 5	2,505	3,26848
1 - 6	*4,48	3,26848
1 - 7	*5,05738	3,40095
2 - 3	1,2075	3,33658
2 - 4	0,3075	3,33658
2 - 5	1,395	3,33658
2 - 6	*3,37	3,33658
2 - 7	*3,94738	3,46645
3 - 4	-0,9	3,51706
3 - 5	0,1875	3,51706
3 - 6	2,1625	3,51706
3 - 7	2,73988	3,6405
4 - 5	1,0875	3,51706
4 - 6	3,0625	3,51706
4 - 7	3,63988	3,6405
5 - 6	1,975	3,51706
5 - 7	2,55238	3,6405
6 - 7	0,577381	3,6405

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 4 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 2 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor tipico cocido vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor tipico cocido
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	10,0539	0,634267	15,8512	0,0000
Slope	-0,763104	0,14936	-5,10916	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	143,097	1	143,097	26,10	0,0000
Residual	317,951	58	5,48192		
Total (Corr.)	461,048	59			

Correlation Coefficient = -0,557112
R-squared = 31,0373 percent
Standard Error of Est. = 2,34135

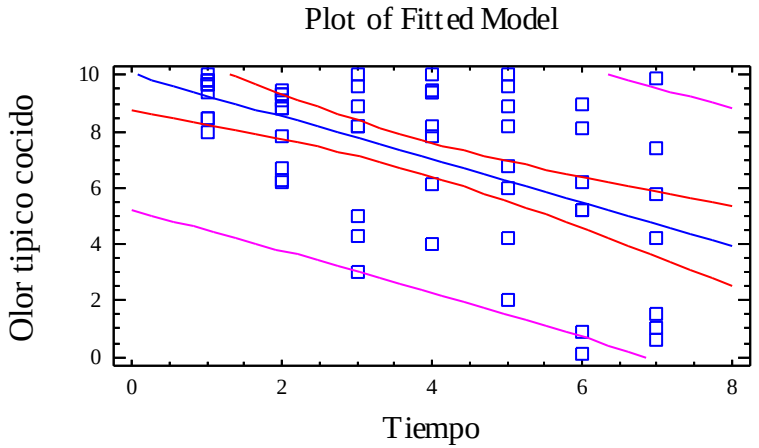
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor tipico cocido and Tiempo. The equation of the fitted model is

Olor tipico cocido = 10,0539 - 0,763104*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor tipico cocido and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 31,0373% of the variability in Olor tipico cocido. The correlation coefficient equals -0,557112, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,34135. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	143,097	1	143,097	26,10	0,0000
Residual	317,951	58	5,48192		
Lack-of-Fit	20,1234	5	4,02468	0,72	0,6141
Pure Error	297,828	53	5,61939		
Total (Corr.)	461,048	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Olor tipico cocido

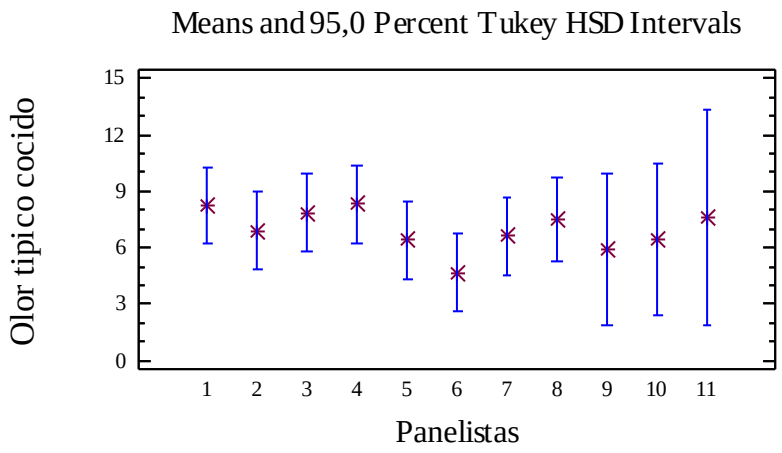
Analysis Summary

Dependent variable: Olor tipico cocido
Factors:
- Panelistas
- Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor tipico cocido. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor tipico cocido. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor tipico cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	75,3169	10	7,53169	1,46	0,1896
B:Tiempo	151,424	6	25,2374	4,88	0,0007
RESIDUAL	222,511	43	5,17467		
TOTAL (CORRECTED)	461,048	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor tipico cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor tipico cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor tipico cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,94206			
Panelistas					
1	7	8,24286	0,85979	6,50892	9,97679
2	7	6,88571	0,85979	5,15178	8,61965
3	7	7,84286	0,85979	6,10892	9,57679
4	7	8,31429	0,85979	6,58035	10,0482
5	7	6,38571	0,85979	4,65178	8,11965
6	7	4,64286	0,85979	2,90892	6,37679
7	7	6,6	0,85979	4,86606	8,33394
8	6	7,52585	0,938108	5,63397	9,41773
9	2	5,94252	1,67945	2,55558	9,32946
10	2	6,39252	1,67945	3,00558	9,77946
11	1	7,58752	2,38047	2,78684	12,3882
Tiempo					
1	11	9,35455	0,685875	7,97134	10,7377
2	10	8,24455	0,751339	6,72932	9,75977
3	8	7,03705	0,870954	5,2806	8,79349
4	8	7,93705	0,870954	6,1806	9,69349
5	8	6,84955	0,870954	5,0931	8,60599
6	8	4,87455	0,870954	3,1181	6,63099
7	7	4,29716	0,930788	2,42005	6,17428

The StatAdvisor

This table shows the mean Olor tipico cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor tipico cocido by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
6	7	4,64286	X
9	2	5,94252	X
5	7	6,38571	X
10	2	6,39252	X
7	7	6,6	X
2	7	6,88571	X
8	6	7,52585	X
11	1	7,58752	X
3	7	7,84286	X
1	7	8,24286	X
4	7	8,31429	X

Contrast	Difference	+/- Limits
1 - 2	1,35714	4,1308
1 - 3	0,4	4,1308
1 - 4	-0,0714286	4,1308
1 - 5	1,85714	4,1308
1 - 6	3,6	4,1308
1 - 7	1,64286	4,1308
1 - 8	0,717007	4,29948
1 - 9	2,30034	6,1962
1 - 10	1,85034	6,1962
1 - 11	0,65534	8,26161
2 - 3	-0,957143	4,1308
2 - 4	-1,42857	4,1308
2 - 5	0,5	4,1308
2 - 6	2,24286	4,1308
2 - 7	0,285714	4,1308
2 - 8	-0,640136	4,29948
2 - 9	0,943197	6,1962
2 - 10	0,493197	6,1962
2 - 11	-0,701803	8,26161
3 - 4	-0,471429	4,1308
3 - 5	1,45714	4,1308
3 - 6	3,2	4,1308
3 - 7	1,24286	4,1308
3 - 8	0,317007	4,29948
3 - 9	1,90034	6,1962
3 - 10	1,45034	6,1962
3 - 11	0,25534	8,26161
4 - 5	1,92857	4,1308

4 - 6	3,67143	4,1308
4 - 7	1,71429	4,1308
4 - 8	0,788435	4,29948
4 - 9	2,37177	6,1962
4 - 10	1,92177	6,1962
4 - 11	0,726769	8,26161
5 - 6	1,74286	4,1308
5 - 7	-0,214286	4,1308
5 - 8	-1,14014	4,29948
5 - 9	0,443197	6,1962
5 - 10	-0,00680272	6,1962
5 - 11	-1,2018	8,26161
6 - 7	-1,95714	4,1308
6 - 8	-2,88299	4,29948
6 - 9	-1,29966	6,1962
6 - 10	-1,74966	6,1962
6 - 11	-2,94466	8,26161
7 - 8	-0,92585	4,29948
7 - 9	0,657483	6,1962
7 - 10	0,207483	6,1962
7 - 11	-0,987517	8,26161
8 - 9	1,58333	6,30991
8 - 10	1,13333	6,30991
8 - 11	-0,0616667	8,34722
9 - 10	-0,45	7,72802
9 - 11	-1,645	9,46486
10 - 11	-1,195	9,46486

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor tipico cocido vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor tipico cocido
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	7,43691	0,766006	9,70869	0,0000
Slope	-0,0474911	0,138062	-0,343984	0,7321

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,938661	1	0,938661	0,12	0,7321
Residual	460,11	58	7,93293		
Total (Corr.)	461,048	59			

Correlation Coefficient = -0,0451213
R-squared = 0,203593 percent
Standard Error of Est. = 2,81655

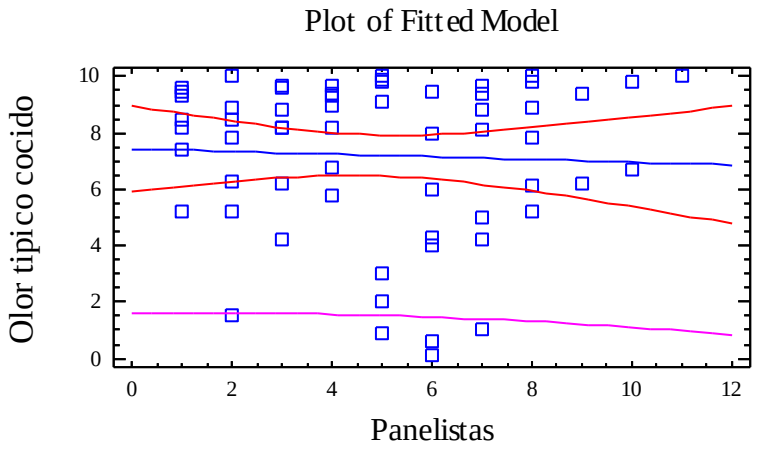
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor tipico cocido and Panelistas. The equation of the fitted model is

Olor tipico cocido = 7,43691 - 0,0474911*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor tipico cocido and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 0,203593% of the variability in Olor tipico cocido. The correlation coefficient equals -0,0451213, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,81655. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,938661	1	0,938661	0,12	0,7321
Residual	460,11	58	7,93293		
Lack-of-Fit	86,1744	9	9,57493	1,25	0,2853
Pure Error	373,935	49	7,63134		
Total (Corr.)	461,048	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.8 ANOVA OLOR RANCIO COCIDO

```
Analysis Summary

Dependent variable: Olor rancio cocido
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for Olor
rancio cocido.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Olor rancio
cocido.  It also tests for significant interactions amongst the
factors, given sufficient data.  The F-tests in the ANOVA table will
allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are
significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
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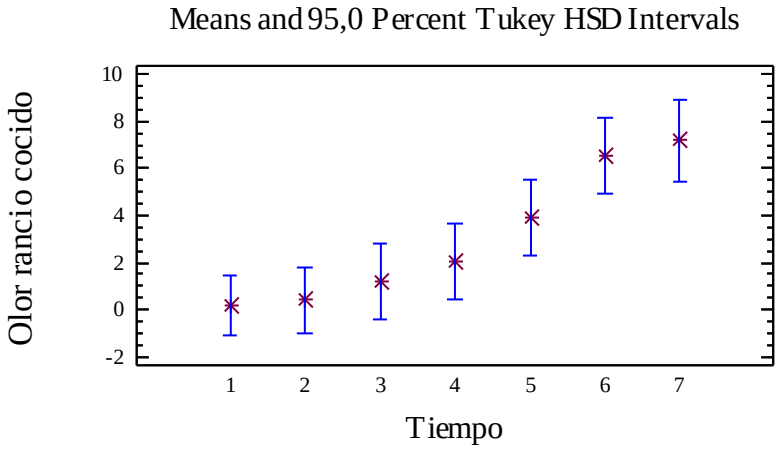


Analysis of Variance for Olor rancio cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	380,535	6	63,4225	16,81	0,0000
B:Panelistas	28,6309	10	2,86309	0,76	0,6662
RESIDUAL	162,208	43	3,77229		
TOTAL (CORRECTED)	604,857	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor rancio cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor rancio cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor rancio cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	3,06566			
Tiempo					
1	11	0,154545	0,585607	-1,02645	1,33554
2	10	0,394545	0,6415	-0,899165	1,68826
3	8	1,21205	0,743628	-0,287627	2,71172
4	8	2,03705	0,743628	0,537373	3,53672
5	8	3,91205	0,743628	2,41237	5,41172
6	8	6,52455	0,743628	5,02487	8,02422
7	7	7,22484	0,794715	5,62214	8,82754
Panelistas					
1	7	2,42857	0,734097	0,948121	3,90902
2	7	4,24286	0,734097	2,76241	5,72331
3	7	1,78571	0,734097	0,305264	3,26616
4	7	3,18571	0,734097	1,70526	4,66616
5	7	3,37143	0,734097	1,89098	4,85188
6	7	3,45714	0,734097	1,97669	4,93759
7	7	2,61429	0,734097	1,13384	4,09474
8	6	3,5432	0,800966	1,92789	5,1585
9	2	3,09111	1,43393	0,199314	5,98291
10	2	3,09111	1,43393	0,199314	5,98291
11	1	2,91111	2,03246	-1,18775	7,00998

The StatAdvisor

This table shows the mean Olor rancio cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor rancio cocido by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
1	11	0,154545	X
2	10	0,394545	X
3	8	1,21205	XX
4	8	2,03705	XX
5	8	3,91205	XX
6	8	6,52455	XX
7	7	7,22484	X

Contrast	Difference	+/- Limits
1 - 2	-0,24	2,62412
1 - 3	-1,0575	2,79065
1 - 4	-1,8825	2,79065
1 - 5	*-3,7575	2,79065
1 - 6	*-6,37	2,79065
1 - 7	*-7,0703	2,90377
2 - 3	-0,8175	2,8488
2 - 4	-1,6425	2,8488
2 - 5	*-3,5175	2,8488
2 - 6	*-6,13	2,8488
2 - 7	*-6,8303	2,95969
3 - 4	-0,825	3,0029
3 - 5	-2,7	3,0029
3 - 6	*-5,3125	3,0029
3 - 7	*-6,0128	3,1083
4 - 5	-1,875	3,0029
4 - 6	*-4,4875	3,0029
4 - 7	*-5,1878	3,1083
5 - 6	-2,6125	3,0029
5 - 7	*-3,3128	3,1083
6 - 7	-0,700298	3,1083

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 11 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor rancio cocido vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor rancio cocido
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-1,91038	0,526955	-3,62532	0,0006
Slope	1,25233	0,12409	10,0922	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	385,393	1	385,393	101,85	0,0000
Residual	219,463	58	3,78385		
Total (Corr.)	604,857	59			

Correlation Coefficient = 0,798226
R-squared = 63,7164 percent
Standard Error of Est. = 1,94521

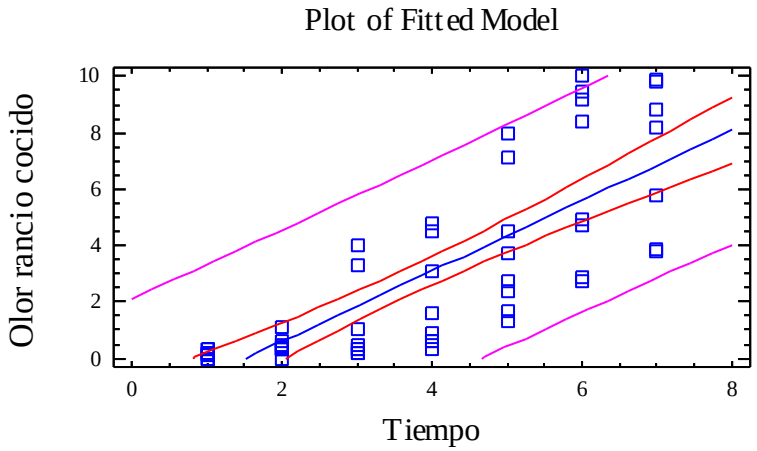
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor rancio cocido and Tiempo. The equation of the fitted model is

Olor rancio cocido = -1,91038 + 1,25233*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor rancio cocido and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 63,7164% of the variability in Olor rancio cocido. The correlation coefficient equals 0,798226, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,94521. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	385,393	1	385,393	101,85	0,0000
Residual	219,463	58	3,78385		
Lack-of-Fit	28,6242	5	5,72484	1,59	0,1790
Pure Error	190,839	53	3,60074		
Total (Corr.)	604,857	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Olor rancio cocido

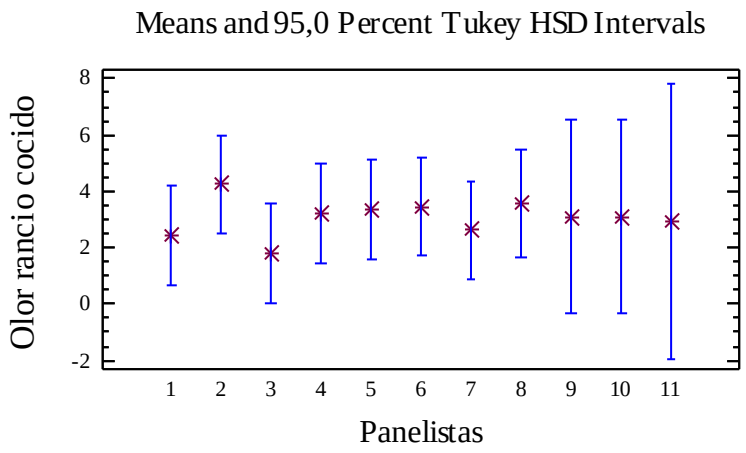
Analysis Summary

Dependent variable: Olor rancio cocido
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor rancio cocido. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor rancio cocido. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor rancio cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	28,6309	10	2,86309	0,76	0,6662
B:Tiempo	380,535	6	63,4225	16,81	0,0000
RESIDUAL	162,208	43	3,77229		
TOTAL (CORRECTED)	604,857	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor rancio cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor rancio cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor rancio cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	3,06566			
Panelistas					
1	7	2,42857	0,734097	0,948121	3,90902
2	7	4,24286	0,734097	2,76241	5,72331
3	7	1,78571	0,734097	0,305264	3,26616
4	7	3,18571	0,734097	1,70526	4,66616
5	7	3,37143	0,734097	1,89098	4,85188
6	7	3,45714	0,734097	1,97669	4,93759
7	7	2,61429	0,734097	1,13384	4,09474
8	6	3,5432	0,800966	1,92789	5,1585
9	2	3,09111	1,43393	0,199314	5,98291
10	2	3,09111	1,43393	0,199314	5,98291
11	1	2,91111	2,03246	-1,18775	7,00998
Tiempo					
1	11	0,154545	0,585607	-1,02645	1,33554
2	10	0,394545	0,6415	-0,899165	1,68826
3	8	1,21205	0,743628	-0,287627	2,71172
4	8	2,03705	0,743628	0,537373	3,53672
5	8	3,91205	0,743628	2,41237	5,41172
6	8	6,52455	0,743628	5,02487	8,02422
7	7	7,22484	0,794715	5,62214	8,82754

The StatAdvisor

This table shows the mean Olor rancio cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor rancio cocido by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
3	7	1,78571	X
1	7	2,42857	X
7	7	2,61429	X
11	1	2,91111	X
10	2	3,09111	X
9	2	3,09111	X
4	7	3,18571	X
5	7	3,37143	X
6	7	3,45714	X
8	6	3,5432	X
2	7	4,24286	X

Contrast	Difference	+/- Limits
1 - 2	-1,81429	3,52692
1 - 3	0,642857	3,52692
1 - 4	-0,757143	3,52692
1 - 5	-0,942857	3,52692
1 - 6	-1,02857	3,52692
1 - 7	-0,185714	3,52692
1 - 8	-1,11463	3,67093
1 - 9	-0,662543	5,29038
1 - 10	-0,662543	5,29038
1 - 11	-0,482543	7,05384
2 - 3	2,45714	3,52692
2 - 4	1,05714	3,52692
2 - 5	0,871429	3,52692
2 - 6	0,785714	3,52692
2 - 7	1,62857	3,52692
2 - 8	0,69966	3,67093
2 - 9	1,15174	5,29038
2 - 10	1,15174	5,29038
2 - 11	1,33174	7,05384
3 - 4	-1,4	3,52692
3 - 5	-1,58571	3,52692
3 - 6	-1,67143	3,52692
3 - 7	-0,828571	3,52692
3 - 8	-1,75748	3,67093
3 - 9	-1,3054	5,29038
3 - 10	-1,3054	5,29038
3 - 11	-1,1254	7,05384
4 - 5	-0,185714	3,52692

4 - 6	-0,271429	3,52692
4 - 7	0,571429	3,52692
4 - 8	-0,357483	3,67093
4 - 9	0,0946003	5,29038
4 - 10	0,0946003	5,29038
4 - 11	0,2746	7,05384
5 - 6	-0,0857143	3,52692
5 - 7	0,757143	3,52692
5 - 8	-0,171769	3,67093
5 - 9	0,280315	5,29038
5 - 10	0,280315	5,29038
5 - 11	0,460315	7,05384
6 - 7	0,842857	3,52692
6 - 8	-0,0860544	3,67093
6 - 9	0,366029	5,29038
6 - 10	0,366029	5,29038
6 - 11	0,546029	7,05384
7 - 8	-0,928912	3,67093
7 - 9	-0,476828	5,29038
7 - 10	-0,476828	5,29038
7 - 11	-0,296828	7,05384
8 - 9	0,452083	5,38746
8 - 10	0,452083	5,38746
8 - 11	0,632083	7,12694
9 - 10	0,0	6,59826
9 - 11	0,18	8,08119
10 - 11	0,18	8,08119

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor rancio cocido vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor rancio cocido
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3,55755	0,870274	4,08785	0,0001
Slope	-0,162296	0,156855	-1,03469	0,3051

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	10,9623	1	10,9623	1,07	0,3051
Residual	593,894	58	10,2396		
Total (Corr.)	604,857	59			

Correlation Coefficient = -0,134625
R-squared = 1,81238 percent
Standard Error of Est. = 3,19993

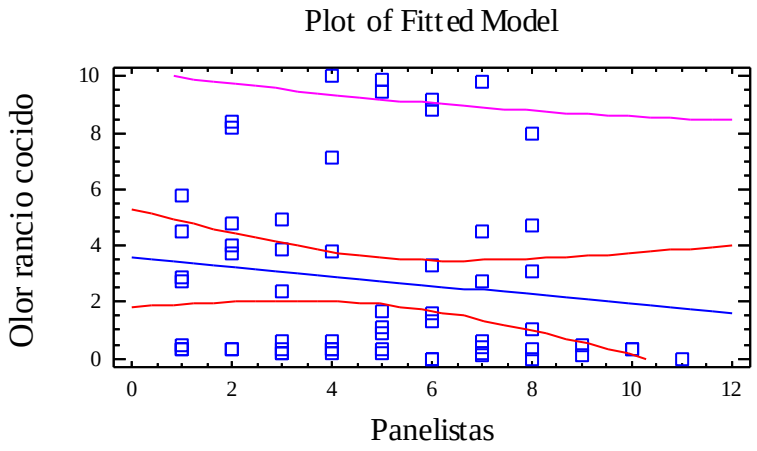
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor rancio cocido and Panelistas. The equation of the fitted model is

Olor rancio cocido = 3,55755 - 0,162296*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor rancio cocido and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,81238% of the variability in Olor rancio cocido. The correlation coefficient equals -0,134625, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 3,19993. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	10,9623	1	10,9623	1,07	0,3051
Residual	593,894	58	10,2396		
Lack-of-Fit	51,1506	9	5,6834	0,51	0,8580
Pure Error	542,744	49	11,0764		
Total (Corr.)	604,857	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.9 ANOVA OLOR PUTRIDO COCIDO

```
Analysis Summary

Dependent variable: Olor putrido cocido
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
---------------
   This procedure performs a multifactor analysis of variance for Olor
putrido cocido.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Olor putrido
cocido.  It also tests for significant interactions amongst the
factors, given sufficient data.  The F-tests in the ANOVA table will
allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are
significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
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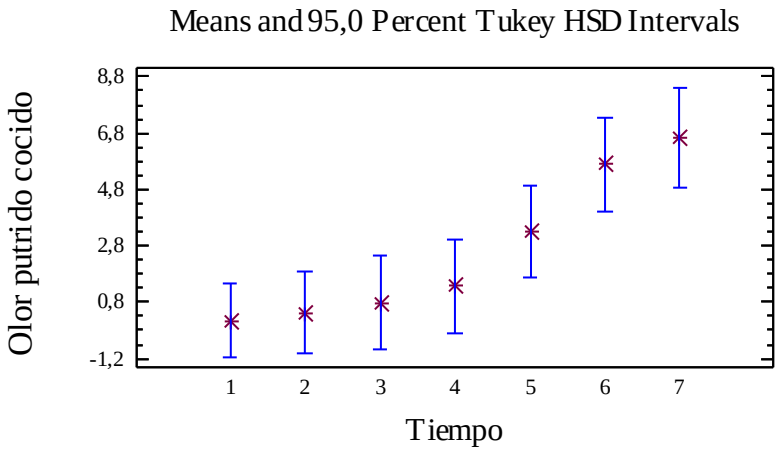


Analysis of Variance for Olor putrido cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	316,066	6	52,6777	13,41	0,0000
B:Panelistas	12,2424	10	1,22424	0,31	0,9740
RESIDUAL	168,871	43	3,92723		
TOTAL (CORRECTED)	518,777	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor putrido cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor putrido cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor putrido cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	2,61913			
Tiempo					
1	11	0,145455	0,597512	-1,05955	1,35045
2	10	0,425455	0,654542	-0,894557	1,74547
3	8	0,785455	0,758746	-0,744706	2,31561
4	8	1,36045	0,758746	-0,169706	2,89061
5	8	3,29795	0,758746	1,76779	4,82811
6	8	5,69795	0,758746	4,16779	7,22811
7	7	6,62117	0,810872	4,98589	8,25645
Panelistas					
1	7	1,67143	0,749021	0,160881	3,18198
2	7	2,32857	0,749021	0,818024	3,83912
3	7	2,64286	0,749021	1,13231	4,1534
4	7	2,85714	0,749021	1,3466	4,36769
5	7	3,37143	0,749021	1,86088	4,88198
6	7	2,74286	0,749021	1,23231	4,2534
7	7	2,37143	0,749021	0,860881	3,88198
8	6	2,58367	0,817249	0,935531	4,23182
9	2	2,63367	1,46308	-0,316916	5,58426
10	2	3,13367	1,46308	0,183084	6,08426
11	1	2,47367	2,07378	-1,70852	6,65587

The StatAdvisor

This table shows the mean Olor putrido cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor putrido cocido by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
1	11	0,145455	X
2	10	0,425455	XX
3	8	0,785455	XX
4	8	1,36045	XX
5	8	3,29795	XX
6	8	5,69795	XX
7	7	6,62117	X

Contrast	Difference	+/- Limits
1 - 2	-0,28	2,67747
1 - 3	-0,64	2,84739
1 - 4	-1,215	2,84739
1 - 5	*-3,1525	2,84739
1 - 6	*-5,5525	2,84739
1 - 7	*-6,47571	2,9628
2 - 3	-0,36	2,90671
2 - 4	-0,935	2,90671
2 - 5	-2,8725	2,90671
2 - 6	*-5,2725	2,90671
2 - 7	*-6,19571	3,01986
3 - 4	-0,575	3,06395
3 - 5	-2,5125	3,06395
3 - 6	*-4,9125	3,06395
3 - 7	*-5,83571	3,17149
4 - 5	-1,9375	3,06395
4 - 6	*-4,3375	3,06395
4 - 7	*-5,26071	3,17149
5 - 6	-2,4	3,06395
5 - 7	*-3,32321	3,17149
6 - 7	-0,923214	3,17149

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 10 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor putrido cocido vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor putrido cocido
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-1,80765	0,524498	-3,44644	0,0011
Slope	1,10741	0,123511	8,96604	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	301,355	1	301,355	80,39	0,0000
Residual	217,423	58	3,74866		
Total (Corr.)	518,777	59			

Correlation Coefficient = 0,762164
R-squared = 58,0894 percent
Standard Error of Est. = 1,93615

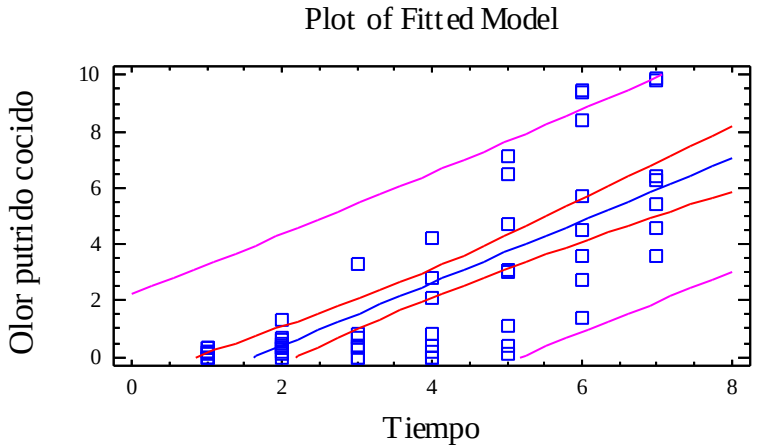
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor putrido cocido and Tiempo. The equation of the fitted model is

Olor putrido cocido = -1,80765 + 1,10741*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Olor putrido cocido and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 58,0894% of the variability in Olor putrido cocido. The correlation coefficient equals 0,762164, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,93615. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	301,355	1	301,355	80,39	0,0000
Residual	217,423	58	3,74866		
Lack-of-Fit	36,3095	5	7,26189	2,13	0,0766
Pure Error	181,113	53	3,41723		
Total (Corr.)	518,777	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.10, there is statistically significant lack-of-fit at the 90% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Multifactor ANOVA - Olor putrido cocido

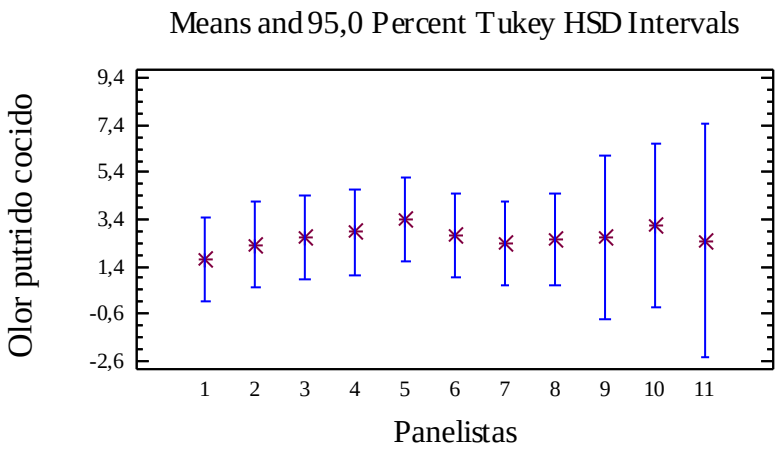
Analysis Summary

Dependent variable: Olor putrido cocido
Factors:
- Panelistas
- Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Olor putrido cocido. It constructs various tests and graphs to determine which factors have a statistically significant effect on Olor putrido cocido. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Olor putrido cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	12,2424	10	1,22424	0,31	0,9740
B:Tiempo	316,066	6	52,6777	13,41	0,0000
RESIDUAL	168,871	43	3,92723		
TOTAL (CORRECTED)	518,777	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Olor putrido cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Olor putrido cocido at the 95,0% confidence level.

Table of Least Squares Means for Olor putrido cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	2,61913			
Panelistas					
1	7	1,67143	0,749021	0,160881	3,18198
2	7	2,32857	0,749021	0,818024	3,83912
3	7	2,64286	0,749021	1,13231	4,1534
4	7	2,85714	0,749021	1,3466	4,36769
5	7	3,37143	0,749021	1,86088	4,88198
6	7	2,74286	0,749021	1,23231	4,2534
7	7	2,37143	0,749021	0,860881	3,88198
8	6	2,58367	0,817249	0,935531	4,23182
9	2	2,63367	1,46308	-0,316916	5,58426
10	2	3,13367	1,46308	0,183084	6,08426
11	1	2,47367	2,07378	-1,70852	6,65587
Tiempo					
1	11	0,145455	0,597512	-1,05955	1,35045
2	10	0,425455	0,654542	-0,894557	1,74547
3	8	0,785455	0,758746	-0,744706	2,31561
4	8	1,36045	0,758746	-0,169706	2,89061
5	8	3,29795	0,758746	1,76779	4,82811
6	8	5,69795	0,758746	4,16779	7,22811
7	7	6,62117	0,810872	4,98589	8,25645

The StatAdvisor

This table shows the mean Olor putrido cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Olor putrido cocido by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
1	7	1,67143	X
2	7	2,32857	X
7	7	2,37143	X
11	1	2,47367	X
8	6	2,58367	X
9	2	2,63367	X
3	7	2,64286	X
6	7	2,74286	X
4	7	2,85714	X
10	2	3,13367	X
5	7	3,37143	X

Contrast	Difference	+/- Limits
1 - 2	-0,657143	3,59862
1 - 3	-0,971429	3,59862
1 - 4	-1,18571	3,59862
1 - 5	-1,7	3,59862
1 - 6	-1,07143	3,59862
1 - 7	-0,7	3,59862
1 - 8	-0,912245	3,74556
1 - 9	-0,962245	5,39793
1 - 10	-1,46224	5,39793
1 - 11	-0,802245	7,19724
2 - 3	-0,314286	3,59862
2 - 4	-0,528571	3,59862
2 - 5	-1,04286	3,59862
2 - 6	-0,414286	3,59862
2 - 7	-0,0428571	3,59862
2 - 8	-0,255102	3,74556
2 - 9	-0,305102	5,39793
2 - 10	-0,805102	5,39793
2 - 11	-0,145102	7,19724
3 - 4	-0,214286	3,59862
3 - 5	-0,728571	3,59862
3 - 6	-0,1	3,59862
3 - 7	0,271429	3,59862
3 - 8	0,0591837	3,74556
3 - 9	0,00918367	5,39793
3 - 10	-0,490816	5,39793
3 - 11	0,169184	7,19724
4 - 5	-0,514286	3,59862

4 - 6	0,114286	3,59862
4 - 7	0,485714	3,59862
4 - 8	0,273469	3,74556
4 - 9	0,223469	5,39793
4 - 10	-0,276531	5,39793
4 - 11	0,383469	7,19724
5 - 6	0,628571	3,59862
5 - 7	1,0	3,59862
5 - 8	0,787755	3,74556
5 - 9	0,737755	5,39793
5 - 10	0,237755	5,39793
5 - 11	0,897755	7,19724
6 - 7	0,371429	3,59862
6 - 8	0,159184	3,74556
6 - 9	0,109184	5,39793
6 - 10	-0,390816	5,39793
6 - 11	0,269184	7,19724
7 - 8	-0,212245	3,74556
7 - 9	-0,262245	5,39793
7 - 10	-0,762245	5,39793
7 - 11	-0,102245	7,19724
8 - 9	-0,05	5,49698
8 - 10	-0,55	5,49698
8 - 11	0,11	7,27182
9 - 10	-0,5	6,7324
9 - 11	0,16	8,24547
10 - 11	0,66	8,24547

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Olor putrido cocido vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Olor putrido cocido
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	2,78561	0,81049	3,43694	0,0011
Slope	-0,093981	0,14608	-0,643354	0,5225

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	3,67591	1	3,67591	0,41	0,5225
Residual	515,101	58	8,88106		
Total (Corr.)	518,777	59			

Correlation Coefficient = -0,0841767
R-squared = 0,708572 percent
Standard Error of Est. = 2,98011

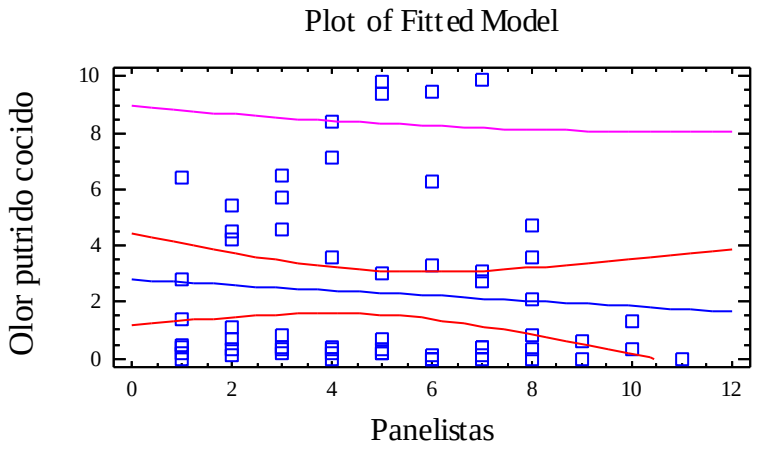
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Olor putrido cocido and Panelistas. The equation of the fitted model is

Olor putrido cocido = 2,78561 - 0,093981*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Olor putrido cocido and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 0,708572% of the variability in Olor putrido cocido. The correlation coefficient equals -0,0841767, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,98011. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	3,67591	1	3,67591	0,41	0,5225
Residual	515,101	58	8,88106		
Lack-of-Fit	30,1645	9	3,35161	0,34	0,9575
Pure Error	484,937	49	9,89667		
Total (Corr.)	518,777	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.10 ANOVA COLOR TIPICO

```
Analysis Summary

Dependent variable: Color tipico
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
---------------
   This procedure performs a multifactor analysis of variance for
Color tipico.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Color tipico.
It also tests for significant interactions amongst the factors, given
sufficient data.  The F-tests in the ANOVA table will allow you to
identify the significant factors.  For each significant factor, the
Multiple Range Tests will tell you which means are significantly
different from which others.  The Means Plot and Interaction Plot will
help you interpret the significant effects.  The Residual Plots will
help you judge whether the assumptions underlying the analysis of
variance are violated by the data.
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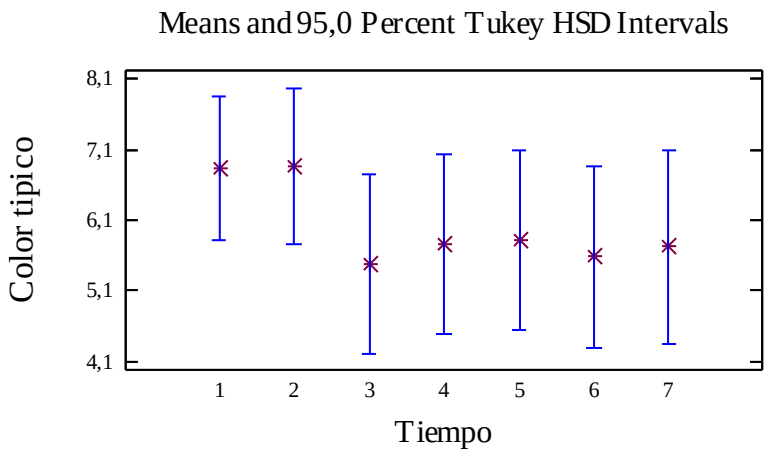


Analysis of Variance for Color tipico - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	16,5133	6	2,75222	1,18	0,3367
B:Panelistas	39,0438	10	3,90438	1,67	0,1198
RESIDUAL	100,6	43	2,33954		
TOTAL (CORRECTED)	165,296	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Color tipico into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Color tipico at the 95,0% confidence level.

Table of Least Squares Means for Color tipico
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,00651			
Tiempo					
1	11	6,83636	0,461178	5,90631	7,76642
2	10	6,86636	0,505195	5,84754	7,88519
3	8	5,47636	0,585623	4,29534	6,65739
4	8	5,75136	0,585623	4,57034	6,93239
5	8	5,81386	0,585623	4,63284	6,99489
6	8	5,57636	0,585623	4,39534	6,75739
7	7	5,72488	0,625855	4,46272	6,98704
Panelistas					
1	7	5,87143	0,578117	4,70554	7,03732
2	7	4,67143	0,578117	3,50554	5,83732
3	7	5,08571	0,578117	3,91983	6,2516
4	7	6,44286	0,578117	5,27697	7,60874
5	7	4,97143	0,578117	3,80554	6,13732
6	7	7,25714	0,578117	6,09126	8,42303
7	7	5,77143	0,578117	4,60554	6,93732
8	6	6,26973	0,630777	4,99764	7,54181
9	2	5,95514	1,12925	3,67779	8,2325
10	2	6,60514	1,12925	4,32779	8,8825
11	1	7,17014	1,60061	3,9422	10,3981

The StatAdvisor

This table shows the mean Color tipico for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Color tipico by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
3	8	5,47636	X
6	8	5,57636	X
7	7	5,72488	X
4	8	5,75136	X
5	8	5,81386	X
1	11	6,83636	X
2	10	6,86636	X

Contrast	Difference	+/- Limits
1 - 2	-0,03	2,06655
1 - 3	1,36	2,1977
1 - 4	1,085	2,1977
1 - 5	1,0225	2,1977
1 - 6	1,26	2,1977
1 - 7	1,11149	2,28678
2 - 3	1,39	2,24349
2 - 4	1,115	2,24349
2 - 5	1,0525	2,24349
2 - 6	1,29	2,24349
2 - 7	1,14149	2,33082
3 - 4	-0,275	2,36485
3 - 5	-0,3375	2,36485
3 - 6	-0,1	2,36485
3 - 7	-0,248512	2,44785
4 - 5	-0,0625	2,36485
4 - 6	0,175	2,36485
4 - 7	0,0264881	2,44785
5 - 6	0,2375	2,36485
5 - 7	0,0889881	2,44785
6 - 7	-0,148512	2,44785

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Color tipico vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Color tipico
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,87457	0,434287	15,8296	0,0000
Slope	-0,257027	0,102268	-2,51327	0,0148

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	16,2338	1	16,2338	6,32	0,0148
Residual	149,063	58	2,57005		
Total (Corr.)	165,296	59			

Correlation Coefficient = -0,313385
R-squared = 9,82102 percent
Standard Error of Est. = 1,60314

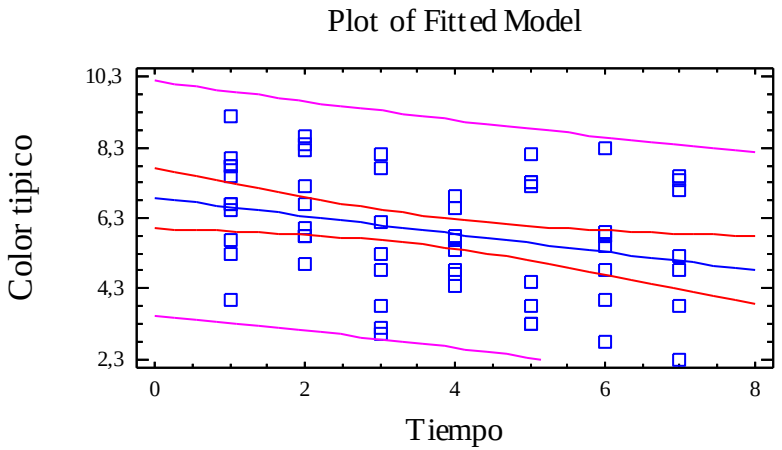
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Color tipico and Tiempo. The equation of the fitted model is

Color tipico = 6,87457 - 0,257027*Tiempo

Since the P-value in the ANOVA table is less than 0.05, there is a statistically significant relationship between Color tipico and Tiempo at the 95% confidence level.

The R-Squared statistic indicates that the model as fitted explains 9,82102% of the variability in Color tipico. The correlation coefficient equals -0,313385, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,60314. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	16,2338	1	16,2338	6,32	0,0148
Residual	149,063	58	2,57005		
Lack-of-Fit	9,41885	5	1,88377	0,71	0,6150
Pure Error	139,644	53	2,63479		
Total (Corr.)	165,296	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Color tipico

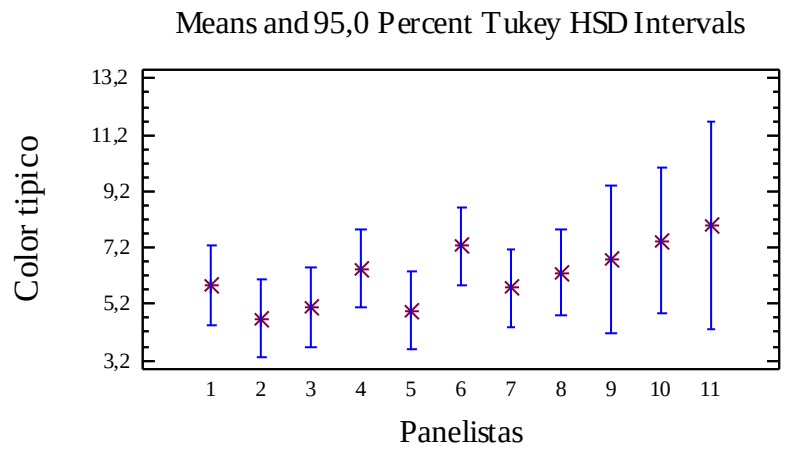
Analysis Summary

Dependent variable: Color tipico
Factors:
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Color tipico. It constructs various tests and graphs to determine which factors have a statistically significant effect on Color tipico. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Color tipico - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	48,1832	10	4,81832	2,02	0,0517
RESIDUAL	117,113	49	2,39007		
TOTAL (CORRECTED)	165,296	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Color tipico into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Color tipico at the 95,0% confidence level.

Table of Least Squares Means for Color tipico
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,23983			
Panelistas					
1	7	5,87143	0,584327	4,69718	7,04568
2	7	4,67143	0,584327	3,49718	5,84568
3	7	5,08571	0,584327	3,91146	6,25997
4	7	6,44286	0,584327	5,26861	7,61711
5	7	4,97143	0,584327	3,79718	6,14568
6	7	7,25714	0,584327	6,08289	8,43139
7	7	5,77143	0,584327	4,59718	6,94568
8	6	6,31667	0,631146	5,04833	7,585
9	2	6,8	1,09318	4,60318	8,99682
10	2	7,45	1,09318	5,25318	9,64682
11	1	8,0	1,54598	4,89322	11,1068

The StatAdvisor

This table shows the mean Color tipico for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Color tipico by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
2	7	4,67143	X
5	7	4,97143	X
3	7	5,08571	X
7	7	5,77143	X
1	7	5,87143	X
8	6	6,31667	X
4	7	6,44286	X
9	2	6,8	X
6	7	7,25714	X
10	2	7,45	X
11	1	8,0	X

Contrast	Difference	+/- Limits
1 - 2	1,2	2,7889
1 - 3	0,785714	2,7889
1 - 4	-0,571429	2,7889
1 - 5	0,9	2,7889
1 - 6	-1,38571	2,7889
1 - 7	0,1	2,7889
1 - 8	-0,445238	2,90278
1 - 9	-0,928571	4,18335
1 - 10	-1,57857	4,18335
1 - 11	-2,12857	5,57781
2 - 3	-0,414286	2,7889
2 - 4	-1,77143	2,7889
2 - 5	-0,3	2,7889
2 - 6	-2,58571	2,7889
2 - 7	-1,1	2,7889
2 - 8	-1,64524	2,90278
2 - 9	-2,12857	4,18335
2 - 10	-2,77857	4,18335
2 - 11	-3,32857	5,57781
3 - 4	-1,35714	2,7889
3 - 5	0,114286	2,7889
3 - 6	-2,17143	2,7889
3 - 7	-0,685714	2,7889
3 - 8	-1,23095	2,90278
3 - 9	-1,71429	4,18335
3 - 10	-2,36429	4,18335
3 - 11	-2,91429	5,57781
4 - 5	1,47143	2,7889

4 - 6	-0,814286	2,7889
4 - 7	0,671429	2,7889
4 - 8	0,12619	2,90278
4 - 9	-0,357143	4,18335
4 - 10	-1,00714	4,18335
4 - 11	-1,55714	5,57781
5 - 6	-2,28571	2,7889
5 - 7	-0,8	2,7889
5 - 8	-1,34524	2,90278
5 - 9	-1,82857	4,18335
5 - 10	-2,47857	4,18335
5 - 11	-3,02857	5,57781
6 - 7	1,48571	2,7889
6 - 8	0,940476	2,90278
6 - 9	0,457143	4,18335
6 - 10	-0,192857	4,18335
6 - 11	-0,742857	5,57781
7 - 8	-0,545238	2,90278
7 - 9	-1,02857	4,18335
7 - 10	-1,67857	4,18335
7 - 11	-2,22857	5,57781
8 - 9	-0,483333	4,26012
8 - 10	-1,13333	4,26012
8 - 11	-1,68333	5,63561
9 - 10	-0,65	5,21756
9 - 11	-1,2	6,39018
10 - 11	-0,55	6,39018

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Color tipico vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Color tipico
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	4,91993	0,434466	11,3241	0,0000
Slope	0,203768	0,0783065	2,60219	0,0117

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	17,2806	1	17,2806	6,77	0,0117
Residual	148,016	58	2,552		
Total (Corr.)	165,296	59			

Correlation Coefficient = 0,323331
R-squared = 10,4543 percent
Standard Error of Est. = 1,5975

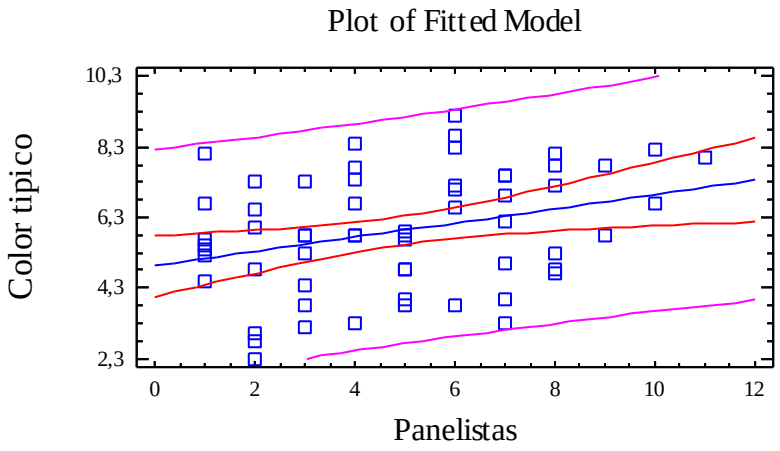
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Color tipico and Panelistas. The equation of the fitted model is

Color tipico = 4,91993 + 0,203768*Panelistas

Since the P-value in the ANOVA table is less than 0.05, there is a statistically significant relationship between Color tipico and Panelistas at the 95% confidence level.

The R-Squared statistic indicates that the model as fitted explains 10,4543% of the variability in Color tipico. The correlation coefficient equals 0,323331, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,5975. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	17,2806	1	17,2806	6,77	0,0117
Residual	148,016	58	2,552		
Lack-of-Fit	30,9026	9	3,43362	1,44	0,1988
Pure Error	117,113	49	2,39007		
Total (Corr.)	165,296	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.11 ANOVA Color Roche

Multifactor ANOVA - Color roche

```
Analysis Summary

Dependent variable: Color roche
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for Color roche.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Color roche. It also tests for significant interactions amongst the factors,
given sufficient data.  The F-tests in the ANOVA table will allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The Residual Plots will help you judge whether the assumptions
underlying the analysis of variance are violated by the data.
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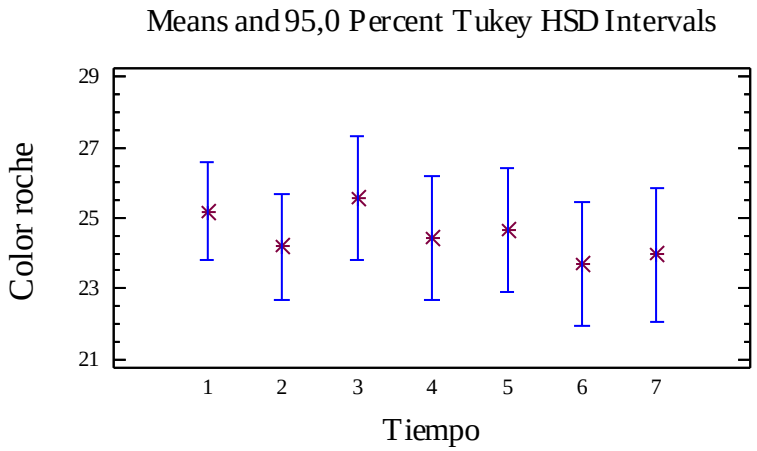


Analysis of Variance for Color roche - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	22,1042	6	3,68403	0,83	0,5498
B:Panelistas	43,6322	10	4,36322	0,99	0,4675
RESIDUAL	189,729	43	4,41231		
TOTAL (CORRECTED)	254,85	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Color roche into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Color roche at the 95,0% confidence level.

Table of Least Squares Means for Color roche
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	24,5241			
Tiempo					
1	11	25,1818	0,633339	23,9046	26,4591
2	10	24,1818	0,693789	22,7827	25,581
3	8	25,5568	0,804241	23,9349	27,1787
4	8	24,4318	0,804241	22,8099	26,0537
5	8	24,6818	0,804241	23,0599	26,3037
6	8	23,6818	0,804241	22,0599	25,3037
7	7	23,9527	0,859492	22,2193	25,686
Panelistas					
1	7	24,1429	0,793933	22,5417	25,744
2	7	23,0	0,793933	21,3989	24,6011
3	7	25,0	0,793933	23,3989	26,6011
4	7	25,1429	0,793933	23,5417	26,744
5	7	24,7143	0,793933	23,1132	26,3154
6	7	25,7143	0,793933	24,1132	27,3154
7	7	24,2857	0,793933	22,6846	25,8868
8	6	23,7381	0,866252	21,9911	25,4851
9	2	24,3423	1,55081	21,2148	27,4698
10	2	26,3423	1,55081	23,2148	29,4698
11	1	23,3423	2,19813	18,9093	27,7752

The StatAdvisor

This table shows the mean Color roche for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Color roche by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
6	8	23,6818	X
7	7	23,9527	X
2	10	24,1818	X
4	8	24,4318	X
5	8	24,6818	X
1	11	25,1818	X
3	8	25,5568	X

Contrast	Difference	+/- Limits
1 - 2	1,0	2,83801
1 - 3	-0,375	3,01812
1 - 4	0,75	3,01812
1 - 5	0,5	3,01812
1 - 6	1,5	3,01812
1 - 7	1,22917	3,14045
2 - 3	-1,375	3,081
2 - 4	-0,25	3,081
2 - 5	-0,5	3,081
2 - 6	0,5	3,081
2 - 7	0,229167	3,20093
3 - 4	1,125	3,24766
3 - 5	0,875	3,24766
3 - 6	1,875	3,24766
3 - 7	1,60417	3,36165
4 - 5	-0,25	3,24766
4 - 6	0,75	3,24766
4 - 7	0,479167	3,36165
5 - 6	1,0	3,24766
5 - 7	0,729167	3,36165
6 - 7	-0,270833	3,36165

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Color roche vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Color roche
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	25,2975	0,556768	45,4363	0,0000
Slope	-0,200217	0,13111	-1,52709	0,1322

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,85068	1	9,85068	2,33	0,1322
Residual	244,999	58	4,22413		
Total (Corr.)	254,85	59			

Correlation Coefficient = -0,196603
R-squared = 3,86528 percent
Standard Error of Est. = 2,05527

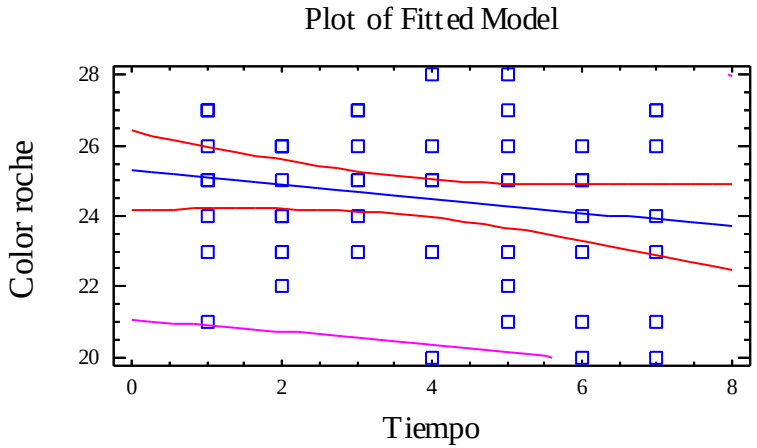
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Color roche and Tiempo. The equation of the fitted model is

Color roche = 25,2975 - 0,200217*Tiempo

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Color roche and Tiempo at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 3,86528% of the variability in Color roche. The correlation coefficient equals -0,196603, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,05527. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,85068	1	9,85068	2,33	0,1322
Residual	244,999	58	4,22413		
Lack-of-Fit	11,638	5	2,32759	0,53	0,7536
Pure Error	233,361	53	4,40304		
Total (Corr.)	254,85	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Comparison of Alternative Models

Model	Correlation	R-Squared
Reciprocal-Y	0,2125	4,52%
Exponential	-0,2048	4,19%
Square root-Y	-0,2007	4,03%
Linear	-0,1966	3,87%
Square root-X	-0,1914	3,66%
Multiplicative	-0,1901	3,62%
Logarithmic-X	-0,1839	3,38%
Double reciprocal	-0,1731	3,00%
S-curve	0,1699	2,89%
Reciprocal-X	0,1663	2,77%
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the reciprocal-Y model yields the highest R-Squared value with 4,51696%. This is 0,651678% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

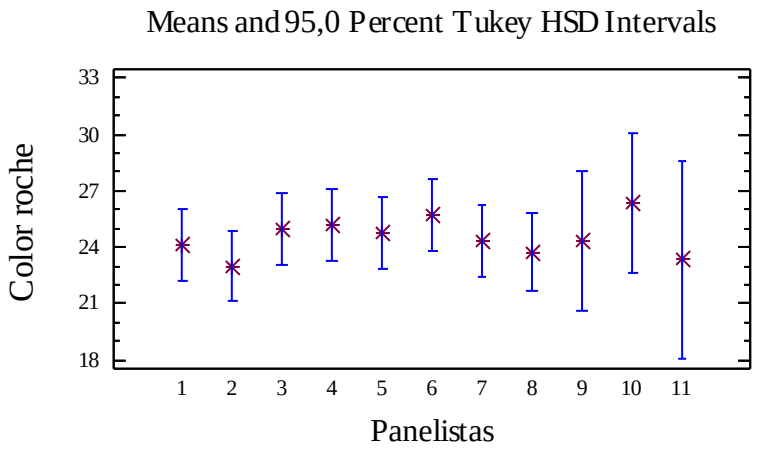
Multifactor ANOVA - Color roche
Analysis Summary

Dependent variable: Color roche
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Color roche. It constructs various tests and graphs to determine which factors have a statistically significant effect on Color roche. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Color roche - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	43,6322	10	4,36322	0,99	0,4675
B:Tiempo	22,1042	6	3,68403	0,83	0,5498
RESIDUAL	189,729	43	4,41231		
TOTAL (CORRECTED)	254,85	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Color roche into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Color roche at the 95,0% confidence level.

Table of Least Squares Means for Color roche
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	24,5241			
Panelistas					
1	7	24,1429	0,793933	22,5417	25,744
2	7	23,0	0,793933	21,3989	24,6011
3	7	25,0	0,793933	23,3989	26,6011
4	7	25,1429	0,793933	23,5417	26,744
5	7	24,7143	0,793933	23,1132	26,3154
6	7	25,7143	0,793933	24,1132	27,3154
7	7	24,2857	0,793933	22,6846	25,8868
8	6	23,7381	0,866252	21,9911	25,4851
9	2	24,3423	1,55081	21,2148	27,4698
10	2	26,3423	1,55081	23,2148	29,4698
11	1	23,3423	2,19813	18,9093	27,7752
Tiempo					
1	11	25,1818	0,633339	23,9046	26,4591
2	10	24,1818	0,693789	22,7827	25,581
3	8	25,5568	0,804241	23,9349	27,1787
4	8	24,4318	0,804241	22,8099	26,0537
5	8	24,6818	0,804241	23,0599	26,3037
6	8	23,6818	0,804241	22,0599	25,3037
7	7	23,9527	0,859492	22,2193	25,686

The StatAdvisor

This table shows the mean Color roche for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Color roche by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
2	7	23,0	X
11	1	23,3423	X
8	6	23,7381	X
1	7	24,1429	X
7	7	24,2857	X
9	2	24,3423	X
5	7	24,7143	X
3	7	25,0	X
4	7	25,1429	X
6	7	25,7143	X
10	2	26,3423	X

Contrast	Difference	+/- Limits
1 - 2	1,14286	3,8144
1 - 3	-0,857143	3,8144
1 - 4	-1,0	3,8144
1 - 5	-0,571429	3,8144
1 - 6	-1,57143	3,8144
1 - 7	-0,142857	3,8144
1 - 8	0,404762	3,97015
1 - 9	-0,199405	5,72159
1 - 10	-2,1994	5,72159
1 - 11	0,800595	7,62879
2 - 3	-2,0	3,8144
2 - 4	-2,14286	3,8144
2 - 5	-1,71429	3,8144
2 - 6	-2,71429	3,8144
2 - 7	-1,28571	3,8144
2 - 8	-0,738095	3,97015
2 - 9	-1,34226	5,72159
2 - 10	-3,34226	5,72159
2 - 11	-0,342262	7,62879

3 - 4	-0,142857	3,8144
3 - 5	0,285714	3,8144
3 - 6	-0,714286	3,8144
3 - 7	0,714286	3,8144
3 - 8	1,2619	3,97015
3 - 9	0,657738	5,72159
3 - 10	-1,34226	5,72159
3 - 11	1,65774	7,62879
4 - 5	0,428571	3,8144
4 - 6	-0,571429	3,8144
4 - 7	0,857143	3,8144
4 - 8	1,40476	3,97015
4 - 9	0,800595	5,72159
4 - 10	-1,1994	5,72159
4 - 11	1,8006	7,62879
5 - 6	-1,0	3,8144
5 - 7	0,428571	3,8144
5 - 8	0,97619	3,97015
5 - 9	0,372024	5,72159
5 - 10	-1,62798	5,72159
5 - 11	1,37202	7,62879
6 - 7	1,42857	3,8144
6 - 8	1,97619	3,97015
6 - 9	1,37202	5,72159
6 - 10	-0,627976	5,72159
6 - 11	2,37202	7,62879
7 - 8	0,547619	3,97015
7 - 9	-0,0565476	5,72159
7 - 10	-2,05655	5,72159
7 - 11	0,943452	7,62879
8 - 9	-0,604167	5,82659
8 - 10	-2,60417	5,82659
8 - 11	0,395833	7,70785
9 - 10	-2,0	7,13608
9 - 11	1,0	8,73988
10 - 11	3,0	8,73988

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Color roche vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Color roche
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	24,0707	0,565588	42,5587	0,0000
Slope	0,0981539	0,101939	0,962864	0,3396

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	4,00959	1	4,00959	0,93	0,3396
Residual	250,84	58	4,32483		
Total (Corr.)	254,85	59			

Correlation Coefficient = 0,125432
R-squared = 1,57331 percent
Standard Error of Est. = 2,07962

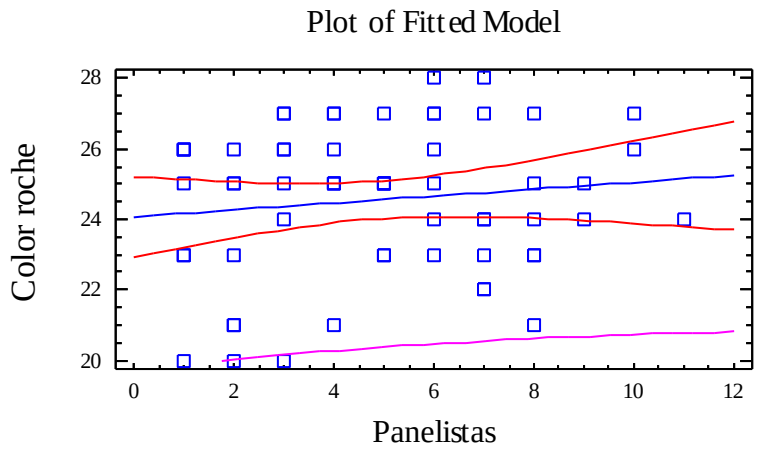
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Color roche and Panelistas. The equation of the fitted model is

Color roche = 24,0707 + 0,0981539*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Color roche and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,57331% of the variability in Color roche. The correlation coefficient equals 0,125432, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,07962. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	4,00959	1	4,00959	0,93	0,3396
Residual	250,84	58	4,32483		
Lack-of-Fit	39,0071	9	4,33412	1,00	0,4508
Pure Error	211,833	49	4,32313		
Total (Corr.)	254,85	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Comparison of Alternative Models

Model	Correlation	R-Squared
Multiplicative	0,1602	2,57%
Double reciprocal	0,1581	2,50%
Logarithmic-X	0,1545	2,39%
S-curve	-0,1542	2,38%
Reciprocal-X	-0,1506	2,27%
Square root-X	0,1427	2,04%
Reciprocal-Y	-0,1399	1,96%
Exponential	0,1324	1,75%
Square root-Y	0,1288	1,66%
Linear	0,1254	1,57%
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the multiplicative model yields the highest R-Squared value with 2,56573%. This is 0,992422% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

6.12 ANOVA DUREZA CRUDO

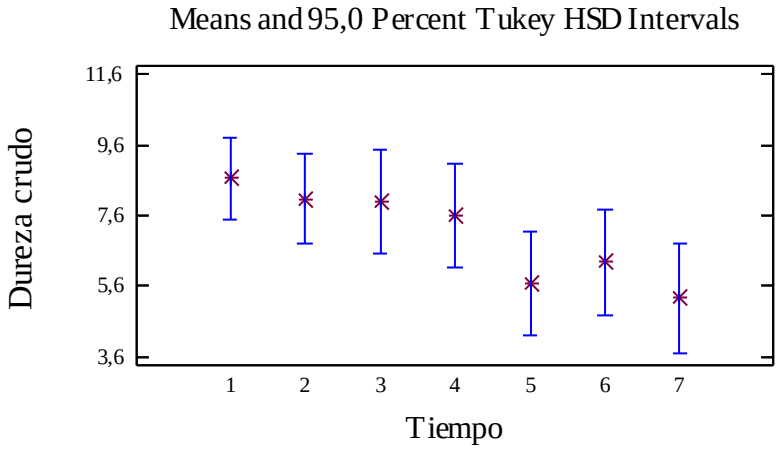
Analysis Summary

Dependent variable: Dureza crudo
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Dureza crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Dureza crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Dureza crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	80,6511	6	13,4419	4,27	0,0018
B:Panelistas	34,7895	10	3,47895	1,11	0,3796
RESIDUAL	135,246	43	3,14526		
TOTAL (CORRECTED)	252,842	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Dureza crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Dureza crudo at the 95,0% confidence level.

Table of Least Squares Means for Dureza crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,07205			
Tiempo					
1	11	8,66364	0,534726	7,58526	9,74202
2	10	8,06364	0,585763	6,88233	9,24494
3	8	7,98239	0,679018	6,61301	9,35176
4	8	7,59489	0,679018	6,22551	8,96426
5	8	5,68239	0,679018	4,31301	7,05176
6	8	6,26989	0,679018	4,90051	7,63926
7	7	5,24756	0,725667	3,78412	6,71101
Panelistas					
1	7	6,84286	0,670315	5,49104	8,19468
2	7	8,17143	0,670315	6,81961	9,52325
3	7	6,55714	0,670315	5,20532	7,90896
4	7	8,41429	0,670315	7,06246	9,76611
5	7	6,42857	0,670315	5,07675	7,78039
6	7	7,91429	0,670315	6,56246	9,26611
7	7	6,34286	0,670315	4,99104	7,69468
8	6	6,94592	0,731374	5,47096	8,42088
9	2	6,85842	1,30934	4,21787	9,49896
10	2	6,70842	1,30934	4,06787	9,34896
11	1	6,60842	1,85587	2,86568	10,3512

The StatAdvisor

This table shows the mean Dureza crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Dureza crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	5,24756	X
5	8	5,68239	XX
6	8	6,26989	XXX
4	8	7,59489	XXX
3	8	7,98239	XXX
2	10	8,06364	XX
1	11	8,66364	X

Contrast	Difference	+/- Limits
1 - 2	0,6	2,39613
1 - 3	0,68125	2,54819
1 - 4	1,06875	2,54819
1 - 5	*2,98125	2,54819
1 - 6	2,39375	2,54819
1 - 7	*3,41607	2,65147
2 - 3	0,08125	2,60128
2 - 4	0,46875	2,60128
2 - 5	2,38125	2,60128
2 - 6	1,79375	2,60128
2 - 7	*2,81607	2,70254
3 - 4	0,3875	2,74199
3 - 5	2,3	2,74199
3 - 6	1,7125	2,74199
3 - 7	2,73482	2,83823
4 - 5	1,9125	2,74199
4 - 6	1,325	2,74199
4 - 7	2,34732	2,83823
5 - 6	-0,5875	2,74199
5 - 7	0,434821	2,83823
6 - 7	1,02232	2,83823

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 3 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Dureza crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Dureza crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,33856	0,477773	19,546	0,0000
Slope	-0,542919	0,112508	-4,82561	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	72,4327	1	72,4327	23,29	0,0000
Residual	180,409	58	3,1105		
Total (Corr.)	252,842	59			

Correlation Coefficient = -0,535233
R-squared = 28,6474 percent
Standard Error of Est. = 1,76366

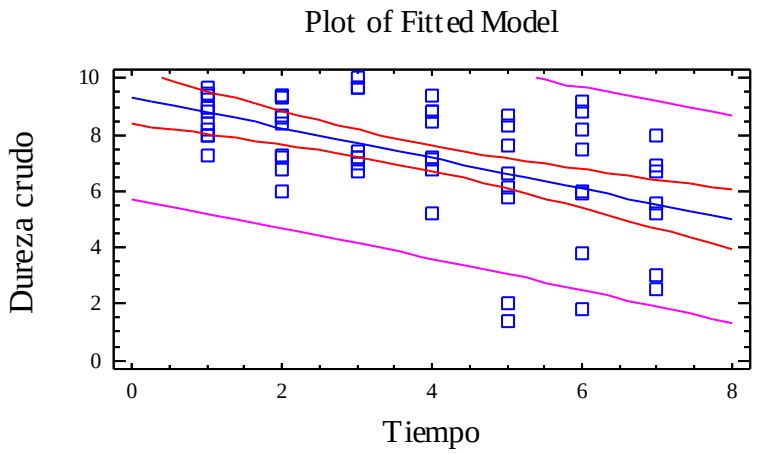
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Dureza crudo and Tiempo. The equation of the fitted model is

Dureza crudo = 9,33856 - 0,542919*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Dureza crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 28,6474% of the variability in Dureza crudo. The correlation coefficient equals -0,535233, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 1,76366. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	72,4327	1	72,4327	23,29	0,0000
Residual	180,409	58	3,1105		
Lack-of-Fit	10,3737	5	2,07473	0,65	0,6652
Pure Error	170,036	53	3,20822		
Total (Corr.)	252,842	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Dureza crudo

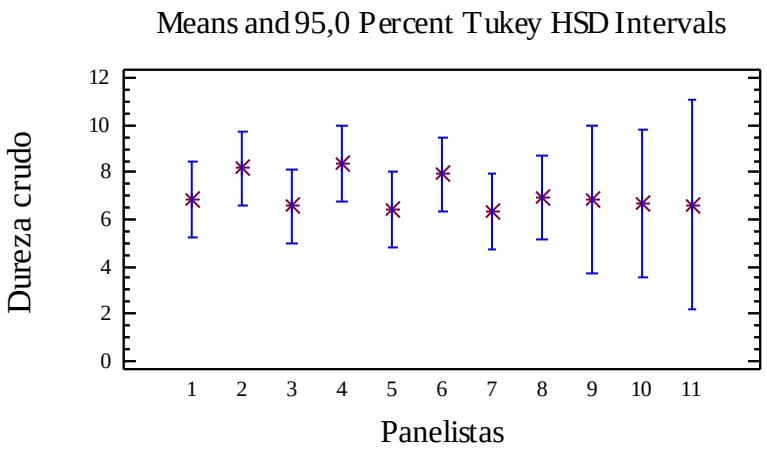
Analysis Summary

Dependent variable: Dureza crudo
Factors:
- Panelistas
- Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Dureza crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Dureza crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Dureza crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	34,7895	10	3,47895	1,11	0,3796
B:Tiempo	80,6511	6	13,4419	4,27	0,0018
RESIDUAL	135,246	43	3,14526		
TOTAL (CORRECTED)	252,842	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Dureza crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Dureza crudo at the 95,0% confidence level.

Table of Least Squares Means for Dureza crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,07205			
Panelistas					
1	7	6,84286	0,670315	5,49104	8,19468
2	7	8,17143	0,670315	6,81961	9,52325
3	7	6,55714	0,670315	5,20532	7,90896
4	7	8,41429	0,670315	7,06246	9,76611
5	7	6,42857	0,670315	5,07675	7,78039
6	7	7,91429	0,670315	6,56246	9,26611
7	7	6,34286	0,670315	4,99104	7,69468
8	6	6,94592	0,731374	5,47096	8,42088
9	2	6,85842	1,30934	4,21787	9,49896
10	2	6,70842	1,30934	4,06787	9,34896
11	1	6,60842	1,85587	2,86568	10,3512
Tiempo					
1	11	8,66364	0,534726	7,58526	9,74202
2	10	8,06364	0,585763	6,88233	9,24494
3	8	7,98239	0,679018	6,61301	9,35176
4	8	7,59489	0,679018	6,22551	8,96426
5	8	5,68239	0,679018	4,31301	7,05176
6	8	6,26989	0,679018	4,90051	7,63926
7	7	5,24756	0,725667	3,78412	6,71101

The StatAdvisor

This table shows the mean Dureza crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Dureza crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
7	7	6,34286	X
5	7	6,42857	X
3	7	6,55714	X
11	1	6,60842	X
10	2	6,70842	X
1	7	6,84286	X
9	2	6,85842	X
8	6	6,94592	X
6	7	7,91429	X
2	7	8,17143	X
4	7	8,41429	X

Contrast	Difference	+/- Limits
1 - 2	-1,32857	3,22048
1 - 3	0,285714	3,22048
1 - 4	-1,57143	3,22048
1 - 5	0,414286	3,22048
1 - 6	-1,07143	3,22048
1 - 7	0,5	3,22048
1 - 8	-0,103061	3,35198
1 - 9	-0,0155612	4,83072
1 - 10	0,134439	4,83072
1 - 11	0,234439	6,44096
2 - 3	1,61429	3,22048
2 - 4	-0,242857	3,22048
2 - 5	1,74286	3,22048
2 - 6	0,257143	3,22048
2 - 7	1,82857	3,22048
2 - 8	1,22551	3,35198
2 - 9	1,31301	4,83072
2 - 10	1,46301	4,83072
2 - 11	1,56301	6,44096
3 - 4	-1,85714	3,22048
3 - 5	0,128571	3,22048
3 - 6	-1,35714	3,22048
3 - 7	0,214286	3,22048
3 - 8	-0,388776	3,35198
3 - 9	-0,301276	4,83072
3 - 10	-0,151276	4,83072
3 - 11	-0,0512755	6,44096
4 - 5	1,98571	3,22048

4 - 6	0,5	3,22048
4 - 7	2,07143	3,22048
4 - 8	1,46837	3,35198
4 - 9	1,55587	4,83072
4 - 10	1,70587	4,83072
4 - 11	1,80587	6,44096
5 - 6	-1,48571	3,22048
5 - 7	0,0857143	3,22048
5 - 8	-0,517347	3,35198
5 - 9	-0,429847	4,83072
5 - 10	-0,279847	4,83072
5 - 11	-0,179847	6,44096
6 - 7	1,57143	3,22048
6 - 8	0,968367	3,35198
6 - 9	1,05587	4,83072
6 - 10	1,20587	4,83072
6 - 11	1,30587	6,44096
7 - 8	-0,603061	3,35198
7 - 9	-0,515561	4,83072
7 - 10	-0,365561	4,83072
7 - 11	-0,265561	6,44096
8 - 9	0,0875	4,91937
8 - 10	0,2375	4,91937
8 - 11	0,3375	6,50771
9 - 10	0,15	6,02497
9 - 11	0,25	7,37905
10 - 11	0,1	7,37905

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Dureza crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Dureza crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	7,23679	0,56773	12,7469	0,0000
Slope	0,0153338	0,102326	0,149853	0,8814

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,0978551	1	0,0978551	0,02	0,8814
Residual	252,744	58	4,35765		
Total (Corr.)	252,842	59			

Correlation Coefficient = 0,0196729
R-squared = 0,0387021 percent
Standard Error of Est. = 2,0875

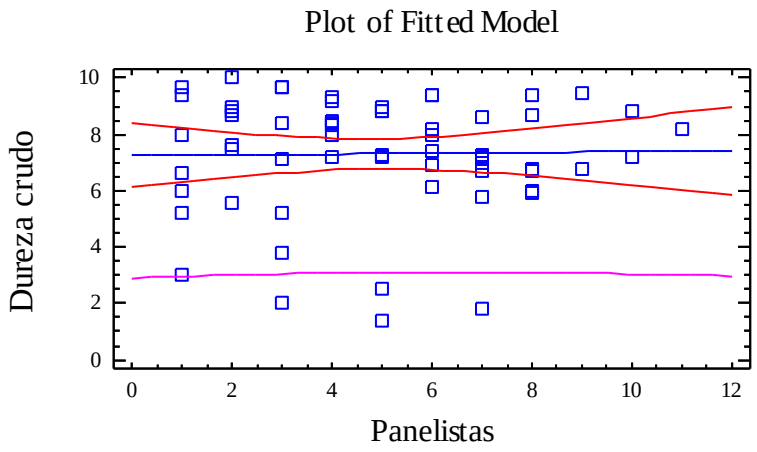
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Dureza crudo and Panelistas. The equation of the fitted model is

Dureza crudo = 7,23679 + 0,0153338*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Dureza crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 0,0387021% of the variability in Dureza crudo. The correlation coefficient equals 0,0196729, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,0875. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,0978551	1	0,0978551	0,02	0,8814
Residual	252,744	58	4,35765		
Lack-of-Fit	36,8468	9	4,09409	0,93	0,5086
Pure Error	215,897	49	4,40606		
Total (Corr.)	252,842	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.13 ANOVA COHESIVIDAD CRUDO

```
Analysis Summary

Dependent variable: Cohesividad crudo
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
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   This procedure performs a multifactor analysis of variance for
Cohesividad crudo.  It constructs various tests and graphs to
determine which factors have a statistically significant effect on
Cohesividad crudo.  It also tests for significant interactions amongst
the factors, given sufficient data.  The F-tests in the ANOVA table
will allow you to identify the significant factors.  For each
significant factor, the Multiple Range Tests will tell you which means
are significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
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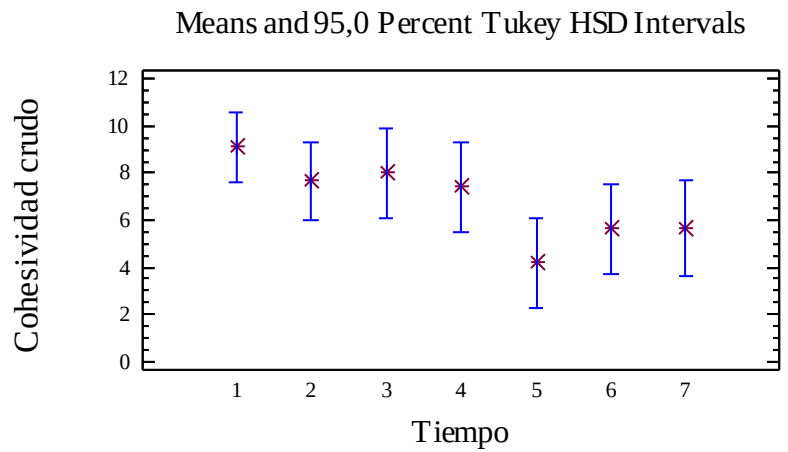


Analysis of Variance for Cohesividad crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	141,225	6	23,5375	4,50	0,0013
B:Panelistas	45,2396	10	4,52396	0,86	0,5724
RESIDUAL	225,131	43	5,23562		
TOTAL (CORRECTED)	425,867	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Cohesividad crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Cohesividad crudo at the 95,0% confidence level.

Table of Least Squares Means for Cohesividad crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,812			
Tiempo					
1	11	9,11818	0,689902	7,72686	10,5095
2	10	7,67818	0,75575	6,15406	9,2023
3	8	8,01068	0,876067	6,24392	9,77744
4	8	7,43568	0,876067	5,66892	9,20244
5	8	4,18568	0,876067	2,41892	5,95244
6	8	5,62318	0,876067	3,85642	7,38994
7	7	5,63241	0,936253	3,74427	7,52055
Panelistas					
1	7	5,65714	0,864838	3,91303	7,40126
2	7	7,78571	0,864838	6,0416	9,52983
3	7	7,22857	0,864838	5,48446	8,97269
4	7	6,5	0,864838	4,75588	8,24412
5	7	6,55714	0,864838	4,81303	8,30126
6	7	8,22857	0,864838	6,48446	9,97269
7	7	5,5	0,864838	3,75588	7,24412
8	6	6,9534	0,943616	5,05041	8,85639
9	2	6,36382	1,68931	2,95699	9,77064
10	2	6,76382	1,68931	3,35699	10,1706
11	1	7,39382	2,39444	2,56495	12,2227

The StatAdvisor

This table shows the mean Cohesividad crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Cohesividad crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
5	8	4,18568	X
6	8	5,62318	XX
7	7	5,63241	XX
4	8	7,43568	XXX
2	10	7,67818	XX
3	8	8,01068	XX
1	11	9,11818	X

Contrast	Difference	+/- Limits
1 - 2	1,44	3,09147
1 - 3	1,1075	3,28766
1 - 4	1,6825	3,28766
1 - 5	*4,9325	3,28766
1 - 6	*3,495	3,28766
1 - 7	*3,48577	3,42092
2 - 3	-0,3325	3,35617
2 - 4	0,2425	3,35617
2 - 5	*3,4925	3,35617
2 - 6	2,055	3,35617
2 - 7	2,04577	3,4868
3 - 4	0,575	3,53771
3 - 5	*3,825	3,53771
3 - 6	2,3875	3,53771
3 - 7	2,37827	3,66188
4 - 5	3,25	3,53771
4 - 6	1,8125	3,53771
4 - 7	1,80327	3,66188
5 - 6	-1,4375	3,53771
5 - 7	-1,44673	3,66188
6 - 7	-0,00922619	3,66188

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 5 pairs, indicating that

these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Cohesividad crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Cohesividad crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,46639	0,631133	14,999	0,0000
Slope	-0,672246	0,148622	-4,5232	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	111,051	1	111,051	20,46	0,0000
Residual	314,817	58	5,42787		
Total (Corr.)	425,867	59			

Correlation Coefficient = -0,51065
R-squared = 26,0763 percent
Standard Error of Est. = 2,32978

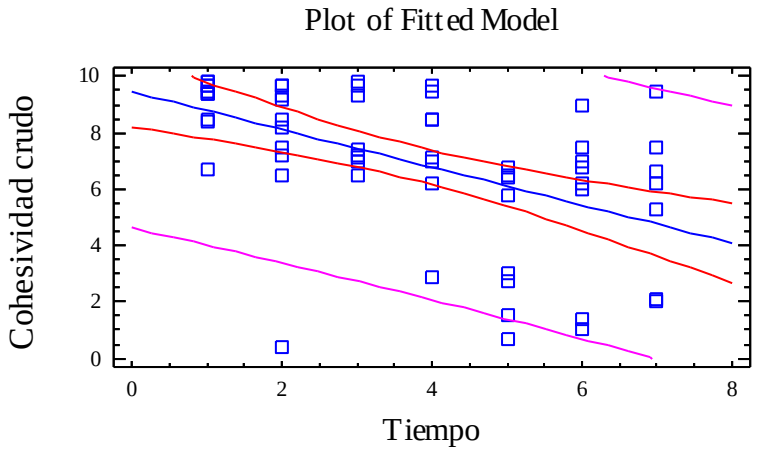
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Cohesividad crudo and Tiempo. The equation of the fitted model is

Cohesividad crudo = 9,46639 - 0,672246*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Cohesividad crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 26,0763% of the variability in Cohesividad crudo. The correlation coefficient equals -0,51065, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,32978. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	111,051	1	111,051	20,46	0,0000
Residual	314,817	58	5,42787		
Lack-of-Fit	44,4456	5	8,88912	1,74	0,1410
Pure Error	270,371	53	5,10134		
Total (Corr.)	425,867	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Cohesividad crudo

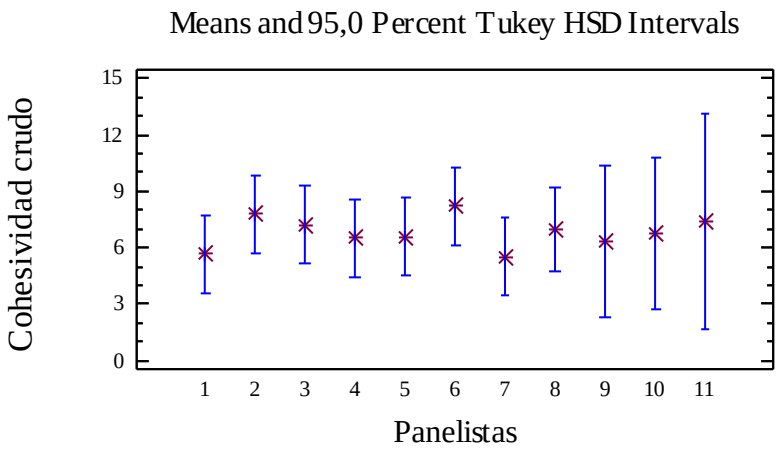
Analysis Summary

Dependent variable: Cohesividad crudo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Cohesividad crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Cohesividad crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Cohesividad crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	45,2396	10	4,52396	0,86	0,5724
B:Tiempo	141,225	6	23,5375	4,50	0,0013
RESIDUAL	225,131	43	5,23562		
TOTAL (CORRECTED)	425,867	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Cohesividad crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Cohesividad crudo at the 95,0% confidence level.

Table of Least Squares Means for Cohesividad crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,812			
Panelistas					
1	7	5,65714	0,864838	3,91303	7,40126
2	7	7,78571	0,864838	6,0416	9,52983
3	7	7,22857	0,864838	5,48446	8,97269
4	7	6,5	0,864838	4,75588	8,24412
5	7	6,55714	0,864838	4,81303	8,30126
6	7	8,22857	0,864838	6,48446	9,97269
7	7	5,5	0,864838	3,75588	7,24412
8	6	6,9534	0,943616	5,05041	8,85639
9	2	6,36382	1,68931	2,95699	9,77064
10	2	6,76382	1,68931	3,35699	10,1706
11	1	7,39382	2,39444	2,56495	12,2227
Tiempo					
1	11	9,11818	0,689902	7,72686	10,5095
2	10	7,67818	0,75575	6,15406	9,2023
3	8	8,01068	0,876067	6,24392	9,77744
4	8	7,43568	0,876067	5,66892	9,20244
5	8	4,18568	0,876067	2,41892	5,95244
6	8	5,62318	0,876067	3,85642	7,38994
7	7	5,63241	0,936253	3,74427	7,52055

The StatAdvisor

This table shows the mean Cohesividad crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Cohesividad crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
7	7	5,5	X
1	7	5,65714	X
9	2	6,36382	X
4	7	6,5	X
5	7	6,55714	X
10	2	6,76382	X
8	6	6,9534	X
3	7	7,22857	X
11	1	7,39382	X
2	7	7,78571	X
6	7	8,22857	X

Contrast	Difference	+/- Limits
1 - 2	-2,12857	4,15506
1 - 3	-1,57143	4,15506
1 - 4	-0,842857	4,15506
1 - 5	-0,9	4,15506
1 - 6	-2,57143	4,15506
1 - 7	0,157143	4,15506
1 - 8	-1,29626	4,32472
1 - 9	-0,706675	6,23258
1 - 10	-1,10668	6,23258
1 - 11	-1,73668	8,31011
2 - 3	0,557143	4,15506
2 - 4	1,28571	4,15506
2 - 5	1,22857	4,15506
2 - 6	-0,442857	4,15506
2 - 7	2,28571	4,15506
2 - 8	0,832313	4,32472
2 - 9	1,4219	6,23258
2 - 10	1,0219	6,23258
2 - 11	0,391896	8,31011
3 - 4	0,728571	4,15506
3 - 5	0,671429	4,15506
3 - 6	-1,0	4,15506
3 - 7	1,72857	4,15506
3 - 8	0,27517	4,32472
3 - 9	0,864753	6,23258
3 - 10	0,464753	6,23258
3 - 11	-0,165247	8,31011
4 - 5	-0,0571429	4,15506

4 - 6	-1,72857	4,15506
4 - 7	1,0	4,15506
4 - 8	-0,453401	4,32472
4 - 9	0,136182	6,23258
4 - 10	-0,263818	6,23258
4 - 11	-0,893818	8,31011
5 - 6	-1,67143	4,15506
5 - 7	1,05714	4,15506
5 - 8	-0,396259	4,32472
5 - 9	0,193325	6,23258
5 - 10	-0,206675	6,23258
5 - 11	-0,836675	8,31011
6 - 7	2,72857	4,15506
6 - 8	1,27517	4,32472
6 - 9	1,86475	6,23258
6 - 10	1,46475	6,23258
6 - 11	0,834753	8,31011
7 - 8	-1,4534	4,32472
7 - 9	-0,863818	6,23258
7 - 10	-1,26382	6,23258
7 - 11	-1,89382	8,31011
8 - 9	0,589583	6,34695
8 - 10	0,189583	6,34695
8 - 11	-0,440417	8,39623
9 - 10	-0,4	7,7734
9 - 11	-1,03	9,52043
10 - 11	-0,63	9,52043

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Cohesividad crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Cohesividad crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,38528	0,732004	8,72301	0,0000
Slope	0,117008	0,131934	0,886867	0,3788

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	5,69789	1	5,69789	0,79	0,3788
Residual	420,169	58	7,2443		
Total (Corr.)	425,867	59			

Correlation Coefficient = 0,11567
R-squared = 1,33795 percent
Standard Error of Est. = 2,69152

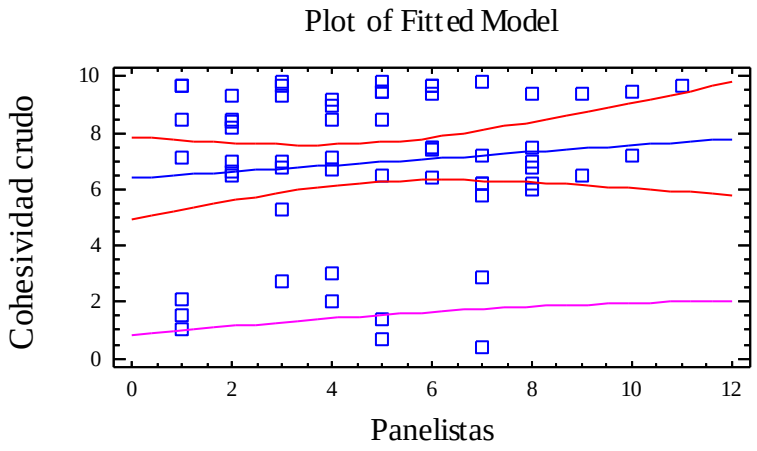
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Cohesividad crudo and Panelistas. The equation of the fitted model is

Cohesividad crudo = 6,38528 + 0,117008*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Cohesividad crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,33795% of the variability in Cohesividad crudo. The correlation coefficient equals 0,11567, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,69152. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	5,69789	1	5,69789	0,79	0,3788
Residual	420,169	58	7,2443		
Lack-of-Fit	53,813	9	5,97922	0,80	0,6182
Pure Error	366,356	49	7,47666		
Total (Corr.)	425,867	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.14 ANOVA ELASTICIDAD CRUDO

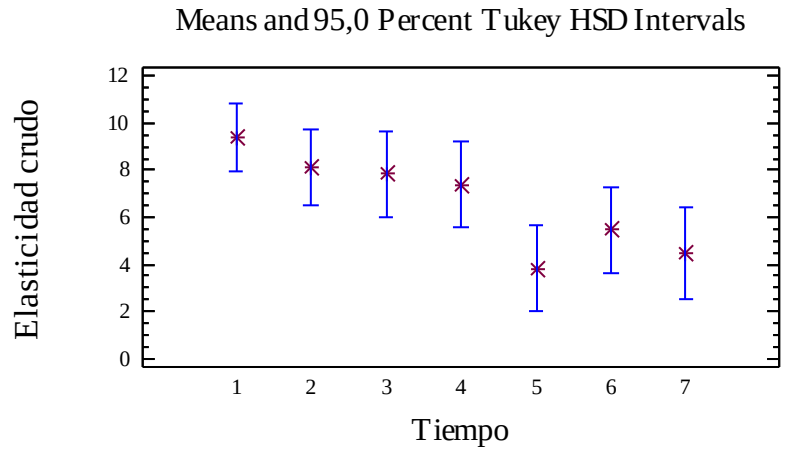
Analysis Summary

Dependent variable: Elasticidad crudo
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Elasticidad crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Elasticidad crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Elasticidad crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	203,114	6	33,8523	6,91	0,0000
B:Panelistas	57,3509	10	5,73509	1,17	0,3362
RESIDUAL	210,61	43	4,89791		
TOTAL (CORRECTED)	469,637	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Elasticidad crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Elasticidad crudo at the 95,0% confidence level.

Table of Least Squares Means for Elasticidad crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,64492			
Tiempo					
1	11	9,40909	0,667281	8,06339	10,7548
2	10	8,11909	0,73097	6,64495	9,59324
3	8	7,83909	0,847342	6,13026	9,54792
4	8	7,38909	0,847342	5,68026	9,09792
5	8	3,82659	0,847342	2,11776	5,53542
6	8	5,46409	0,847342	3,75526	7,17292
7	7	4,46736	0,905554	2,64114	6,29359
Panelistas					
1	7	7,65714	0,836481	5,97021	9,34407
2	7	4,88571	0,836481	3,19879	6,57264
3	7	6,78571	0,836481	5,09879	8,47264
4	7	7,6	0,836481	5,91307	9,28693
5	7	6,57143	0,836481	4,8845	8,25836
6	7	7,74286	0,836481	6,05593	9,42979
7	7	7,9	0,836481	6,21307	9,58693
8	6	6,30374	0,912676	4,46315	8,14433
9	2	5,73082	1,63392	2,43571	9,02594
10	2	5,28082	1,63392	1,98571	8,57594
11	1	6,63582	2,31593	1,96529	11,3064

The StatAdvisor

This table shows the mean Elasticidad crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Elasticidad crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
5	8	3,82659	X
7	7	4,46736	XX
6	8	5,46409	XXX
4	8	7,38909	XXX
3	8	7,83909	XXX
2	10	8,11909	XX
1	11	9,40909	X

Contrast	Difference	+/- Limits
1 - 2	1,29	2,99011
1 - 3	1,57	3,17987
1 - 4	2,02	3,17987
1 - 5	*5,5825	3,17987
1 - 6	*3,945	3,17987
1 - 7	*4,94173	3,30875
2 - 3	0,28	3,24612
2 - 4	0,73	3,24612
2 - 5	*4,2925	3,24612
2 - 6	2,655	3,24612
2 - 7	*3,65173	3,37248
3 - 4	0,45	3,42171
3 - 5	*4,0125	3,42171
3 - 6	2,375	3,42171
3 - 7	3,37173	3,54181
4 - 5	*3,5625	3,42171
4 - 6	1,925	3,42171
4 - 7	2,92173	3,54181
5 - 6	-1,6375	3,42171
5 - 7	-0,640774	3,54181
6 - 7	0,996726	3,54181

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 7 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 4 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Elasticidad crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Elasticidad crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	10,0771	0,625961	16,0986	0,0000
Slope	-0,80681	0,147404	-5,47346	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	159,958	1	159,958	29,96	0,0000
Residual	309,678	58	5,33928		
Total (Corr.)	469,637	59			

Correlation Coefficient = -0,583609
R-squared = 34,06 percent
Standard Error of Est. = 2,31069

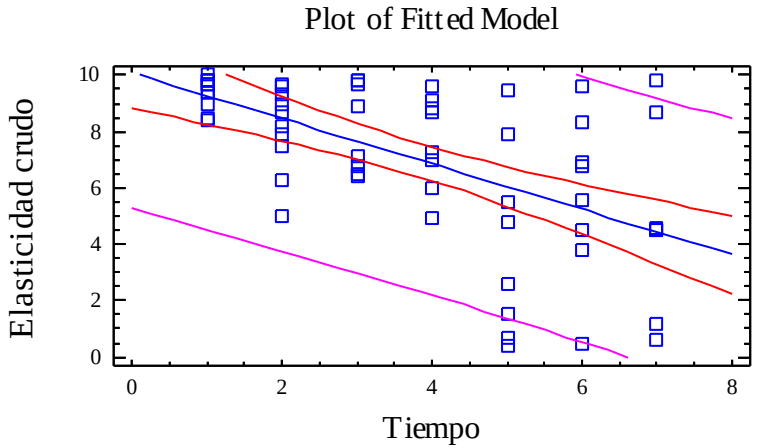
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Elasticidad crudo and Tiempo. The equation of the fitted model is

Elasticidad crudo = 10,0771 - 0,80681*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Elasticidad crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 34,06% of the variability in Elasticidad crudo. The correlation coefficient equals -0,583609, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,31069. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	159,958	1	159,958	29,96	0,0000
Residual	309,678	58	5,33928		
Lack-of-Fit	41,7175	5	8,34349	1,65	0,1629
Pure Error	267,961	53	5,05587		
Total (Corr.)	469,637	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Elasticidad crudo

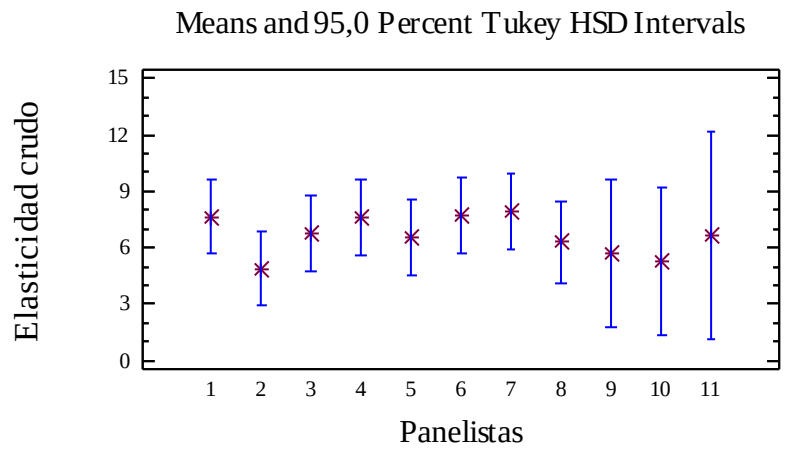
Analysis Summary

Dependent variable: Elasticidad crudo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Elasticidad crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Elasticidad crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Elasticidad crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	57,3509	10	5,73509	1,17	0,3362
B:Tiempo	203,114	6	33,8523	6,91	0,0000
RESIDUAL	210,61	43	4,89791		
TOTAL (CORRECTED)	469,637	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Elasticidad crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Elasticidad crudo at the 95,0% confidence level.

Table of Least Squares Means for Elasticidad crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	6,64492			
Panelistas					
1	7	7,65714	0,836481	5,97021	9,34407
2	7	4,88571	0,836481	3,19879	6,57264
3	7	6,78571	0,836481	5,09879	8,47264
4	7	7,6	0,836481	5,91307	9,28693
5	7	6,57143	0,836481	4,8845	8,25836
6	7	7,74286	0,836481	6,05593	9,42979
7	7	7,9	0,836481	6,21307	9,58693
8	6	6,30374	0,912676	4,46315	8,14433
9	2	5,73082	1,63392	2,43571	9,02594
10	2	5,28082	1,63392	1,98571	8,57594
11	1	6,63582	2,31593	1,96529	11,3064
Tiempo					
1	11	9,40909	0,667281	8,06339	10,7548
2	10	8,11909	0,73097	6,64495	9,59324
3	8	7,83909	0,847342	6,13026	9,54792
4	8	7,38909	0,847342	5,68026	9,09792
5	8	3,82659	0,847342	2,11776	5,53542
6	8	5,46409	0,847342	3,75526	7,17292
7	7	4,46736	0,905554	2,64114	6,29359

The StatAdvisor

This table shows the mean Elasticidad crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Elasticidad crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
2	7	4,88571	X
10	2	5,28082	X
9	2	5,73082	X
8	6	6,30374	X
5	7	6,57143	X
11	1	6,63582	X
3	7	6,78571	X
4	7	7,6	X
1	7	7,65714	X
6	7	7,74286	X
7	7	7,9	X

Contrast	Difference	+/- Limits
1 - 2	2,77143	4,01882
1 - 3	0,871429	4,01882
1 - 4	0,0571429	4,01882
1 - 5	1,08571	4,01882
1 - 6	-0,0857143	4,01882
1 - 7	-0,242857	4,01882
1 - 8	1,3534	4,18292
1 - 9	1,92632	6,02823
1 - 10	2,37632	6,02823
1 - 11	1,02132	8,03764
2 - 3	-1,9	4,01882
2 - 4	-2,71429	4,01882
2 - 5	-1,68571	4,01882
2 - 6	-2,85714	4,01882
2 - 7	-3,01429	4,01882
2 - 8	-1,41803	4,18292
2 - 9	-0,845111	6,02823
2 - 10	-0,395111	6,02823
2 - 11	-1,75011	8,03764
3 - 4	-0,814286	4,01882
3 - 5	0,214286	4,01882
3 - 6	-0,957143	4,01882
3 - 7	-1,11429	4,01882
3 - 8	0,481973	4,18292
3 - 9	1,05489	6,02823
3 - 10	1,50489	6,02823
3 - 11	0,149889	8,03764
4 - 5	1,02857	4,01882

4 - 6	-0,142857	4,01882
4 - 7	-0,3	4,01882
4 - 8	1,29626	4,18292
4 - 9	1,86918	6,02823
4 - 10	2,31918	6,02823
4 - 11	0,964175	8,03764
5 - 6	-1,17143	4,01882
5 - 7	-1,32857	4,01882
5 - 8	0,267687	4,18292
5 - 9	0,840604	6,02823
5 - 10	1,2906	6,02823
5 - 11	-0,0643963	8,03764
6 - 7	-0,157143	4,01882
6 - 8	1,43912	4,18292
6 - 9	2,01203	6,02823
6 - 10	2,46203	6,02823
6 - 11	1,10703	8,03764
7 - 8	1,59626	4,18292
7 - 9	2,16918	6,02823
7 - 10	2,61918	6,02823
7 - 11	1,26418	8,03764
8 - 9	0,572917	6,13885
8 - 10	1,02292	6,13885
8 - 11	-0,332083	8,12093
9 - 10	0,45	7,51852
9 - 11	-0,905	9,20827
10 - 11	-1,355	9,20827

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Elasticidad crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Elasticidad crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,33452	0,766184	8,26762	0,0000
Slope	0,149586	0,138094	1,08321	0,2832

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,31245	1	9,31245	1,17	0,2832
Residual	460,324	58	7,93662		
Total (Corr.)	469,637	59			

Correlation Coefficient = 0,140816
R-squared = 1,98291 percent
Standard Error of Est. = 2,8172

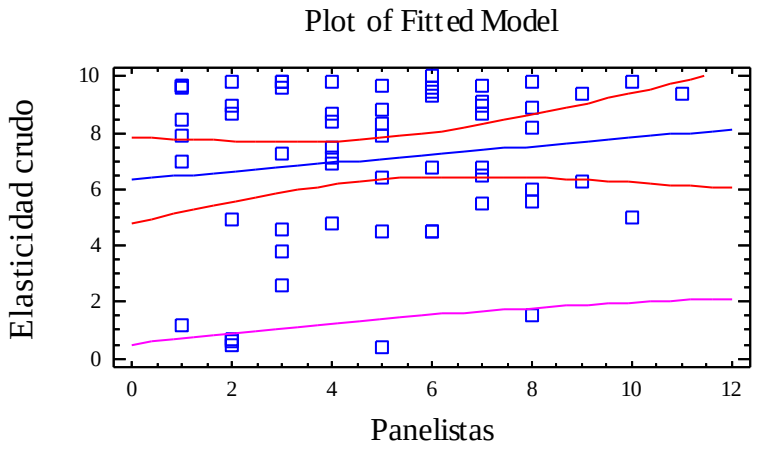
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Elasticidad crudo and Panelistas. The equation of the fitted model is

Elasticidad crudo = 6,33452 + 0,149586*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Elasticidad crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,98291% of the variability in Elasticidad crudo. The correlation coefficient equals 0,140816, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,8172. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	9,31245	1	9,31245	1,17	0,2832
Residual	460,324	58	7,93662		
Lack-of-Fit	46,6	9	5,17778	0,61	0,7798
Pure Error	413,724	49	8,44335		
Total (Corr.)	469,637	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.15 ANOVA FIRMEZA CRUDO

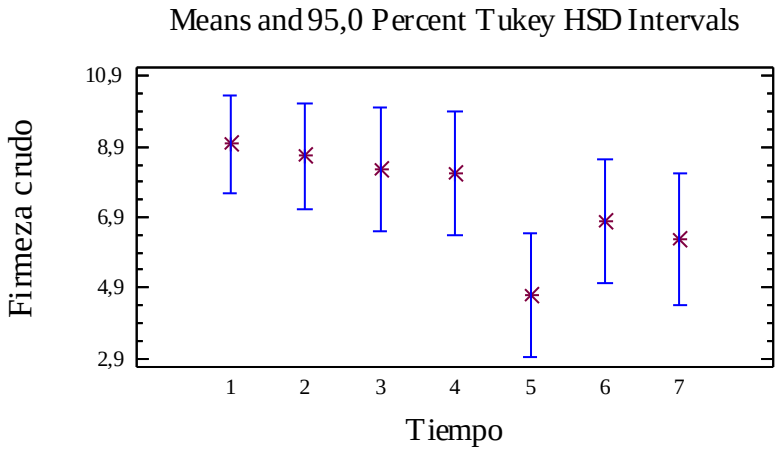
Analysis Summary

Dependent variable: Firmeza crudo
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Firmeza crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Firmeza crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Firmeza crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	113,458	6	18,9096	4,34	0,0017
B:Panelistas	29,6576	10	2,96576	0,68	0,7363
RESIDUAL	187,438	43	4,35902		
TOTAL (CORRECTED)	343,537	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Firmeza crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Firmeza crudo at the 95,0% confidence level.

Table of Least Squares Means for Firmeza crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,3938			
Tiempo					
1	11	8,97273	0,629503	7,70321	10,2422
2	10	8,63273	0,689586	7,24204	10,0234
3	8	8,27148	0,79937	6,65939	9,88356
4	8	8,14648	0,79937	6,53439	9,75856
5	8	4,68398	0,79937	3,07189	6,29606
6	8	6,78398	0,79937	5,17189	8,39606
7	7	6,26523	0,854287	4,54239	7,98806
Panelistas					
1	7	8,2	0,789124	6,60858	9,79142
2	7	6,8	0,789124	5,20858	8,39142
3	7	6,37143	0,789124	4,78	7,96285
4	7	8,05714	0,789124	6,46572	9,64857
5	7	6,51429	0,789124	4,92286	8,10571
6	7	8,0	0,789124	6,40858	9,59142
7	7	7,65714	0,789124	6,06572	9,24857
8	6	6,67857	0,861005	4,94219	8,41496
9	2	7,19107	1,54142	4,0825	10,2996
10	2	8,04107	1,54142	4,9325	11,1496
11	1	7,82107	2,18482	3,41496	12,2272

The StatAdvisor

This table shows the mean Firmeza crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Firmeza crudo by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
5	8	4,68398	X
7	7	6,26523	XX
6	8	6,78398	XX
4	8	8,14648	X
3	8	8,27148	X
2	10	8,63273	X
1	11	8,97273	X

Contrast	Difference	+/- Limits
1 - 2	0,34	2,82082
1 - 3	0,70125	2,99984
1 - 4	0,82625	2,99984
1 - 5	*4,28875	2,99984
1 - 6	2,18875	2,99984
1 - 7	2,7075	3,12143
2 - 3	0,36125	3,06234
2 - 4	0,48625	3,06234
2 - 5	*3,94875	3,06234
2 - 6	1,84875	3,06234
2 - 7	2,3675	3,18155
3 - 4	0,125	3,22799
3 - 5	*3,5875	3,22799
3 - 6	1,4875	3,22799
3 - 7	2,00625	3,34129
4 - 5	*3,4625	3,22799
4 - 6	1,3625	3,22799
4 - 7	1,88125	3,34129
5 - 6	-2,1	3,22799
5 - 7	-1,58125	3,34129
6 - 7	0,51875	3,34129

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 4 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 2 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Firmeza crudo vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Firmeza crudo
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	9,58072	0,578629	16,5576	0,0000
Slope	-0,566712	0,136258	-4,15911	0,0001

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	78,9203	1	78,9203	17,30	0,0001
Residual	264,616	58	4,56235		
Total (Corr.)	343,537	59			

Correlation Coefficient = -0,479301
R-squared = 22,9729 percent
Standard Error of Est. = 2,13597

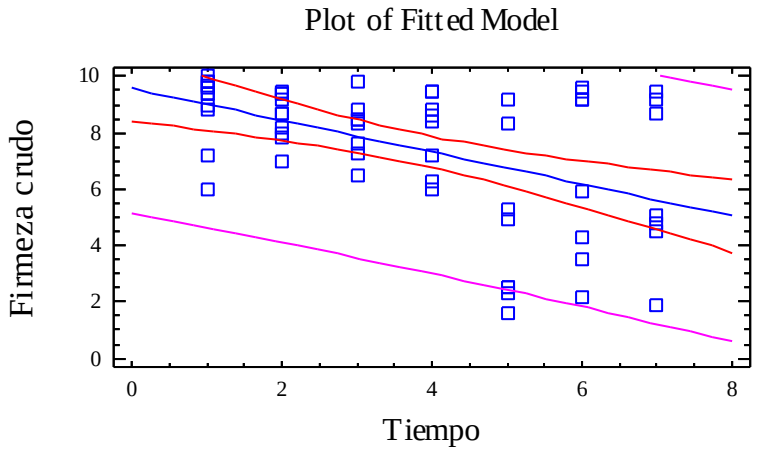
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Firmeza crudo and Tiempo. The equation of the fitted model is

Firmeza crudo = 9,58072 - 0,566712*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Firmeza crudo and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 22,9729% of the variability in Firmeza crudo. The correlation coefficient equals -0,479301, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,13597. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	78,9203	1	78,9203	17,30	0,0001
Residual	264,616	58	4,56235		
Lack-of-Fit	47,5207	5	9,50415	2,32	0,0559
Pure Error	217,095	53	4,09614		
Total (Corr.)	343,537	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.10, there is statistically significant lack-of-fit at the 90% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Multifactor ANOVA - Firmeza crudo

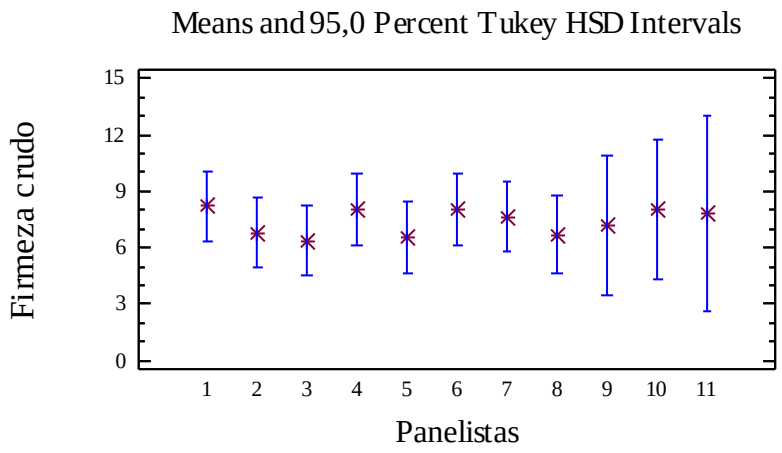
Analysis Summary

Dependent variable: Firmeza crudo
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Firmeza crudo. It constructs various tests and graphs to determine which factors have a statistically significant effect on Firmeza crudo. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Firmeza crudo - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	29,6576	10	2,96576	0,68	0,7363
B:Tiempo	113,458	6	18,9096	4,34	0,0017
RESIDUAL	187,438	43	4,35902		
TOTAL (CORRECTED)	343,537	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Firmeza crudo into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Firmeza crudo at the 95,0% confidence level.

Table of Least Squares Means for Firmeza crudo
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	7,3938			
Panelistas					
1	7	8,2	0,789124	6,60858	9,79142
2	7	6,8	0,789124	5,20858	8,39142
3	7	6,37143	0,789124	4,78	7,96285
4	7	8,05714	0,789124	6,46572	9,64857
5	7	6,51429	0,789124	4,92286	8,10571
6	7	8,0	0,789124	6,40858	9,59142
7	7	7,65714	0,789124	6,06572	9,24857
8	6	6,67857	0,861005	4,94219	8,41496
9	2	7,19107	1,54142	4,0825	10,2996
10	2	8,04107	1,54142	4,9325	11,1496
11	1	7,82107	2,18482	3,41496	12,2272
Tiempo					
1	11	8,97273	0,629503	7,70321	10,2422
2	10	8,63273	0,689586	7,24204	10,0234
3	8	8,27148	0,79937	6,65939	9,88356
4	8	8,14648	0,79937	6,53439	9,75856
5	8	4,68398	0,79937	3,07189	6,29606
6	8	6,78398	0,79937	5,17189	8,39606
7	7	6,26523	0,854287	4,54239	7,98806

The StatAdvisor

This table shows the mean Firmeza crudo for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Firmeza crudo by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
3	7	6,37143	X
5	7	6,51429	X
8	6	6,67857	X
2	7	6,8	X
9	2	7,19107	X
7	7	7,65714	X
11	1	7,82107	X
6	7	8,0	X
10	2	8,04107	X
4	7	8,05714	X
1	7	8,2	X

Contrast	Difference	+/- Limits
1 - 2	1,4	3,79129
1 - 3	1,82857	3,79129
1 - 4	0,142857	3,79129
1 - 5	1,68571	3,79129
1 - 6	0,2	3,79129
1 - 7	0,542857	3,79129
1 - 8	1,52143	3,9461
1 - 9	1,00893	5,68694
1 - 10	0,158929	5,68694
1 - 11	0,378929	7,58259
2 - 3	0,428571	3,79129
2 - 4	-1,25714	3,79129
2 - 5	0,285714	3,79129
2 - 6	-1,2	3,79129
2 - 7	-0,857143	3,79129
2 - 8	0,121429	3,9461
2 - 9	-0,391071	5,68694
2 - 10	-1,24107	5,68694
2 - 11	-1,02107	7,58259
3 - 4	-1,68571	3,79129
3 - 5	-0,142857	3,79129
3 - 6	-1,62857	3,79129
3 - 7	-1,28571	3,79129
3 - 8	-0,307143	3,9461
3 - 9	-0,819643	5,68694
3 - 10	-1,66964	5,68694
3 - 11	-1,44964	7,58259
4 - 5	1,54286	3,79129

4 - 6	0,0571429	3,79129
4 - 7	0,4	3,79129
4 - 8	1,37857	3,9461
4 - 9	0,866071	5,68694
4 - 10	0,0160714	5,68694
4 - 11	0,236071	7,58259
5 - 6	-1,48571	3,79129
5 - 7	-1,14286	3,79129
5 - 8	-0,164286	3,9461
5 - 9	-0,676786	5,68694
5 - 10	-1,52679	5,68694
5 - 11	-1,30679	7,58259
6 - 7	0,342857	3,79129
6 - 8	1,32143	3,9461
6 - 9	0,808929	5,68694
6 - 10	-0,0410714	5,68694
6 - 11	0,178929	7,58259
7 - 8	0,978571	3,9461
7 - 9	0,466071	5,68694
7 - 10	-0,383929	5,68694
7 - 11	-0,163929	7,58259
8 - 9	-0,5125	5,7913
8 - 10	-1,3625	5,7913
8 - 11	-1,1425	7,66117
9 - 10	-0,85	7,09286
9 - 11	-0,63	8,68695
10 - 11	0,22	8,68695

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Firmeza crudo vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Firmeza crudo
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	6,9868	0,658037	10,6176	0,0000
Slope	0,0979256	0,118602	0,825664	0,4124

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	3,99096	1	3,99096	0,68	0,4124
Residual	339,546	58	5,85423		
Total (Corr.)	343,537	59			

Correlation Coefficient = 0,107783
R-squared = 1,16173 percent
Standard Error of Est. = 2,41955

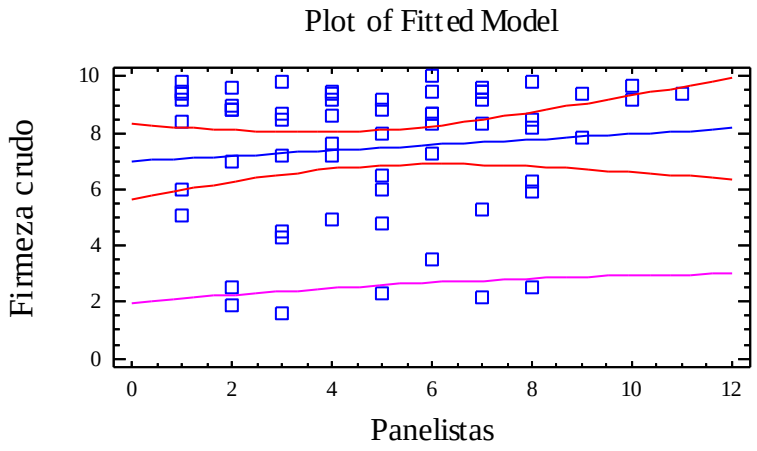
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Firmeza crudo and Panelistas. The equation of the fitted model is

Firmeza crudo = 6,9868 + 0,0979256*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Firmeza crudo and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,16173% of the variability in Firmeza crudo. The correlation coefficient equals 0,107783, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 2,41955. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	3,99096	1	3,99096	0,68	0,4124
Residual	339,546	58	5,85423		
Lack-of-Fit	38,6501	9	4,29445	0,70	0,7062
Pure Error	300,895	49	6,14072		
Total (Corr.)	343,537	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

6.16 ANOVA FIRMEZA COCIDO

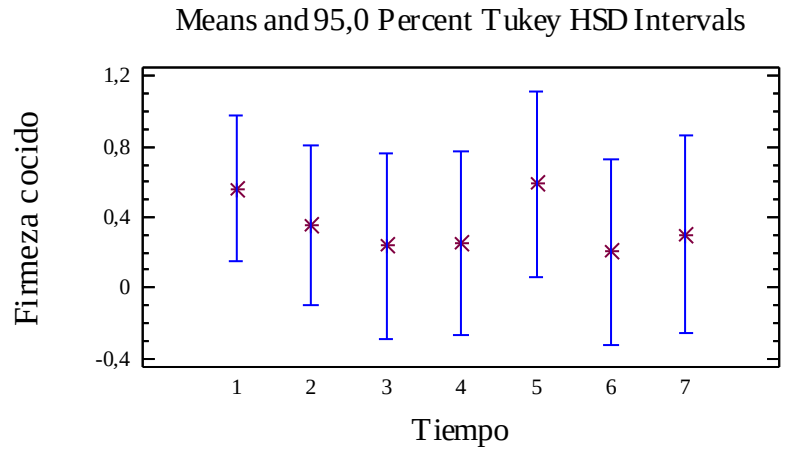
Analysis Summary

Dependent variable: Firmeza cocido
Factors:
Tiempo
Panelistas

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Firmeza cocido. It constructs various tests and graphs to determine which factors have a statistically significant effect on Firmeza cocido. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Firmeza cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	1,23008	6	0,205014	0,52	0,7908
B:Panelistas	4,07347	10	0,407347	1,03	0,4347
RESIDUAL	16,9921	43	0,395164		
TOTAL (CORRECTED)	22,3273	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Firmeza cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Firmeza cocido at the 95,0% confidence level.

Table of Least Squares Means for Firmeza cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	0,357446			
Tiempo					
1	11	0,563636	0,189536	0,181399	0,945874
2	10	0,353636	0,207627	-0,0650835	0,772356
3	8	0,239886	0,240681	-0,245495	0,725267
4	8	0,252386	0,240681	-0,232995	0,737767
5	8	0,589886	0,240681	0,104505	1,07527
6	8	0,202386	0,240681	-0,282995	0,687767
7	7	0,300303	0,257216	-0,218423	0,81903
Panelistas					
1	7	1,04286	0,237596	0,563697	1,52202
2	7	0,271429	0,237596	-0,207731	0,750588
3	7	0,171429	0,237596	-0,307731	0,650588
4	7	0,228571	0,237596	-0,250588	0,707731
5	7	0,185714	0,237596	-0,293445	0,664874
6	7	0,328571	0,237596	-0,150588	0,807731
7	7	0,371429	0,237596	-0,107731	0,850588
8	6	0,340476	0,259239	-0,18233	0,863282
9	2	0,54881	0,464103	-0,387145	1,48476
10	2	0,14881	0,464103	-0,787145	1,08476
11	1	0,29381	0,657823	-1,03282	1,62044

The StatAdvisor

This table shows the mean Firmeza cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Firmeza cocido by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
6	8	0,202386	X
3	8	0,239886	X
4	8	0,252386	X
7	7	0,300303	X
2	10	0,353636	X
1	11	0,563636	X
5	8	0,589886	X

Contrast	Difference	+/- Limits
1 - 2	0,21	0,849318
1 - 3	0,32375	0,903218
1 - 4	0,31125	0,903218
1 - 5	-0,02625	0,903218
1 - 6	0,36125	0,903218
1 - 7	0,263333	0,939827
2 - 3	0,11375	0,922037
2 - 4	0,10125	0,922037
2 - 5	-0,23625	0,922037
2 - 6	0,15125	0,922037
2 - 7	0,0533333	0,957927
3 - 4	-0,0125	0,971912
3 - 5	-0,35	0,971912
3 - 6	0,0375	0,971912
3 - 7	-0,0604167	1,00602
4 - 5	-0,3375	0,971912
4 - 6	0,05	0,971912
4 - 7	-0,0479167	1,00602
5 - 6	0,3875	0,971912
5 - 7	0,289583	1,00602
6 - 7	-0,0979167	1,00602

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Firmeza cocido vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Firmeza cocido
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	0,48261	0,167331	2,88416	0,0055
Slope	-0,0283776	0,0394039	-0,720173	0,4743

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,197887	1	0,197887	0,52	0,4743
Residual	22,1294	58	0,381542		
Total (Corr.)	22,3273	59			

Correlation Coefficient = -0,0941434
R-squared = 0,886298 percent
Standard Error of Est. = 0,617691

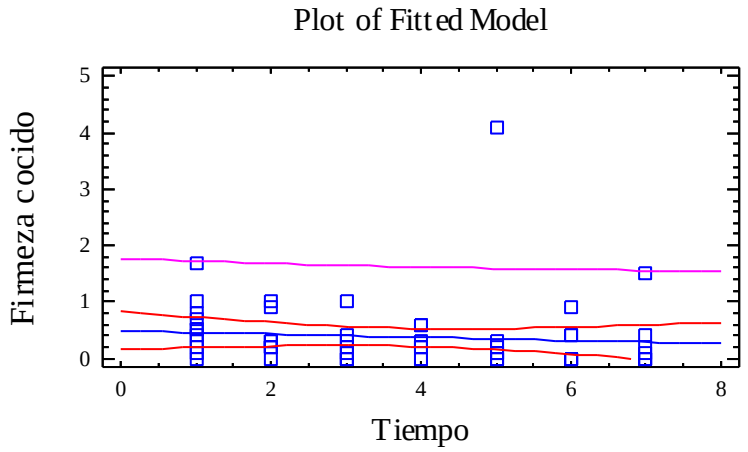
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Firmeza cocido and Tiempo. The equation of the fitted model is

Firmeza cocido = 0,48261 - 0,0283776*Tiempo

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Firmeza cocido and Tiempo at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 0,886298% of the variability in Firmeza cocido. The correlation coefficient equals -0,0941434, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,617691. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,197887	1	0,197887	0,52	0,4743
Residual	22,1294	58	0,381542		
Lack-of-Fit	1,06392	5	0,212784	0,54	0,7485
Pure Error	21,0655	53	0,397463		
Total (Corr.)	22,3273	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Firmeza cocido

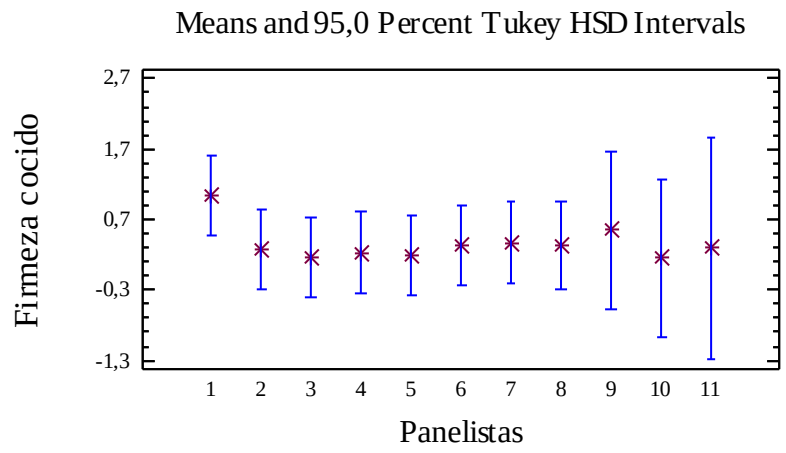
Analysis Summary

Dependent variable: Firmeza cocido
Factors:
Panelistas
Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Firmeza cocido. It constructs various tests and graphs to determine which factors have a statistically significant effect on Firmeza cocido. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Firmeza cocido - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	4,07347	10	0,407347	1,03	0,4347
B:Tiempo	1,23008	6	0,205014	0,52	0,7908
RESIDUAL	16,9921	43	0,395164		
TOTAL (CORRECTED)	22,3273	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Firmeza cocido into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since no P-values are less than 0,05, none of the factors have a statistically significant effect on Firmeza cocido at the 95,0% confidence level.

Table of Least Squares Means for Firmeza cocido
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	0,357446			
Panelistas					
1	7	1,04286	0,237596	0,563697	1,52202
2	7	0,271429	0,237596	-0,207731	0,750588
3	7	0,171429	0,237596	-0,307731	0,650588
4	7	0,228571	0,237596	-0,250588	0,707731
5	7	0,185714	0,237596	-0,293445	0,664874
6	7	0,328571	0,237596	-0,150588	0,807731
7	7	0,371429	0,237596	-0,107731	0,850588
8	6	0,340476	0,259239	-0,18233	0,863282
9	2	0,54881	0,464103	-0,387145	1,48476
10	2	0,14881	0,464103	-0,787145	1,08476
11	1	0,29381	0,657823	-1,03282	1,62044
Tiempo					
1	11	0,563636	0,189536	0,181399	0,945874
2	10	0,353636	0,207627	-0,0650835	0,772356
3	8	0,239886	0,240681	-0,245495	0,725267
4	8	0,252386	0,240681	-0,232995	0,737767
5	8	0,589886	0,240681	0,104505	1,07527
6	8	0,202386	0,240681	-0,282995	0,687767
7	7	0,300303	0,257216	-0,218423	0,81903

The StatAdvisor

This table shows the mean Firmeza cocido for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Firmeza cocido by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
10	2	0,14881	X
3	7	0,171429	X
5	7	0,185714	X
4	7	0,228571	X
2	7	0,271429	X
11	1	0,29381	X
6	7	0,328571	X
8	6	0,340476	X
7	7	0,371429	X
9	2	0,54881	X
1	7	1,04286	X

Contrast	Difference	+/- Limits
1 - 2	0,771429	1,14152
1 - 3	0,871429	1,14152
1 - 4	0,814286	1,14152
1 - 5	0,857143	1,14152
1 - 6	0,714286	1,14152
1 - 7	0,671429	1,14152
1 - 8	0,702381	1,18813
1 - 9	0,494048	1,71227
1 - 10	0,894048	1,71227
1 - 11	0,749048	2,28303
2 - 3	0,1	1,14152
2 - 4	0,0428571	1,14152
2 - 5	0,0857143	1,14152
2 - 6	-0,0571429	1,14152
2 - 7	-0,1	1,14152
2 - 8	-0,0690476	1,18813
2 - 9	-0,277381	1,71227
2 - 10	0,122619	1,71227
2 - 11	-0,022381	2,28303
3 - 4	-0,0571429	1,14152
3 - 5	-0,0142857	1,14152
3 - 6	-0,157143	1,14152
3 - 7	-0,2	1,14152
3 - 8	-0,169048	1,18813
3 - 9	-0,377381	1,71227
3 - 10	0,022619	1,71227
3 - 11	-0,122381	2,28303
4 - 5	0,0428571	1,14152

4 - 6	-0,1	1,14152
4 - 7	-0,142857	1,14152
4 - 8	-0,111905	1,18813
4 - 9	-0,320238	1,71227
4 - 10	0,0797619	1,71227
4 - 11	-0,0652381	2,28303
5 - 6	-0,142857	1,14152
5 - 7	-0,185714	1,14152
5 - 8	-0,154762	1,18813
5 - 9	-0,363095	1,71227
5 - 10	0,0369048	1,71227
5 - 11	-0,108095	2,28303
6 - 7	-0,0428571	1,14152
6 - 8	-0,0119048	1,18813
6 - 9	-0,220238	1,71227
6 - 10	0,179762	1,71227
6 - 11	0,0347619	2,28303
7 - 8	0,0309524	1,18813
7 - 9	-0,177381	1,71227
7 - 10	0,222619	1,71227
7 - 11	0,077619	2,28303
8 - 9	-0,208333	1,74369
8 - 10	0,191667	1,74369
8 - 11	0,0466667	2,30669
9 - 10	0,4	2,13558
9 - 11	0,255	2,61554
10 - 11	-0,145	2,61554

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Firmeza cocido vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Firmeza cocido
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	0,514693	0,16748	3,07317	0,0032
Slope	-0,0282648	0,0301859	-0,936357	0,3530

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,332488	1	0,332488	0,88	0,3530
Residual	21,9948	58	0,379221		
Total (Corr.)	22,3273	59			

Correlation Coefficient = -0,122031
R-squared = 1,48915 percent
Standard Error of Est. = 0,61581

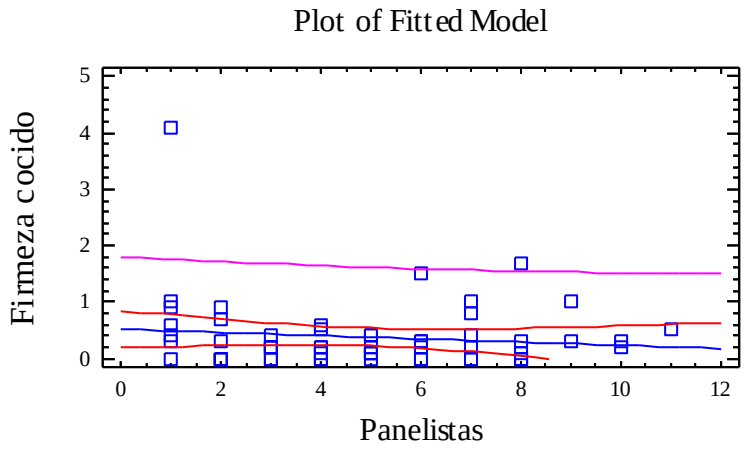
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Firmeza cocido and Panelistas. The equation of the fitted model is

Firmeza cocido = 0,514693 - 0,0282648*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Firmeza cocido and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 1,48915% of the variability in Firmeza cocido. The correlation coefficient equals -0,122031, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,61581. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	0,332488	1	0,332488	0,88	0,3530
Residual	21,9948	58	0,379221		
Lack-of-Fit	3,7727	9	0,419189	1,13	0,3622
Pure Error	18,2221	49	0,37188		
Total (Corr.)	22,3273	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

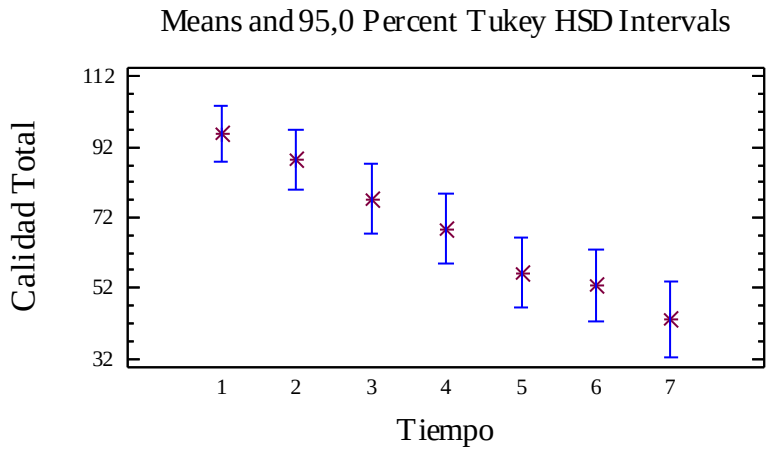
6.17 ANOVA CALIDAD TOTAL

```
Analysis Summary

Dependent variable: Calidad Total
Factors:
        Tiempo
        Panelistas

Number of complete cases: 60


The StatAdvisor
---------------
   This procedure performs a multifactor analysis of variance for
Calidad Total.  It constructs various tests and graphs to determine
which factors have a statistically significant effect on Calidad
Total.  It also tests for significant interactions amongst the
factors, given sufficient data.  The F-tests in the ANOVA table will
allow you to identify the significant factors.  For each significant
factor, the Multiple Range Tests will tell you which means are
significantly different from which others.  The Means Plot and
Interaction Plot will help you interpret the significant effects.  The
Residual Plots will help you judge whether the assumptions underlying
the analysis of variance are violated by the data.
```



Analysis of Variance for Calidad Total - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Tiempo	17209,0	6	2868,17	19,96	0,0000
B:Panelistas	366,31	10	36,631	0,25	0,9876
RESIDUAL	6179,83	43	143,717		
TOTAL (CORRECTED)	25982,7	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Calidad Total into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Calidad Total at the 95,0% confidence level.

Table of Least Squares Means for Calidad Total
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	68,9135			
Tiempo					
1	11	95,6364	3,61458	88,3469	102,926
2	10	88,4364	3,95957	80,4511	96,4216
3	8	77,2239	4,58994	67,9673	86,4804
4	8	68,7239	4,58994	59,4673	77,9804
5	8	56,3489	4,58994	47,0923	65,6054
6	8	52,7239	4,58994	43,4673	61,9804
7	7	43,3012	4,90527	33,4088	53,1937
Panelistas					
1	7	71,7143	4,53111	62,5764	80,8522
2	7	66,4286	4,53111	57,2907	75,5664
3	7	71,1429	4,53111	62,005	80,2807
4	7	70,4286	4,53111	61,2907	79,5664
5	7	65,4286	4,53111	56,2907	74,5664
6	7	67,5714	4,53111	58,4336	76,7093
7	7	71,5714	4,53111	62,4336	80,7093
8	6	69,2313	4,94385	59,2611	79,2015
9	2	63,8771	8,85073	46,0279	81,7264
10	2	67,3771	8,85073	49,5279	85,2264
11	1	73,2771	12,5451	47,9775	98,5768

The StatAdvisor

This table shows the mean Calidad Total for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Calidad Total by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	LS Mean	Homogeneous Groups
7	7	43,3012	X
6	8	52,7239	XX
5	8	56,3489	XX
4	8	68,7239	XX
3	8	77,2239	XX
2	10	88,4364	XX
1	11	95,6364	X

Contrast	Difference	+/- Limits
1 - 2	7,2	16,197
1 - 3	*18,4125	17,2249
1 - 4	*26,9125	17,2249
1 - 5	*39,2875	17,2249
1 - 6	*42,9125	17,2249
1 - 7	*52,3351	17,9231
2 - 3	11,2125	17,5838
2 - 4	*19,7125	17,5838
2 - 5	*32,0875	17,5838
2 - 6	*35,7125	17,5838
2 - 7	*45,1351	18,2683
3 - 4	8,5	18,535
3 - 5	*20,875	18,535
3 - 6	*24,5	18,535
3 - 7	*33,9226	19,1855
4 - 5	12,375	18,535
4 - 6	16,0	18,535
4 - 7	*25,4226	19,1855
5 - 6	3,625	18,535
5 - 7	13,0476	19,1855
6 - 7	9,42262	19,1855

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 13 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Calidad Total vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Calidad Total
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	104,509	2,91052	35,9073	0,0000
Slope	-8,85947	0,685381	-12,9263	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	19287,7	1	19287,7	167,09	0,0000
Residual	6695,08	58	115,432		
Total (Corr.)	25982,7	59			

Correlation Coefficient = -0,861583
R-squared = 74,2326 percent
Standard Error of Est. = 10,7439

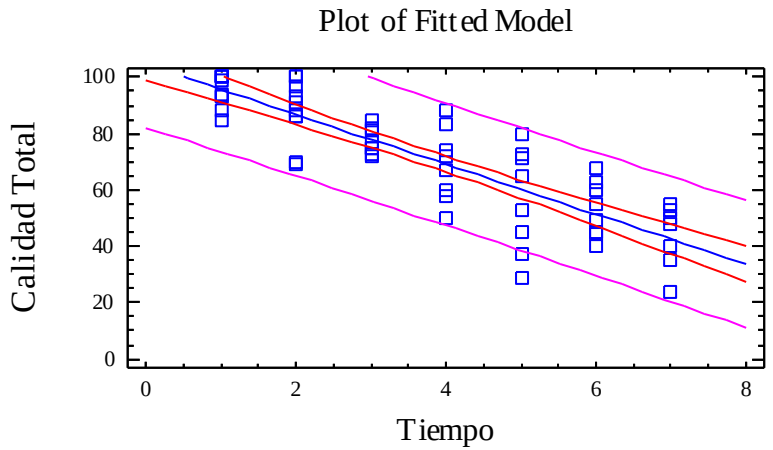
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Calidad Total and Tiempo. The equation of the fitted model is

Calidad Total = 104,509 - 8,85947*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Calidad Total and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 74,2326% of the variability in Calidad Total. The correlation coefficient equals -0,861583, indicating a moderately strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 10,7439. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	19287,7	1	19287,7	167,09	0,0000
Residual	6695,08	58	115,432		
Lack-of-Fit	148,946	5	29,7891	0,24	0,9424
Pure Error	6546,13	53	123,512		
Total (Corr.)	25982,7	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

Multifactor ANOVA - Calidad Total

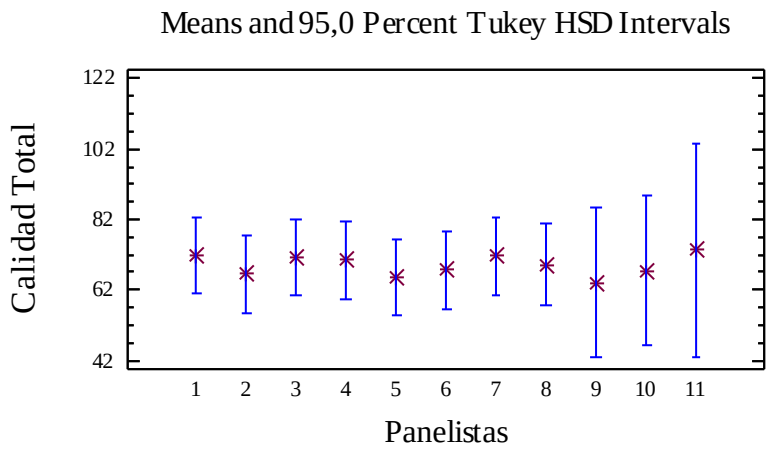
Analysis Summary

Dependent variable: Calidad Total
Factors:
- Panelistas
- Tiempo

Number of complete cases: 60

The StatAdvisor

This procedure performs a multifactor analysis of variance for Calidad Total. It constructs various tests and graphs to determine which factors have a statistically significant effect on Calidad Total. It also tests for significant interactions amongst the factors, given sufficient data. The F-tests in the ANOVA table will allow you to identify the significant factors. For each significant factor, the Multiple Range Tests will tell you which means are significantly different from which others. The Means Plot and Interaction Plot will help you interpret the significant effects. The Residual Plots will help you judge whether the assumptions underlying the analysis of variance are violated by the data.



Analysis of Variance for Calidad Total - Type III Sums of Squares

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
MAIN EFFECTS					
A:Panelistas	366,31	10	36,631	0,25	0,9876
B:Tiempo	17209,0	6	2868,17	19,96	0,0000
RESIDUAL	6179,83	43	143,717		
TOTAL (CORRECTED)	25982,7	59			

All F-ratios are based on the residual mean square error.

The StatAdvisor

The ANOVA table decomposes the variability of Calidad Total into contributions due to various factors. Since Type III sums of squares (the default) have been chosen, the contribution of each factor is measured having removed the effects of all other factors. The P-values test the statistical significance of each of the factors. Since one P-value is less than 0,05, this factor has a statistically significant effect on Calidad Total at the 95,0% confidence level.

Table of Least Squares Means for Calidad Total
with 95,0 Percent Confidence Intervals

Level	Count	Mean	Stnd. Error	Lower Limit	Upper Limit
GRAND MEAN	60	68,9135			
Panelistas					
1	7	71,7143	4,53111	62,5764	80,8522
2	7	66,4286	4,53111	57,2907	75,5664
3	7	71,1429	4,53111	62,005	80,2807
4	7	70,4286	4,53111	61,2907	79,5664
5	7	65,4286	4,53111	56,2907	74,5664
6	7	67,5714	4,53111	58,4336	76,7093
7	7	71,5714	4,53111	62,4336	80,7093
8	6	69,2313	4,94385	59,2611	79,2015
9	2	63,8771	8,85073	46,0279	81,7264
10	2	67,3771	8,85073	49,5279	85,2264
11	1	73,2771	12,5451	47,9775	98,5768
Tiempo					
1	11	95,6364	3,61458	88,3469	102,926
2	10	88,4364	3,95957	80,4511	96,4216
3	8	77,2239	4,58994	67,9673	86,4804
4	8	68,7239	4,58994	59,4673	77,9804
5	8	56,3489	4,58994	47,0923	65,6054
6	8	52,7239	4,58994	43,4673	61,9804
7	7	43,3012	4,90527	33,4088	53,1937

The StatAdvisor

This table shows the mean Calidad Total for each level of the factors. It also shows the standard error of each mean, which is a measure of its sampling variability. The rightmost two columns show 95,0% confidence intervals for each of the means. You can display these means and intervals by selecting Means Plot from the list of Graphical Options.

Multiple Range Tests for Calidad Total by Panelistas

Method: 95,0 percent Tukey HSD

Panelistas	Count	LS Mean	Homogeneous Groups
9	2	63,8771	X
5	7	65,4286	X
2	7	66,4286	X
10	2	67,3771	X
6	7	67,5714	X
8	6	69,2313	X
4	7	70,4286	X
3	7	71,1429	X
7	7	71,5714	X
1	7	71,7143	X
11	1	73,2771	X

Contrast	Difference	+/- Limits
1 - 2	5,28571	21,7694
1 - 3	0,571429	21,7694
1 - 4	1,28571	21,7694
1 - 5	6,28571	21,7694
1 - 6	4,14286	21,7694
1 - 7	0,142857	21,7694
1 - 8	2,48299	22,6583
1 - 9	7,83716	32,6541
1 - 10	4,33716	32,6541
1 - 11	-1,56284	43,5388
2 - 3	-4,71429	21,7694
2 - 4	-4,0	21,7694
2 - 5	1,0	21,7694
2 - 6	-1,14286	21,7694
2 - 7	-5,14286	21,7694
2 - 8	-2,80272	22,6583
2 - 9	2,55145	32,6541
2 - 10	-0,948554	32,6541
2 - 11	-6,84855	43,5388
3 - 4	0,714286	21,7694
3 - 5	5,71429	21,7694
3 - 6	3,57143	21,7694
3 - 7	-0,428571	21,7694
3 - 8	1,91156	22,6583
3 - 9	7,26573	32,6541
3 - 10	3,76573	32,6541
3 - 11	-2,13427	43,5388
4 - 5	5,0	21,7694

4 - 6	2,85714	21,7694
4 - 7	-1,14286	21,7694
4 - 8	1,19728	22,6583
4 - 9	6,55145	32,6541
4 - 10	3,05145	32,6541
4 - 11	-2,84855	43,5388
5 - 6	-2,14286	21,7694
5 - 7	-6,14286	21,7694
5 - 8	-3,80272	22,6583
5 - 9	1,55145	32,6541
5 - 10	-1,94855	32,6541
5 - 11	-7,84855	43,5388
6 - 7	-4,0	21,7694
6 - 8	-1,65986	22,6583
6 - 9	3,6943	32,6541
6 - 10	0,194303	32,6541
6 - 11	-5,7057	43,5388
7 - 8	2,34014	22,6583
7 - 9	7,6943	32,6541
7 - 10	4,1943	32,6541
7 - 11	-1,7057	43,5388
8 - 9	5,35417	33,2533
8 - 10	1,85417	33,2533
8 - 11	-4,04583	43,99
9 - 10	-3,5	40,7269
9 - 11	-9,4	49,88
10 - 11	-5,9	49,88

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. There are no statistically significant differences between any pair of means at the 95,0% confidence level. At the top of the page, one homogenous group is identified by a column of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Simple Regression - Calidad Total vs. Panelistas

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Calidad Total
Independent variable: Panelistas

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	64,3106	5,65738	11,3676	0,0000
Slope	1,45857	1,01966	1,43044	0,1580

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	885,402	1	885,402	2,05	0,1580
Residual	25097,3	58	432,713		
Total (Corr.)	25982,7	59			

Correlation Coefficient = 0,184598
R-squared = 3,40765 percent
Standard Error of Est. = 20,8017

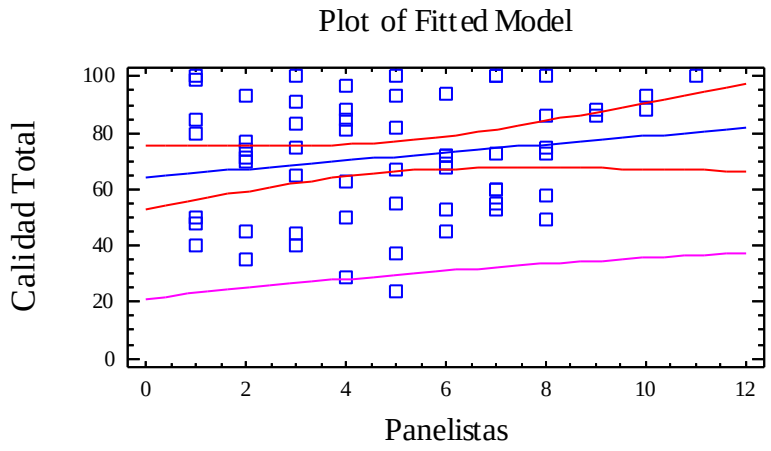
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Calidad Total and Panelistas. The equation of the fitted model is

Calidad Total = 64,3106 + 1,45857*Panelistas

Since the P-value in the ANOVA table is greater or equal to 0.10, there is not a statistically significant relationship between Calidad Total and Panelistas at the 90% or higher confidence level.

The R-Squared statistic indicates that the model as fitted explains 3,40765% of the variability in Calidad Total. The correlation coefficient equals 0,184598, indicating a relatively weak relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 20,8017. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	885,402	1	885,402	2,05	0,1580
Residual	25097,3	58	432,713		
Lack-of-Fit	1708,47	9	189,83	0,40	0,9303
Pure Error	23388,9	49	477,324		
Total (Corr.)	25982,7	59			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is greater or equal to 0.10, the model appears to be adequate for the observed data.

4. PARAMETROS MICROBIOLOGICOS

4.1 LOG RAM VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Log RAM
Factor: Tiempo

Number of observations: 20
Number of levels: 7

The StatAdvisor
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   This procedure performs a one-way analysis of variance for Log RAM. It constructs various tests and graphs to compare the mean
values of Log RAM for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are any significant
differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly different from which
others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians instead of means.
The various plots will help you judge the practical significance of the results, as well as allow you to look for possible violations
of the assumptions underlying the analysis of variance.
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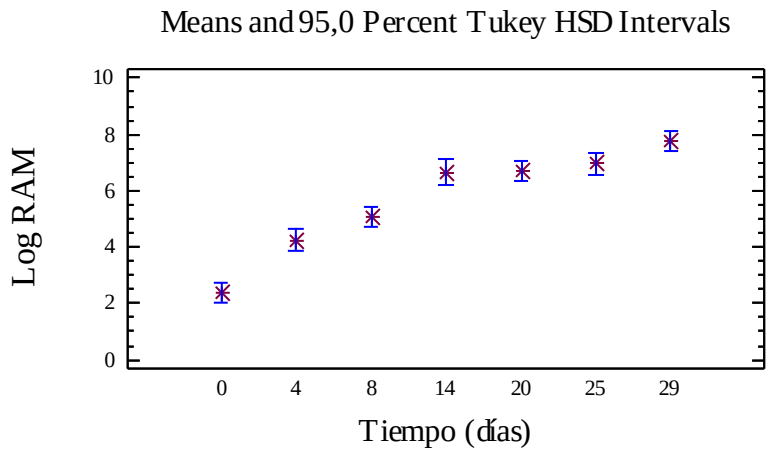


Summary Statistics for Log RAM

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	2,40333	2,4	0,0000333333	0,0057735
4	3	4,25333	3,99	0,268233	0,517912
8	3	5,09333	4,99	0,0320333	0,178979
14	2	6,65	6,65	0,245	0,494975
20	3	6,68	6,71	0,0037	0,0608276
25	3	6,95333	6,94	0,00103333	0,0321455
29	3	7,75667	7,75	0,000933333	0,0305505
Total	20	5,636	6,455	3,3079	1,81876

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,00333333	2,4	2,41	0,01	1,22474
4	0,299017	3,92	4,85	0,93	1,19962
8	0,103333	4,99	5,3	0,31	1,22474
14	0,35	6,3	7,0	0,7	
20	0,0351188	6,61	6,72	0,11	-1,18761
25	0,0185592	6,93	6,99	0,06	1,09276
29	0,0176383	7,73	7,79	0,06	0,6613
Total	0,406688	2,4	7,79	5,39	-1,24518

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-0,757017	-0,691059

The StatAdvisor

This table shows various statistics for Log RAM for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Log RAM to remove any dependence of the standard deviation on the mean.

ANOVA Table for Log RAM by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	61,9931	6	10,3322	156,74	0,0000
Within groups	0,856933	13	0,0659179		
Total (Corr.)	62,8501	19			

The StatAdvisor

The ANOVA table decomposes the variance of Log RAM into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 156,743, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Log RAM from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Log RAM by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	2,40333	0,148232	2,04145	2,76522
4	3	4,25333	0,148232	3,89145	4,61522
8	3	5,09333	0,148232	4,73145	5,45522
14	2	6,65	0,181546	6,20678	7,09322
20	3	6,68	0,148232	6,31812	7,04188
25	3	6,95333	0,148232	6,59145	7,31522
29	3	7,75667	0,148232	7,39478	8,11855
Total	20	5,636			

The StatAdvisor

This table shows the mean Log RAM for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Log RAM by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	3	2,40333	X
4	3	4,25333	X
8	3	5,09333	X
14	2	6,65	X
20	3	6,68	X
25	3	6,95333	X
29	3	7,75667	X

Contrast	Difference	+/- Limits
0 - 4	*-1,85	0,72377
0 - 8	*-2,69	0,72377
0 - 14	*-4,24667	0,809199
0 - 20	*-4,27667	0,72377
0 - 25	*-4,55	0,72377
0 - 29	*-5,35333	0,72377
4 - 8	*-0,84	0,72377
4 - 14	*-2,39667	0,809199
4 - 20	*-2,42667	0,72377
4 - 25	*-2,7	0,72377
4 - 29	*-3,50333	0,72377
8 - 14	*-1,55667	0,809199
8 - 20	*-1,58667	0,72377
8 - 25	*-1,86	0,72377
8 - 29	*-2,66333	0,72377
14 - 20	-0,03	0,809199
14 - 25	-0,303333	0,809199
14 - 29	*-1,10667	0,809199
20 - 25	-0,273333	0,72377
20 - 29	*-1,07667	0,72377
25 - 29	*-0,803333	0,72377

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 18 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 5 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0. NOTE: the intervals are not exact since the number of observations at each level is not the same. You might consider using the Bonferroni procedure instead.

Variance Check

Cochran's C test: 0,486841 P-Value = 0,148977
Bartlett's test: 14,8671 P-Value = 0,0000660894
Hartley's test: 8047,0

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Log RAM within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests. Since the standard deviations differ by more than a factor 3 to 1 and the sample sizes are not equal, the P-values and significance levels of the tests may be off significantly.

Kruskal-Wallis Test for Log RAM by Tiempo

Tiempo	Sample Size	Average Rank
0	3	2,0
4	3	5,0
8	3	8,0
14	2	13,5
20	3	12,0
25	3	15,0
29	3	19,0

Test statistic = 17,9842 P-Value = 0,00627184

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Log RAM within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Log RAM vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Log RAM
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	3,33275	0,243426	13,691	0,0000
Slope	0,161066	0,0137923	11,678	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	55,5218	1	55,5218	136,37	0,0000
Residual	7,32829	18	0,407127		
Total (Corr.)	62,8501	19			

Correlation Coefficient = 0,939894
R-squared = 88,3401 percent
Standard Error of Est. = 0,638065

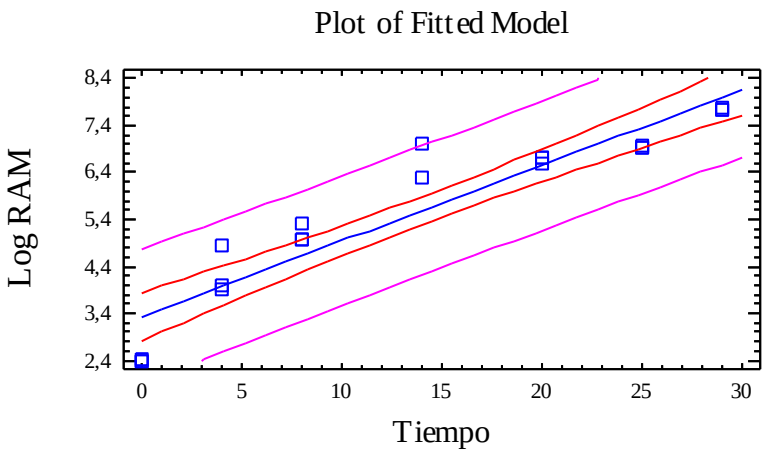
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Log RAM and Tiempo. The equation of the fitted model is

Log RAM = 3,33275 + 0,161066*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Log RAM and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 88,3401% of the variability in Log RAM. The correlation coefficient equals 0,939894, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,638065. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	55,5218	1	55,5218	136,37	0,0000
Residual	7,32829	18	0,407127		
Lack-of-Fit	6,47135	5	1,29427	19,63	0,0000
Pure Error	0,856933	13	0,0659179		
Total (Corr.)	62,8501	19			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Square root-X	0,9841	96,84%
Linear	0,9399	88,34%
Square root-Y	0,9169	84,07%
Exponential	0,8875	78,77%
Reciprocal-Y	-0,8163	66,63%
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the square root-X model yields the highest R-Squared value with 96,8449%. This is 8,50481% higher than the currently selected linear model. To change models, select the Analysis Options dialog box.

4.2 LOG ENTEROBACTERIAS VERSUS TIEMPO

```
Analysis Summary

Dependent variable: Log Enterobacterias
Factor: Tiempo

Number of observations: 21
Number of levels: 7


The StatAdvisor
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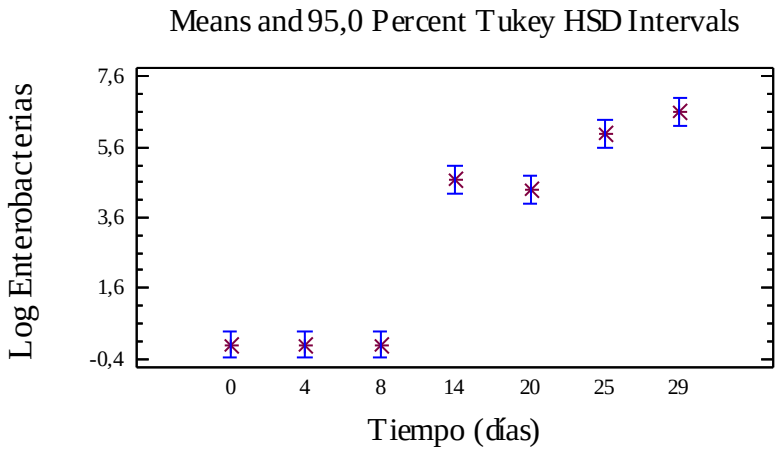
   This procedure performs a one-way analysis of variance for Log Enterobacterias.  It constructs various tests and graphs to compare
the mean values of Log Enterobacterias for the 7 different levels of Tiempo.  The F-test in the ANOVA table will test whether there are
any significant differences amongst the means.  If there are, the Multiple Range Tests will tell you which means are significantly
different from which others.  If you are worried about the presence of outliers, choose the Kruskal-Wallis Test which compares medians
instead of means.  The various plots will help you judge the practical significance of the results, as well as allow you to look for
possible violations of the assumptions underlying the analysis of variance.
```



Summary Statistics for Log Enterobacterias

Tiempo	Count	Average	Median	Variance	Standard deviation
0	3	0,0	0,0	0,0	0,0
4	3	0,0	0,0	0,0	0,0
8	3	0,0	0,0	0,0	0,0
14	3	4,68667	4,81	0,0926333	0,304357
20	3	4,39333	4,72	0,371633	0,609617
25	3	5,98667	5,99	0,0000333333	0,0057735
29	3	6,6	6,62	0,0844	0,290517
Total	21	3,09524	4,34	8,09531	2,84523

Tiempo	Standard error	Minimum	Maximum	Range	Stnd. skewness
0	0,0	0,0	0,0	0,0	
4	0,0	0,0	0,0	0,0	
8	0,0	0,0	0,0	0,0	
14	0,175721	4,34	4,91	0,57	-1,07769
20	0,351963	3,69	4,77	1,08	-1,21548
25	0,00333333	5,98	5,99	0,01	-1,22474
29	0,16773	6,3	6,88	0,58	-0,218018
Total	0,620879	0,0	6,88	6,88	-0,185382

Tiempo	Kurtosis	Stnd. kurtosis
0		
4		
8		
14		
20		
25		
29		
Total	-1,92397	-1,79971

The StatAdvisor

This table shows various statistics for Log Enterobacterias for each of the 7 levels of Tiempo. The one-way analysis of variance is primarily intended to compare the means of the different levels, listed here under the Average column. Select Means Plot from the list of Graphical Options to display the means graphically.

WARNING: There is more than a 3 to 1 difference between the smallest standard deviation and the largest. This may cause problems since the analysis of variance assumes that the standard deviations at all levels are equal. Select Variance Check from the list of Tabular Options to run a formal statistical test for differences among the sigmas. You may want to consider transforming the values of Log Enterobacterias to remove any dependence of the standard deviation on the mean.

ANOVA Table for Log Enterobacterias by Tiempo

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	160,809	6	26,8015	341,92	0,0000
Within groups	1,0974	14	0,0783857		
Total (Corr.)	161,906	20			

The StatAdvisor

The ANOVA table decomposes the variance of Log Enterobacterias into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 341,918, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0,05, there is a statistically significant difference between the mean Log Enterobacterias from one level of Tiempo to another at the 95,0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

Table of Means for Log Enterobacterias by Tiempo
with 95,0 percent Tukey HSD intervals

Tiempo	Count	Mean	Stnd. error (pooled s)	Lower limit	Upper limit
0	3	0,0	0,161643	-0,390503	0,390503
4	3	0,0	0,161643	-0,390503	0,390503
8	3	0,0	0,161643	-0,390503	0,390503
14	3	4,68667	0,161643	4,29616	5,07717
20	3	4,39333	0,161643	4,00283	4,78384
25	3	5,98667	0,161643	5,59616	6,37717
29	3	6,6	0,161643	6,2095	6,9905
Total	21	3,09524			

The StatAdvisor

This table shows the mean Log Enterobacterias for each level of Tiempo. It also shows the standard error of each mean, which is a measure of its sampling variability. The standard error is formed by dividing the pooled standard deviation by the square root of the number of observations at each level. The table also displays an interval around each mean. The intervals currently displayed are based on Tukey's honestly significant difference (HSD) procedure. They are constructed in such a way that if all the means are the same, all the intervals will overlap 95,0% of the time. You can display the intervals graphically by selecting Means Plot from the list of Graphical Options. In the Multiple Range Tests, these intervals are used to determine which means are significantly different from which others.

Multiple Range Tests for Log Enterobacterias by Tiempo

Method: 95,0 percent Tukey HSD

Tiempo	Count	Mean	Homogeneous Groups
0	3	0,0	X
8	3	0,0	X
4	3	0,0	X
20	3	4,39333	X
14	3	4,68667	X
25	3	5,98667	X
29	3	6,6	X

Contrast	Difference	+/- Limits
0 - 4	0,0	0,781007
0 - 8	0,0	0,781007
0 - 14	*-4,68667	0,781007
0 - 20	*-4,39333	0,781007
0 - 25	*-5,98667	0,781007
0 - 29	*-6,6	0,781007
4 - 8	0,0	0,781007
4 - 14	*-4,68667	0,781007
4 - 20	*-4,39333	0,781007
4 - 25	*-5,98667	0,781007
4 - 29	*-6,6	0,781007
8 - 14	*-4,68667	0,781007
8 - 20	*-4,39333	0,781007
8 - 25	*-5,98667	0,781007
8 - 29	*-6,6	0,781007
14 - 20	0,293333	0,781007
14 - 25	*-1,3	0,781007
14 - 29	*-1,91333	0,781007
20 - 25	*-1,59333	0,781007
20 - 29	*-2,20667	0,781007
25 - 29	-0,613333	0,781007

* denotes a statistically significant difference.

The StatAdvisor

This table applies a multiple comparison procedure to determine which means are significantly different from which others. The bottom half of the output shows the estimated difference between each pair of means. An asterisk has been placed next to 16 pairs, indicating that these pairs show statistically significant differences at the 95,0% confidence level. At the top of the page, 3 homogenous groups are identified using columns of X's. Within each column, the levels containing X's form a group of means within which there are no statistically significant differences. The method currently being used to discriminate among the means is Tukey's honestly significant difference (HSD) procedure. With this method, there is a 5,0% risk of calling one or more pairs significantly different when their actual difference equals 0.

Variance Check

Cochran's C test: 0,677298 P-Value = 0,134421
Bartlett's test: 7,77587 P-Value = 0,00353749
Hartley's test: 11149,0

The StatAdvisor

The three statistics displayed in this table test the null hypothesis that the standard deviations of Log Enterobacterias within each of the 7 levels of Tiempo is the same. Of particular interest are the two P-values. Since the smaller of the P-values is less than 0,05, there is a statistically significant difference amongst the standard deviations at the 95,0% confidence level. This violates one of the important assumptions underlying the analysis of variance and will invalidate most of the standard statistical tests.

Kruskal-Wallis Test for Log Enterobacterias by Tiempo

Tiempo	Sample Size	Average Rank
0	3	5,0
4	3	5,0
8	3	5,0
14	3	13,3333
20	3	11,6667
25	3	17,0
29	3	20,0

Test statistic = 19,5255 P-Value = 0,00336236

The StatAdvisor

The Kruskal-Wallis test tests the null hypothesis that the medians of Log Enterobacterias within each of the 7 levels of Tiempo are the same. The data from all the levels is first combined and ranked from smallest to largest. The average rank is then computed for the data at each level. Since the P-value is less than 0,05, there is a statistically significant difference amongst the medians at the 95,0% confidence level. To determine which medians are significantly different from which others, select Box-and-Whisker Plot from the list of Graphical Options and select the median notch option.

Simple Regression - Log Enterobacterias vs. Tiempo

Regression Analysis - Linear model: Y = a + b*X

Dependent variable: Log Enterobacterias
Independent variable: Tiempo

Parameter	Estimate	Standard Error	T Statistic	P-Value
Intercept	-0,609665	0,367549	-1,65873	0,1136
Slope	0,259343	0,0210114	12,343	0,0000

Analysis of Variance

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	143,953	1	143,953	152,35	0,0000
Residual	17,9529	19	0,944887		
Total (Corr.)	161,906	20			

Correlation Coefficient = 0,942929
R-squared = 88,9116 percent
Standard Error of Est. = 0,972053

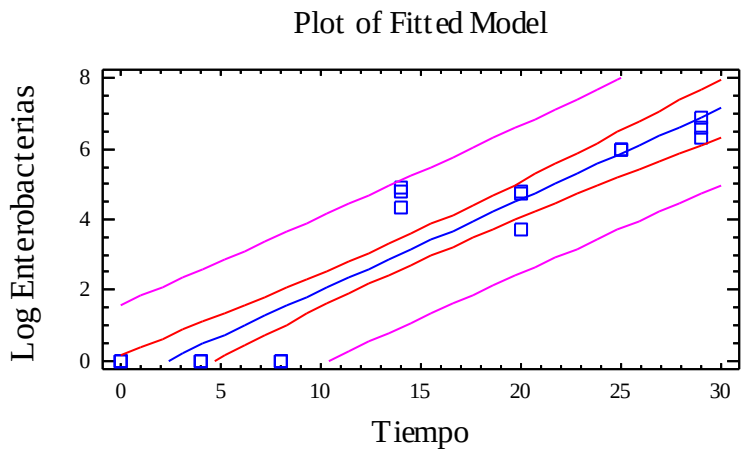
The StatAdvisor

The output shows the results of fitting a linear model to describe the relationship between Log Enterobacterias and Tiempo. The equation of the fitted model is

Log Enterobacterias = -0,609665 + 0,259343*Tiempo

Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between Log Enterobacterias and Tiempo at the 99% confidence level.

The R-Squared statistic indicates that the model as fitted explains 88,9116% of the variability in Log Enterobacterias. The correlation coefficient equals 0,942929, indicating a relatively strong relationship between the variables. The standard error of the estimate shows the standard deviation of the residuals to be 0,972053. This value can be used to construct prediction limits for new observations by selecting the Forecasts option from the text menu.



Analysis of Variance with Lack-of-Fit

Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Model	143,953	1	143,953	152,35	0,0000
Residual	17,9529	19	0,944887		
Lack-of-Fit	16,8555	5	3,37109	43,01	0,0000
Pure Error	1,0974	14	0,0783857		
Total (Corr.)	161,906	20			

The StatAdvisor

The lack of fit test is designed to determine whether the selected model is adequate to describe the observed data, or whether a more complicated model should be used. The test is performed by comparing the variability of the current model residuals to the variability between observations at replicate values of the independent variable X. Since the P-value for lack-of-fit in the ANOVA table is less than 0.01, there is statistically significant lack-of-fit at the 99% confidence level. You might consider selecting a different model form from the Analysis Options dialog box.

Comparison of Alternative Models

Model	Correlation	R-Squared
Linear	0,9429	88,91%
Square root-X	0,8831	77,98%
Exponential	<no fit>	
Reciprocal-Y	<no fit>	
Reciprocal-X	<no fit>	
Double reciprocal	<no fit>	
Logarithmic-X	<no fit>	
Multiplicative	<no fit>	
Square root-Y	<no fit>	
S-curve	<no fit>	
Logistic	<no fit>	
Log probit	<no fit>	

The StatAdvisor

This table shows the results of fitting several curvilinear models to the data. Of the models fitted, the linear model yields the highest R-Squared value with 88,9116%. This is the currently selected model.

ANEXO 4

Correlación de Pearson

Tabla 11. Correlación de Pearson entre los parámetros físicos, químicos, sensoriales y microbiológicos estudiados en belly de trucha arcoiris conservada refrigerada (0º a 2º C) durante 29 días.

	Tiempo	Driping	CRA	Firmeza	Cohesi_vidad	Color roche	color visual	L*	a*	b*	Hue	Croma	Proteinas	Lipidos	Humedad	Cenizas	pH	Anisidina
Tiempo		0,9796	0,9970	0,9716	0,6158	-0,0092	-0,7361	0,4724	-0,8541	-0,9823	-0,8076	-0,9639	-0,9860	0,9924	-0,9755	-0,3830	-0,9461	0,9277
Driping			0,9738	0,9447	0,6646	-0,0405	-0,8446	0,5995	-0,8256	-0,9893	-0,8327	-0,9562	-0,9564	0,9609	-0,9758	-0,4494	-0,9786	0,9574
CRA				0,9673	0,6625	-0,0284	-0,7296	0,4885	-0,8524	-0,9700	-0,7890	-0,9556	-0,9912	0,9981	-0,9805	-0,4325	-0,9373	0,9172
Firmeza					0,5844	0,0017	-0,7498	0,4942	-0,8116	-0,9638	-0,8838	-0,9341	-0,9629	0,9660	-0,9328	-0,2894	-0,9396	0,8320
Cohesividad						-0,4533	-0,6704	0,6957	-0,3995	-0,5686	-0,5137	-0,5158	-0,6419	0,6738	-0,7459	-0,8321	-0,6812	0,6018
Color roche							0,0276	0,0352	-0,4756	-0,0463	0,1594	-0,2373	-0,0699	-0,0605	0,1986	0,3027	0,1832	-0,0636
color visual								-0,8989	0,6154	0,8214	0,7855	0,7644	0,7137	-0,7006	0,7617	0,5196	0,8688	-0,7527
L*									-0,4546	-0,5583	-0,5012	-0,5355	-0,4909	0,4600	-0,5197	-0,6824	-0,6083	0,4821
a*										0,8488	0,5740	0,9483	0,9015	-0,8346	0,7584	0,2723	0,7087	-0,7904
b*											0,8401	0,9727	0,9562	-0,9555	0,9495	0,3591	0,9650	-0,9304
Hue												0,7571	0,7769	-0,7846	0,8011	0,0849	0,9039	-0,7143
Croma													0,9689	-0,9389	0,9023	0,3337	0,8904	-0,9057
Proteinas														-0,9889	0,9538	0,3982	0,9055	-0,8921
Lipidos															-0,9798	-0,4303	-0,9276	0,9006
Humedad																0,5073	0,9629	-0,9389
Cenizas																	0,4128	-0,4388
pH																		-0,9144
Anisidina																		

	Log RAM	Log Enterobact.	Brillo	Humedad	Goteo	Olor típico crudo	Olor rancio crudo	Olor pútrido crudo	Olor típico cocido	Olor rancio cocido	Olor pútrido cocido	Dureza crudo	Cohesividad crudo	Elasticidad crudo	Firmeza crudo	Firmeza cocido	Calidad total
Tiempo	0,9382	0,9461	-0,7586	-0,8418	0,9689	-0,9341	0,9722	0,9870	-0,9226	0,9745	0,9562	-0,9421	-0,8446	-0,8924	-0,7879	-0,3061	-0,9953
Driping	0,9661	0,9263	-0,8436	-0,8890	0,9286	-0,9750	0,9978	0,9617	-0,8960	0,9274	0,8956	-0,8897	-0,791	-0,8454	-0,7493	-0,3836	-0,9931
CRA	0,9481	0,9339	-0,7641	-0,8512	0,9604	-0,9343	0,9627	0,9780	-0,9286	0,9667	0,9494	-0,9419	-0,856	-0,898	-0,7855	-0,3305	-0,9931
Firmeza	0,8935	0,9113	-0,6760	-0,7193	0,9383	-0,9338	0,9375	0,9848	-0,8969	0,9576	0,9313	-0,909	-0,8682	-0,8872	-0,8114	-0,2869	-0,9642
Cohesividad	0,8236	0,5463	-0,6719	-0,7274	0,4871	-0,7438	0,6467	0,5300	-0,5500	0,4670	0,4231	-0,5446	-0,6342	-0,6043	-0,5044	-0,5129	-0,6541
Color roche	-0,2336	-0,1579	-0,1574	0,0258	0,0579	0,1021	-0,0684	0,0902	-0,3124	0,1811	0,2255	0,0942	0,3203	0,2327	0,3123	-0,2919	0,0589
color visual	-0,8241	-0,6396	0,8748	0,7435	-0,6541	0,9184	-0,8471	-0,7421	0,7035	-0,6460	-0,5833	0,5882	0,5597	0,595	0,5564	0,5258	0,7746
L*	0,6258	0,2959	-0,8208	-0,5967	0,3892	-0,7273	0,5848	0,4782	-0,5550	0,3767	0,3193	-0,3369	-0,3594	-0,3757	-0,3369	-0,6176	-0,5243
a*	-0,7261	-0,7356	0,7816	0,7887	-0,8308	0,7535	-0,8002	-0,8693	0,9675	-0,9171	-0,9252	0,7352	0,5282	0,6138	0,4472	0,5371	0,8235
b*	-0,9223	-0,9176	0,8065	0,8316	-0,9559	0,9576	-0,9868	-0,9856	0,9125	-0,9552	-0,9282	0,9067	0,7991	0,8571	0,774	0,3197	0,985
Hue	-0,7955	-0,8488	0,5308	0,5587	-0,7099	0,8693	-0,8494	-0,8239	0,6465	-0,7610	-0,7016	0,6639	0,6878	0,6731	0,6493	0,3294	0,8054
Croma	-0,8720	-0,8737	0,8278	0,8456	-0,9373	0,9056	-0,9437	-0,9726	0,9716	-0,9752	-0,9624	0,8652	0,7093	0,7819	0,6589	0,4295	0,9521
Proteinas	-0,9228	-0,9141	0,7652	0,8437	-0,9399	0,9159	-0,9406	-0,9732	0,9572	-0,9767	-0,9632	0,9064	0,8073	0,8495	0,7178	0,4129	0,973
Lipidos	0,9445	0,9347	-0,7320	-0,8343	0,9544	-0,9221	0,9490	0,9702	-0,9166	0,9610	0,9448	-0,9451	-0,8726	-0,9069	-0,7941	-0,3131	-0,9871
Humedad	-0,9859	-0,9421	0,7718	0,8800	-0,9180	0,9489	-0,9717	-0,9343	0,8542	-0,9037	-0,8751	0,9178	0,8582	0,8927	0,7917	0,3229	0,9844
Cenizas	-0,5908	-0,2090	0,6802	0,6383	-0,3487	0,5118	-0,4202	-0,3027	0,4203	-0,2396	-0,2218	0,4154	0,448	0,4662	0,3906	0,3287	0,4456
pH	-0,9600	-0,9223	0,7732	0,8153	-0,8832	0,9816	-0,9851	-0,9300	0,8060	-0,8690	-0,8228	0,8583	0,8173	0,8476	0,7884	0,3208	0,9623
Anisidina	0,9291	0,9196	-0,8389	-0,9437	0,8740	-0,8870	0,9618	0,8810	-0,8213	0,8681	0,8445	-0,8333	-0,6697	-0,7535	-0,637	-0,3674	-0,9345
Log RAM		0,8997	-0,8248	-0,9084	0,8539	-0,9635	0,9620	0,8877	-0,8266	0,8442	0,8062	-0,8509	-0,8057	-0,8358	-0,7308	-0,4259	-0,9557

	Log RAM	Log Enterobact.	Brillo	Humedad	Goteo	Olor típico crudo	Olor rancio crudo	Olor pútrido crudo	Olor típico cocido	Olor rancio cocido	Olor pútrido cocido	Dureza crudo	Cohesividad crudo	Elasticidad crudo	Firmeza crudo	Firmeza cocido	Calidad total
Log Enterobact.			-0,6159	-0,7884	0,8796	-0,8601	0,9355	0,9124	-0,7770	0,9085	0,8832	-0,8578	-0,7644	-0,8012	-0,703	-0,2637	-0,9319
Brillo				0,9190	-0,7023	0,8454	-0,8287	-0,7331	0,8198	-0,6964	-0,6683	0,6328	0,4816	0,5713	0,4498	0,6070	0,7871
Humedad					-0,7604	0,8379	-0,8796	-0,7723	0,8147	-0,7691	-0,7497	0,7236	0,5582	0,6427	0,4839	0,5579	0,8545
Goteo						-0,8660	0,9186	0,9753	-0,9078	0,9641	0,9596	-0,9809	-0,8701	-0,9311	-0,8540	-0,1158	-0,9667
Olor típico crudo							-0,9717	-0,9233	0,8560	-0,8604	-0,8147	0,8337	0,7980	0,8272	0,7534	0,4294	0,9538
Olor rancio crudo								0,9534	-0,8687	0,9151	0,8802	-0,8787	-0,7808	-0,8353	-0,7473	-0,3638	-0,9815
Olor pútrido crudo									-0,9341	0,9845	0,9672	-0,9336	-0,8373	-0,8849	-0,7978	-0,2727	-0,9792
Olor típico cocido										-0,9491	-0,9479	0,8465	0,7050	0,7697	0,6285	0,4647	0,9087
Olor rancio cocido											0,9956	-0,9146	-0,7817	-0,8382	-0,7227	-0,2982	-0,9522
Olor pútrido cocido												-0,9115	-0,7639	-0,8258	-0,7036	-0,2685	-0,9293
Dureza crudo													0,9343	0,9776	0,9134	0,0130	0,9469
Cohesividad crudo														0,9854	0,9694	-0,0759	0,8621
Elasticidad crudo															0,9697	-0,0569	0,9095
Firmeza crudo																-0,2351	0,8163
Firmeza cocido																	0,2903
Calidad total																	

Multiple-Variable Analysis

Correlations

	Tiempo	Driping	CRA	Firmeza	Cohesividad
Tiempo		0,9796	0,9970	0,9716	0,6158
		(7)	(7)	(7)	(7)
		0,0001	0,0000	0,0003	0,1410
Driping	0,9796		0,9738	0,9447	0,6646
	(7)		(7)	(7)	(7)
	0,0001		0,0002	0,0013	0,1034
CRA	0,9970	0,9738		0,9673	0,6625
	(7)	(7)		(7)	(7)
	0,0000	0,0002		0,0004	0,1049
Firmeza	0,9716	0,9447	0,9673		0,5844
	(7)	(7)	(7)		(7)
	0,0003	0,0013	0,0004		0,1683
Cohesividad	0,6158	0,6646	0,6625	0,5844	
	(7)	(7)	(7)	(7)	
	0,1410	0,1034	0,1049	0,1683	
Color roche	-0,0092	-0,0405	-0,0284	0,0017	-0,4533
	(7)	(7)	(7)	(7)	(7)
	0,9844	0,9314	0,9518	0,9971	0,3070
Color visual	-0,7361	-0,8446	-0,7296	-0,7498	-0,6704
	(7)	(7)	(7)	(7)	(7)
	0,0593	0,0168	0,0627	0,0523	0,0993
L	0,4724	0,5995	0,4885	0,4942	0,6957
	(7)	(7)	(7)	(7)	(7)
	0,2845	0,1548	0,2660	0,2596	0,0826
a	-0,8541	-0,8256	-0,8524	-0,8116	-0,3995
	(7)	(7)	(7)	(7)	(7)
	0,0144	0,0222	0,0148	0,0267	0,3745
b	-0,9823	-0,9893	-0,9700	-0,9638	-0,5686
	(7)	(7)	(7)	(7)	(7)
	0,0001	0,0000	0,0003	0,0005	0,1828
Hue	-0,8076	-0,8327	-0,7890	-0,8838	-0,5137
	(7)	(7)	(7)	(7)	(7)

	0,0280	0,0201	0,0349	0,0083	0,2383
Croma	-0,9639	-0,9562	-0,9556	-0,9341	-0,5158
	(7)	(7)	(7)	(7)	(7)
	0,0005	0,0008	0,0008	0,0021	0,2360
Proteinas	-0,9860	-0,9564	-0,9912	-0,9629	-0,6419
	(7)	(7)	(7)	(7)	(7)
	0,0000	0,0007	0,0000	0,0005	0,1202
Lipidos	0,9924	0,9609	0,9981	0,9660	0,6738
	(7)	(7)	(7)	(7)	(7)
	0,0000	0,0006	0,0000	0,0004	0,0970
Humedad	-0,9755	-0,9758	-0,9805	-0,9328	-0,7459
	(7)	(7)	(7)	(7)	(7)
	0,0002	0,0002	0,0001	0,0022	0,0542
Cenizas	-0,3830	-0,4494	-0,4325	-0,2894	-0,8321
	(7)	(7)	(7)	(7)	(7)
	0,3964	0,3118	0,3325	0,5290	0,0202
pH	-0,9461	-0,9786	-0,9373	-0,9396	-0,6812
	(7)	(7)	(7)	(7)	(7)
	0,0013	0,0001	0,0018	0,0017	0,0920
Anisidina	0,9277	0,9574	0,9172	0,8320	0,6018
	(7)	(7)	(7)	(7)	(7)
	0,0026	0,0007	0,0036	0,0202	0,1528
Log RAM	0,9382	0,9661	0,9481	0,8935	0,8236
	(7)	(7)	(7)	(7)	(7)
	0,0018	0,0004	0,0011	0,0067	0,0228
Log enterobacterias	0,9461	0,9263	0,9339	0,9113	0,5463
	(7)	(7)	(7)	(7)	(7)
	0,0013	0,0027	0,0021	0,0043	0,2045
Brillo	-0,7586	-0,8436	-0,7641	-0,6760	-0,6719
	(7)	(7)	(7)	(7)	(7)
	0,0481	0,0170	0,0455	0,0955	0,0983
Humedad sensorial	-0,8418	-0,8890	-0,8512	-0,7193	-0,7274
	(7)	(7)	(7)	(7)	(7)
	0,0175	0,0074	0,0151	0,0685	0,0639
Goteo	0,9689	0,9286	0,9604	0,9383	0,4871
	(7)	(7)	(7)	(7)	(7)

	0,0003	0,0025	0,0006	0,0018	0,2676
Olor tipico crudo	-0,9341	-0,9750	-0,9343	-0,9338	-0,7438
	(7)	(7)	(7)	(7)	(7)
	0,0021	0,0002	0,0021	0,0021	0,0553
Olor rancio crudo	0,9722	0,9978	0,9627	0,9375	0,6467
	(7)	(7)	(7)	(7)	(7)
	0,0002	0,0000	0,0005	0,0018	0,1165
Olor putrido crudo	0,9870	0,9617	0,9780	0,9848	0,5300
	(7)	(7)	(7)	(7)	(7)
	0,0000	0,0005	0,0001	0,0001	0,2211
Olor tipico cocido	-0,9226	-0,8960	-0,9286	-0,8969	-0,5500
	(7)	(7)	(7)	(7)	(7)
	0,0031	0,0063	0,0025	0,0062	0,2008
Olor rancio cocido	0,9745	0,9274	0,9667	0,9576	0,4670
	(7)	(7)	(7)	(7)	(7)
	0,0002	0,0026	0,0004	0,0007	0,2907
Olor putrido cocido	0,9562	0,8956	0,9494	0,9313	0,4231
	(7)	(7)	(7)	(7)	(7)
	0,0008	0,0064	0,0011	0,0023	0,3442
Dureza crudo	-0,9421	-0,8897	-0,9419	-0,9090	-0,5446
	(7)	(7)	(7)	(7)	(7)
	0,0015	0,0073	0,0015	0,0046	0,2063
cohesividad sensoria	-0,8446	-0,7910	-0,8560	-0,8682	-0,6342
	(7)	(7)	(7)	(7)	(7)
	0,0168	0,0341	0,0140	0,0113	0,1261
Elasticidad crudo	-0,8924	-0,8454	-0,8980	-0,8872	-0,6043
	(7)	(7)	(7)	(7)	(7)
	0,0069	0,0166	0,0060	0,0077	0,1507
Firmeza crudo	-0,7879	-0,7493	-0,7855	-0,8114	-0,5044
	(7)	(7)	(7)	(7)	(7)
	0,0354	0,0525	0,0363	0,0267	0,2484
Firmeza cocido	-0,3061	-0,3836	-0,3305	-0,2869	-0,5129
	(7)	(7)	(7)	(7)	(7)
	0,5044	0,3956	0,4691	0,5328	0,2391
Calidad total	-0,9953	-0,9878	-0,9931	-0,9642	-0,6541
	(7)	(7)	(7)	(7)	(7)

	0,0000	0,0000	0,0000	0,0005	0,1109

	Color roche	Color visual	L	a	b
Tiempo	-0,0092	-0,7361	0,4724	-0,8541	-0,9823
	(7)	(7)	(7)	(7)	(7)
	0,9844	0,0593	0,2845	0,0144	0,0001
Driping	-0,0405	-0,8446	0,5995	-0,8256	-0,9893
	(7)	(7)	(7)	(7)	(7)
	0,9314	0,0168	0,1548	0,0222	0,0000
CRA	-0,0284	-0,7296	0,4885	-0,8524	-0,9700
	(7)	(7)	(7)	(7)	(7)
	0,9518	0,0627	0,2660	0,0148	0,0003
Firmeza	0,0017	-0,7498	0,4942	-0,8116	-0,9638
	(7)	(7)	(7)	(7)	(7)
	0,9971	0,0523	0,2596	0,0267	0,0005
Cohesividad	-0,4533	-0,6704	0,6957	-0,3995	-0,5686
	(7)	(7)	(7)	(7)	(7)
	0,3070	0,0993	0,0826	0,3745	0,1828
Color roche		0,0276	0,0352	-0,4756	-0,0463
		(7)	(7)	(7)	(7)
		0,9532	0,9403	0,2807	0,9214
Color visual	0,0276		-0,8989	0,6154	0,8214
	(7)		(7)	(7)	(7)
	0,9532		0,0059	0,1413	0,0234
L	0,0352	-0,8989		-0,4546	-0,5583
	(7)	(7)		(7)	(7)
	0,9403	0,0059		0,3054	0,1927
a	-0,4756	0,6154	-0,4546		0,8488
	(7)	(7)	(7)		(7)
	0,2807	0,1413	0,3054		0,0157
b	-0,0463	0,8214	-0,5583	0,8488	
	(7)	(7)	(7)	(7)	
	0,9214	0,0234	0,1927	0,0157	
Hue	0,1594	0,7855	-0,5012	0,5740	0,8401
	(7)	(7)	(7)	(7)	(7)
	0,7328	0,0363	0,2519	0,1778	0,0180

Croma	-0,2373	0,7644	-0,5355	0,9483	0,9727
	(7)	(7)	(7)	(7)	(7)
	0,6084	0,0454	0,2154	0,0011	0,0002
Proteinas	-0,0699	0,7137	-0,4909	0,9015	0,9562
	(7)	(7)	(7)	(7)	(7)
	0,8817	0,0717	0,2633	0,0055	0,0008
Lipidos	-0,0605	-0,7006	0,4600	-0,8346	-0,9555
	(7)	(7)	(7)	(7)	(7)
	0,8976	0,0795	0,2990	0,0195	0,0008
Humedad	0,1986	0,7617	-0,5197	0,7584	0,9495
	(7)	(7)	(7)	(7)	(7)
	0,6695	0,0466	0,2319	0,0481	0,0011
Cenizas	0,3027	0,5196	-0,6824	0,2723	0,3591
	(7)	(7)	(7)	(7)	(7)
	0,5093	0,2320	0,0912	0,5546	0,4289
pH	0,1832	0,8688	-0,6083	0,7087	0,9650
	(7)	(7)	(7)	(7)	(7)
	0,6942	0,0112	0,1473	0,0747	0,0004
Anisidina	-0,0636	-0,7527	0,4821	-0,7904	-0,9304
	(7)	(7)	(7)	(7)	(7)
	0,8922	0,0509	0,2733	0,0344	0,0024
Log RAM	-0,2336	-0,8241	0,6258	-0,7261	-0,9223
	(7)	(7)	(7)	(7)	(7)
	0,6142	0,0226	0,1328	0,0646	0,0031
Log enterobacterias	-0,1579	-0,6396	0,2959	-0,7356	-0,9176
	(7)	(7)	(7)	(7)	(7)
	0,7353	0,1219	0,5194	0,0595	0,0036
Brillo	-0,1574	0,8748	-0,8208	0,7816	0,8065
	(7)	(7)	(7)	(7)	(7)
	0,7361	0,0099	0,0237	0,0379	0,0284
Humedad sensorial	0,0258	0,7435	-0,5967	0,7887	0,8316
	(7)	(7)	(7)	(7)	(7)
	0,9562	0,0554	0,1573	0,0351	0,0204
Goteo	0,0579	-0,6541	0,3892	-0,8308	-0,9559
	(7)	(7)	(7)	(7)	(7)
	0,9019	0,1110	0,3881	0,0206	0,0008

Olor tipico crudo	0,1021	0,9184	-0,7273	0,7535	0,9576
	(7)	(7)	(7)	(7)	(7)
	0,8275	0,0035	0,0640	0,0505	0,0007
Olor rancio crudo	-0,0684	-0,8471	0,5848	-0,8002	-0,9868
	(7)	(7)	(7)	(7)	(7)
	0,8842	0,0162	0,1679	0,0307	0,0000
Olor putrido crudo	0,0902	-0,7421	0,4782	-0,8693	-0,9856
	(7)	(7)	(7)	(7)	(7)
	0,8476	0,0561	0,2777	0,0110	0,0000
Olor tipico cocido	-0,3124	0,7035	-0,5550	0,9675	0,9125
	(7)	(7)	(7)	(7)	(7)
	0,4952	0,0778	0,1959	0,0004	0,0041
Olor rancio cocido	0,1811	-0,6460	0,3767	-0,9171	-0,9552
	(7)	(7)	(7)	(7)	(7)
	0,6975	0,1170	0,4049	0,0036	0,0008
Olor putrido cocido	0,2255	-0,5833	0,3193	-0,9252	-0,9282
	(7)	(7)	(7)	(7)	(7)
	0,6268	0,1693	0,4851	0,0028	0,0025
Dureza crudo	0,0942	0,5882	-0,3369	0,7352	0,9067
	(7)	(7)	(7)	(7)	(7)
	0,8408	0,1648	0,4599	0,0597	0,0049
cohesividad sensoria	0,3203	0,5597	-0,3594	0,5282	0,7991
	(7)	(7)	(7)	(7)	(7)
	0,4838	0,1914	0,4285	0,2229	0,0311
Elasticidad crudo	0,2327	0,5950	-0,3757	0,6138	0,8571
	(7)	(7)	(7)	(7)	(7)
	0,6156	0,1588	0,4063	0,1426	0,0137
Firmeza crudo	0,3123	0,5564	-0,3369	0,4472	0,7740
	(7)	(7)	(7)	(7)	(7)
	0,4953	0,1945	0,4600	0,3144	0,0411
Firmeza cocido	-0,2919	0,5258	-0,6176	0,5371	0,3197
	(7)	(7)	(7)	(7)	(7)
	0,5253	0,2255	0,1395	0,2138	0,4845
Calidad total	0,0589	0,7746	-0,5243	0,8235	0,9850
	(7)	(7)	(7)	(7)	(7)
	0,9002	0,0408	0,2271	0,0228	0,0001

	Hue	Croma	Proteinas	Lipidos	Humedad
Tiempo	-0,8076	-0,9639	-0,9860	0,9924	-0,9755
	(7)	(7)	(7)	(7)	(7)
	0,0280	0,0005	0,0000	0,0000	0,0002
Driping	-0,8327	-0,9562	-0,9564	0,9609	-0,9758
	(7)	(7)	(7)	(7)	(7)
	0,0201	0,0008	0,0007	0,0006	0,0002
CRA	-0,7890	-0,9556	-0,9912	0,9981	-0,9805
	(7)	(7)	(7)	(7)	(7)
	0,0349	0,0008	0,0000	0,0000	0,0001
Firmeza	-0,8838	-0,9341	-0,9629	0,9660	-0,9328
	(7)	(7)	(7)	(7)	(7)
	0,0083	0,0021	0,0005	0,0004	0,0022
Cohesividad	-0,5137	-0,5158	-0,6419	0,6738	-0,7459
	(7)	(7)	(7)	(7)	(7)
	0,2383	0,2360	0,1202	0,0970	0,0542
Color roche	0,1594	-0,2373	-0,0699	-0,0605	0,1986
	(7)	(7)	(7)	(7)	(7)
	0,7328	0,6084	0,8817	0,8976	0,6695
Color visual	0,7855	0,7644	0,7137	-0,7006	0,7617
	(7)	(7)	(7)	(7)	(7)
	0,0363	0,0454	0,0717	0,0795	0,0466
L	-0,5012	-0,5355	-0,4909	0,4600	-0,5197
	(7)	(7)	(7)	(7)	(7)
	0,2519	0,2154	0,2633	0,2990	0,2319
a	0,5740	0,9483	0,9015	-0,8346	0,7584
	(7)	(7)	(7)	(7)	(7)
	0,1778	0,0011	0,0055	0,0195	0,0481
b	0,8401	0,9727	0,9562	-0,9555	0,9495
	(7)	(7)	(7)	(7)	(7)
	0,0180	0,0002	0,0008	0,0008	0,0011
Hue		0,7571	0,7769	-0,7846	0,8011
		(7)	(7)	(7)	(7)
		0,0488	0,0399	0,0367	0,0304

Croma	0,7571		0,9689	-0,9389	0,9023
	(7)		(7)	(7)	(7)
	0,0488		0,0003	0,0017	0,0054
Proteinas	0,7769	0,9689		-0,9889	0,9538
	(7)	(7)		(7)	(7)
	0,0399	0,0003		0,0000	0,0009
Lipidos	-0,7846	-0,9389	-0,9889		-0,9798
	(7)	(7)	(7)		(7)
	0,0367	0,0017	0,0000		0,0001
Humedad	0,8011	0,9023	0,9538	-0,9798	
	(7)	(7)	(7)	(7)	
	0,0304	0,0054	0,0009	0,0001	
Cenizas	0,0849	0,3337	0,3982	-0,4303	0,5073
	(7)	(7)	(7)	(7)	(7)
	0,8564	0,4644	0,3763	0,3352	0,2451
pH	0,9039	0,8904	0,9055	-0,9276	0,9629
	(7)	(7)	(7)	(7)	(7)
	0,0052	0,0072	0,0050	0,0026	0,0005
Anisidina	-0,7143	-0,9057	-0,8921	0,9006	-0,9389
	(7)	(7)	(7)	(7)	(7)
	0,0714	0,0050	0,0069	0,0057	0,0017
Log RAM	-0,7955	-0,8720	-0,9228	0,9445	-0,9859
	(7)	(7)	(7)	(7)	(7)
	0,0324	0,0105	0,0031	0,0014	0,0000
Log enterobacterias	-0,8488	-0,8737	-0,9141	0,9347	-0,9421
	(7)	(7)	(7)	(7)	(7)
	0,0157	0,0102	0,0040	0,0020	0,0015
Brillo	0,5308	0,8278	0,7652	-0,7320	0,7718
	(7)	(7)	(7)	(7)	(7)
	0,2203	0,0215	0,0450	0,0614	0,0421
Humedad sensorial	0,5587	0,8456	0,8437	-0,8343	0,8800
	(7)	(7)	(7)	(7)	(7)
	0,1923	0,0165	0,0170	0,0196	0,0090
Goteo	-0,7099	-0,9373	-0,9399	0,9544	-0,9180
	(7)	(7)	(7)	(7)	(7)
	0,0739	0,0018	0,0016	0,0008	0,0035

Olor tipico crudo	0,8693	0,9056	0,9159	-0,9221	0,9489
	(7)	(7)	(7)	(7)	(7)
	0,0110	0,0050	0,0038	0,0031	0,0011
Olor rancio crudo	-0,8494	-0,9437	-0,9406	0,9490	-0,9717
	(7)	(7)	(7)	(7)	(7)
	0,0156	0,0014	0,0016	0,0011	0,0003
Olor putrido crudo	-0,8239	-0,9726	-0,9732	0,9702	-0,9343
	(7)	(7)	(7)	(7)	(7)
	0,0227	0,0002	0,0002	0,0003	0,0020
Olor tipico cocido	0,6465	0,9716	0,9572	-0,9166	0,8542
	(7)	(7)	(7)	(7)	(7)
	0,1166	0,0003	0,0007	0,0037	0,0144
Olor rancio cocido	-0,7610	-0,9752	-0,9767	0,9610	-0,9037
	(7)	(7)	(7)	(7)	(7)
	0,0469	0,0002	0,0002	0,0006	0,0052
Olor putrido cocido	-0,7016	-0,9624	-0,9632	0,9448	-0,8751
	(7)	(7)	(7)	(7)	(7)
	0,0789	0,0005	0,0005	0,0013	0,0099
Dureza crudo	0,6639	0,8652	0,9064	-0,9451	0,9178
	(7)	(7)	(7)	(7)	(7)
	0,1039	0,0119	0,0049	0,0013	0,0036
cohesividad sensoria	0,6878	0,7093	0,8073	-0,8726	0,8582
	(7)	(7)	(7)	(7)	(7)
	0,0876	0,0743	0,0281	0,0104	0,0135
Elasticidad crudo	0,6731	0,7819	0,8495	-0,9069	0,8927
	(7)	(7)	(7)	(7)	(7)
	0,0975	0,0378	0,0155	0,0048	0,0068
Firmeza crudo	0,6493	0,6589	0,7178	-0,7941	0,7917
	(7)	(7)	(7)	(7)	(7)
	0,1145	0,1075	0,0693	0,0330	0,0339
Firmeza cocido	0,3294	0,4295	0,4129	-0,3131	0,3229
	(7)	(7)	(7)	(7)	(7)
	0,4706	0,3363	0,3572	0,4942	0,4799
Calidad total	0,8054	0,9521	0,9730	-0,9871	0,9844
	(7)	(7)	(7)	(7)	(7)
	0,0288	0,0009	0,0002	0,0000	0,0001

	Cenizas	pH	Anisidina	Log RAM	Log enterobacterias
Tiempo	-0,3830	-0,9461	0,9277	0,9382	0,9461
	(7)	(7)	(7)	(7)	(7)
	0,3964	0,0013	0,0026	0,0018	0,0013
Driping	-0,4494	-0,9786	0,9574	0,9661	0,9263
	(7)	(7)	(7)	(7)	(7)
	0,3118	0,0001	0,0007	0,0004	0,0027
CRA	-0,4325	-0,9373	0,9172	0,9481	0,9339
	(7)	(7)	(7)	(7)	(7)
	0,3325	0,0018	0,0036	0,0011	0,0021
Firmeza	-0,2894	-0,9396	0,8320	0,8935	0,9113
	(7)	(7)	(7)	(7)	(7)
	0,5290	0,0017	0,0202	0,0067	0,0043
Cohesividad	-0,8321	-0,6812	0,6018	0,8236	0,5463
	(7)	(7)	(7)	(7)	(7)
	0,0202	0,0920	0,1528	0,0228	0,2045
Color roche	0,3027	0,1832	-0,0636	-0,2336	-0,1579
	(7)	(7)	(7)	(7)	(7)
	0,5093	0,6942	0,8922	0,6142	0,7353
Color visual	0,5196	0,8688	-0,7527	-0,8241	-0,6396
	(7)	(7)	(7)	(7)	(7)
	0,2320	0,0112	0,0509	0,0226	0,1219
L	-0,6824	-0,6083	0,4821	0,6258	0,2959
	(7)	(7)	(7)	(7)	(7)
	0,0912	0,1473	0,2733	0,1328	0,5194
a	0,2723	0,7087	-0,7904	-0,7261	-0,7356
	(7)	(7)	(7)	(7)	(7)
	0,5546	0,0747	0,0344	0,0646	0,0595
b	0,3591	0,9650	-0,9304	-0,9223	-0,9176
	(7)	(7)	(7)	(7)	(7)
	0,4289	0,0004	0,0024	0,0031	0,0036
Hue	0,0849	0,9039	-0,7143	-0,7955	-0,8488
	(7)	(7)	(7)	(7)	(7)
	0,8564	0,0052	0,0714	0,0324	0,0157
Croma	0,3337	0,8904	-0,9057	-0,8720	-0,8737

	(7)	(7)	(7)	(7)	(7)
	0,4644	0,0072	0,0050	0,0105	0,0102
Proteinas	0,3982	0,9055	-0,8921	-0,9228	-0,9141
	(7)	(7)	(7)	(7)	(7)
	0,3763	0,0050	0,0069	0,0031	0,0040
Lipidos	-0,4303	-0,9276	0,9006	0,9445	0,9347
	(7)	(7)	(7)	(7)	(7)
	0,3352	0,0026	0,0057	0,0014	0,0020
Humedad	0,5073	0,9629	-0,9389	-0,9859	-0,9421
	(7)	(7)	(7)	(7)	(7)
	0,2451	0,0005	0,0017	0,0000	0,0015
Cenizas		0,4128	-0,4388	-0,5908	-0,2090
		(7)	(7)	(7)	(7)
		0,3573	0,3247	0,1625	0,6528
pH	0,4128		-0,9144	-0,9600	-0,9223
	(7)		(7)	(7)	(7)
	0,3573		0,0039	0,0006	0,0031
Anisidina	-0,4388	-0,9144		0,9291	0,9196
	(7)	(7)		(7)	(7)
	0,3247	0,0039		0,0025	0,0034
Log RAM	-0,5908	-0,9600	0,9291		0,8997
	(7)	(7)	(7)		(7)
	0,1625	0,0006	0,0025		0,0058
Log enterobacterias	-0,2090	-0,9223	0,9196	0,8997	
	(7)	(7)	(7)	(7)	
	0,6528	0,0031	0,0034	0,0058	
Brillo	0,6802	0,7732	-0,8389	-0,8248	-0,6159
	(7)	(7)	(7)	(7)	(7)
	0,0927	0,0415	0,0183	0,0224	0,1409
Humedad sensorial	0,6383	0,8153	-0,9437	-0,9084	-0,7884
	(7)	(7)	(7)	(7)	(7)
	0,1229	0,0254	0,0014	0,0046	0,0352
Goteo	-0,3487	-0,8832	0,8740	0,8539	0,8796
	(7)	(7)	(7)	(7)	(7)
	0,4434	0,0084	0,0101	0,0145	0,0090
Olor tipico crudo	0,5118	0,9816	-0,8870	-0,9635	-0,8601

	(7)	(7)	(7)	(7)	(7)
	0,2403	0,0001	0,0078	0,0005	0,0130
Olor rancio crudo	-0,4202	-0,9851	0,9618	0,9620	0,9355
	(7)	(7)	(7)	(7)	(7)
	0,3480	0,0001	0,0005	0,0005	0,0020
Olor putrido crudo	-0,3027	-0,9300	0,8810	0,8877	0,9124
	(7)	(7)	(7)	(7)	(7)
	0,5093	0,0024	0,0088	0,0076	0,0042
Olor tipico cocido	0,4203	0,8060	-0,8213	-0,8266	-0,7770
	(7)	(7)	(7)	(7)	(7)
	0,3478	0,0286	0,0235	0,0219	0,0398
Olor rancio cocido	-0,2396	-0,8690	0,8681	0,8442	0,9085
	(7)	(7)	(7)	(7)	(7)
	0,6048	0,0111	0,0113	0,0169	0,0046
Olor putrido cocido	-0,2218	-0,8228	0,8445	0,8062	0,8832
	(7)	(7)	(7)	(7)	(7)
	0,6327	0,0230	0,0168	0,0285	0,0084
Dureza crudo	0,4154	0,8583	-0,8333	-0,8509	-0,8578
	(7)	(7)	(7)	(7)	(7)
	0,3541	0,0134	0,0199	0,0152	0,0135
cohesividad sensoria	0,4480	0,8173	-0,6697	-0,8057	-0,7644
	(7)	(7)	(7)	(7)	(7)
	0,3135	0,0248	0,0998	0,0287	0,0454
Elasticidad crudo	0,4662	0,8476	-0,7535	-0,8358	-0,8012
	(7)	(7)	(7)	(7)	(7)
	0,2917	0,0160	0,0505	0,0192	0,0303
Firmeza crudo	0,3906	0,7884	-0,6370	-0,7308	-0,7030
	(7)	(7)	(7)	(7)	(7)
	0,3864	0,0352	0,1239	0,0621	0,0781
Firmeza cocido	0,3287	0,3208	-0,3674	-0,4259	-0,2637
	(7)	(7)	(7)	(7)	(7)
	0,4716	0,4830	0,4176	0,3407	0,5677
Calidad total	0,4456	0,9623	-0,9345	-0,9557	-0,9319
	(7)	(7)	(7)	(7)	(7)
	0,3164	0,0005	0,0020	0,0008	0,0022

	Brillo	Humedad sensorial	Goteo	Olor tipico crudo	Olor rancio crudo

Tiempo	-0,7586	-0,8418	0,9689	-0,9341	0,9722
	(7)	(7)	(7)	(7)	(7)
	0,0481	0,0175	0,0003	0,0021	0,0002
Driping	-0,8436	-0,8890	0,9286	-0,9750	0,9978
	(7)	(7)	(7)	(7)	(7)
	0,0170	0,0074	0,0025	0,0002	0,0000
CRA	-0,7641	-0,8512	0,9604	-0,9343	0,9627
	(7)	(7)	(7)	(7)	(7)
	0,0455	0,0151	0,0006	0,0021	0,0005
Firmeza	-0,6760	-0,7193	0,9383	-0,9338	0,9375
	(7)	(7)	(7)	(7)	(7)
	0,0955	0,0685	0,0018	0,0021	0,0018
Cohesividad	-0,6719	-0,7274	0,4871	-0,7438	0,6467
	(7)	(7)	(7)	(7)	(7)
	0,0983	0,0639	0,2676	0,0553	0,1165
Color roche	-0,1574	0,0258	0,0579	0,1021	-0,0684
	(7)	(7)	(7)	(7)	(7)
	0,7361	0,9562	0,9019	0,8275	0,8842
Color visual	0,8748	0,7435	-0,6541	0,9184	-0,8471
	(7)	(7)	(7)	(7)	(7)
	0,0099	0,0554	0,1110	0,0035	0,0162
L	-0,8208	-0,5967	0,3892	-0,7273	0,5848
	(7)	(7)	(7)	(7)	(7)
	0,0237	0,1573	0,3881	0,0640	0,1679
a	0,7816	0,7887	-0,8308	0,7535	-0,8002
	(7)	(7)	(7)	(7)	(7)
	0,0379	0,0351	0,0206	0,0505	0,0307
b	0,8065	0,8316	-0,9559	0,9576	-0,9868
	(7)	(7)	(7)	(7)	(7)
	0,0284	0,0204	0,0008	0,0007	0,0000
Hue	0,5308	0,5587	-0,7099	0,8693	-0,8494
	(7)	(7)	(7)	(7)	(7)
	0,2203	0,1923	0,0739	0,0110	0,0156
Croma	0,8278	0,8456	-0,9373	0,9056	-0,9437
	(7)	(7)	(7)	(7)	(7)
	0,0215	0,0165	0,0018	0,0050	0,0014

Proteinas	0,7652	0,8437	-0,9399	0,9159	-0,9406
	(7)	(7)	(7)	(7)	(7)
	0,0450	0,0170	0,0016	0,0038	0,0016
Lipidos	-0,7320	-0,8343	0,9544	-0,9221	0,9490
	(7)	(7)	(7)	(7)	(7)
	0,0614	0,0196	0,0008	0,0031	0,0011
Humedad	0,7718	0,8800	-0,9180	0,9489	-0,9717
	(7)	(7)	(7)	(7)	(7)
	0,0421	0,0090	0,0035	0,0011	0,0003
Cenizas	0,6802	0,6383	-0,3487	0,5118	-0,4202
	(7)	(7)	(7)	(7)	(7)
	0,0927	0,1229	0,4434	0,2403	0,3480
pH	0,7732	0,8153	-0,8832	0,9816	-0,9851
	(7)	(7)	(7)	(7)	(7)
	0,0415	0,0254	0,0084	0,0001	0,0001
Anisidina	-0,8389	-0,9437	0,8740	-0,8870	0,9618
	(7)	(7)	(7)	(7)	(7)
	0,0183	0,0014	0,0101	0,0078	0,0005
Log RAM	-0,8248	-0,9084	0,8539	-0,9635	0,9620
	(7)	(7)	(7)	(7)	(7)
	0,0224	0,0046	0,0145	0,0005	0,0005
Log enterobacterias	-0,6159	-0,7884	0,8796	-0,8601	0,9355
	(7)	(7)	(7)	(7)	(7)
	0,1409	0,0352	0,0090	0,0130	0,0020
Brillo		0,9190	-0,7023	0,8454	-0,8287
		(7)	(7)	(7)	(7)
		0,0034	0,0785	0,0166	0,0212
Humedad sensorial	0,9190		-0,7604	0,8379	-0,8796
	(7)		(7)	(7)	(7)
	0,0034		0,0472	0,0186	0,0090
Goteo	-0,7023	-0,7604		-0,8660	0,9186
	(7)	(7)		(7)	(7)
	0,0785	0,0472		0,0117	0,0035
Olor tipico crudo	0,8454	0,8379	-0,8660		-0,9717
	(7)	(7)	(7)		(7)
	0,0166	0,0186	0,0117		0,0003

Olor rancio crudo	-0,8287	-0,8796	0,9186	-0,9717
	(7)	(7)	(7)	(7)
	0,0212	0,0090	0,0035	0,0003

Correlation
(Sample Size)
P-Value

CONTINUACIÓN ANALISIS DE CORRELACION

	Olor rancio crudo	Olor putrido crudo	Olor tipico cocido	Olor rancio cocido	Olor putrido cocido
Olor rancio crudo		0,9534	-0,8687	0,9151	0,8802
		(7)	(7)	(7)	(7)
		0,0009	0,0112	0,0038	0,0089
Olor putrido crudo	0,9534		-0,9341	0,9845	0,9672
	(7)		(7)	(7)	(7)
	0,0009		0,0021	0,0001	0,0004
Olor tipico cocido	-0,8687	-0,9341		-0,9491	-0,9479
	(7)	(7)		(7)	(7)
	0,0112	0,0021		0,0011	0,0012
Olor rancio cocido	0,9151	0,9845	-0,9491		0,9956
	(7)	(7)	(7)		(7)
	0,0038	0,0001	0,0011		0,0000
Olor putrido cocido	0,8802	0,9672	-0,9479	0,9956	
	(7)	(7)	(7)	(7)	
	0,0089	0,0004	0,0012	0,0000	

Correlations

	Brillo	Humedad	Goteo	Olor tipico crudo	Olor rancio crudo
Brillo		0,9190	-0,7023	0,8454	-0,8287
		(7)	(7)	(7)	(7)
		0,0034	0,0785	0,0166	0,0212
Humedad	0,9190		-0,7604	0,8379	-0,8796
	(7)		(7)	(7)	(7)
	0,0034		0,0472	0,0186	0,0090
Goteo	-0,7023	-0,7604		-0,8660	0,9186
	(7)	(7)		(7)	(7)
	0,0785	0,0472		0,0117	0,0035
Olor tipico crudo	0,8454	0,8379	-0,8660		-0,9717
	(7)	(7)	(7)		(7)
	0,0166	0,0186	0,0117		0,0003
Olor rancio crudo	-0,8287	-0,8796	0,9186	-0,9717	
	(7)	(7)	(7)	(7)	
	0,0212	0,0090	0,0035	0,0003	
Olor putrido crudo	-0,7331	-0,7723	0,9753	-0,9233	0,9534
	(7)	(7)	(7)	(7)	(7)
	0,0609	0,0418	0,0002	0,0030	0,0009
Olor tipico cosico	0,8198	0,8147	-0,9078	0,8560	-0,8687
	(7)	(7)	(7)	(7)	(7)
	0,0240	0,0256	0,0047	0,0140	0,0112
Olor rancio cocido	-0,6964	-0,7691	0,9641	-0,8604	0,9151
	(7)	(7)	(7)	(7)	(7)
	0,0821	0,0433	0,0005	0,0129	0,0038
Olor putrido cocido	-0,6683	-0,7497	0,9596	-0,8147	0,8802
	(7)	(7)	(7)	(7)	(7)
	0,1008	0,0523	0,0006	0,0256	0,0089
Dureza crudo	0,6328	0,7236	-0,9809	0,8337	-0,8787
	(7)	(7)	(7)	(7)	(7)
	0,1272	0,0660	0,0001	0,0197	0,0092
Cohesividad crudo	0,4816	0,5582	-0,8701	0,7980	-0,7808
	(7)	(7)	(7)	(7)	(7)
	0,2738	0,1929	0,0109	0,0315	0,0383

Elasticidad crudo	0,5713	0,6427	-0,9311	0,8272	-0,8353
	(7)	(7)	(7)	(7)	(7)
	0,1803	0,1195	0,0023	0,0217	0,0193
Firmeza crudo	0,4498	0,4839	-0,8540	0,7534	-0,7473
	(7)	(7)	(7)	(7)	(7)
	0,3112	0,2712	0,0144	0,0505	0,0535
Firmeza cocido	0,6070	0,5579	-0,1158	0,4294	-0,3638
	(7)	(7)	(7)	(7)	(7)
	0,1483	0,1931	0,8048	0,3364	0,4224
Calidad total	0,7871	0,8545	-0,9667	0,9538	-0,9815
	(7)	(7)	(7)	(7)	(7)
	0,0357	0,0143	0,0004	0,0009	0,0001

	Olor putrido crudo	Olor tipico cosico	Olor rancio cocido	Olor putrido cocido	Dureza crudo
Brillo	-0,7331	0,8198	-0,6964	-0,6683	0,6328
	(7)	(7)	(7)	(7)	(7)
	0,0609	0,0240	0,0821	0,1008	0,1272
Humedad	-0,7723	0,8147	-0,7691	-0,7497	0,7236
	(7)	(7)	(7)	(7)	(7)
	0,0418	0,0256	0,0433	0,0523	0,0660
Goteo	0,9753	-0,9078	0,9641	0,9596	-0,9809
	(7)	(7)	(7)	(7)	(7)
	0,0002	0,0047	0,0005	0,0006	0,0001
Olor tipico crudo	-0,9233	0,8560	-0,8604	-0,8147	0,8337
	(7)	(7)	(7)	(7)	(7)
	0,0030	0,0140	0,0129	0,0256	0,0197
Olor rancio crudo	0,9534	-0,8687	0,9151	0,8802	-0,8787
	(7)	(7)	(7)	(7)	(7)
	0,0009	0,0112	0,0038	0,0089	0,0092
Olor putrido crudo		-0,9341	0,9845	0,9672	-0,9336
		(7)	(7)	(7)	(7)
		0,0021	0,0001	0,0004	0,0021
Olor tipico cosico	-0,9341		-0,9491	-0,9479	0,8465
	(7)		(7)	(7)	(7)
	0,0021		0,0011	0,0012	0,0163

Olor rancio cocido	0,9845	-0,9491		0,9956	-0,9146
	(7)	(7)		(7)	(7)
	0,0001	0,0011		0,0000	0,0039
Olor putrido cocido	0,9672	-0,9479	0,9956		-0,9115
	(7)	(7)	(7)		(7)
	0,0004	0,0012	0,0000		0,0043
Dureza crudo	-0,9336	0,8465	-0,9146	-0,9115	
	(7)	(7)	(7)	(7)	
	0,0021	0,0163	0,0039	0,0043	
Cohesividad crudo	-0,8373	0,7050	-0,7817	-0,7639	0,9343
	(7)	(7)	(7)	(7)	(7)
	0,0188	0,0768	0,0379	0,0456	0,0020
Elasticidad crudo	-0,8849	0,7697	-0,8382	-0,8258	0,9776
	(7)	(7)	(7)	(7)	(7)
	0,0081	0,0430	0,0185	0,0221	0,0001
Firmeza crudo	-0,7978	0,6285	-0,7227	-0,7036	0,9134
	(7)	(7)	(7)	(7)	(7)
	0,0316	0,1306	0,0665	0,0777	0,0040
Firmeza cocido	-0,2727	0,4647	-0,2982	-0,2685	0,0130
	(7)	(7)	(7)	(7)	(7)
	0,5541	0,2935	0,5160	0,5604	0,9779
Calidad total	-0,9792	0,9087	-0,9522	-0,9293	0,9469
	(7)	(7)	(7)	(7)	(7)
	0,0001	0,0046	0,0009	0,0025	0,0012

	Cohesividad crudo	Elasticidad crudo	Firmeza crudo	Firmeza cocido	Calidad total
Brillo	0,4816	0,5713	0,4498	0,6070	0,7871
	(7)	(7)	(7)	(7)	(7)
	0,2738	0,1803	0,3112	0,1483	0,0357
Humedad	0,5582	0,6427	0,4839	0,5579	0,8545
	(7)	(7)	(7)	(7)	(7)
	0,1929	0,1195	0,2712	0,1931	0,0143
Goteo	-0,8701	-0,9311	-0,8540	-0,1158	-0,9667
	(7)	(7)	(7)	(7)	(7)
	0,0109	0,0023	0,0144	0,8048	0,0004
Olor tipico crudo	0,7980	0,8272	0,7534	0,4294	0,9538

	(7)	(7)	(7)	(7)	(7)
	0,0315	0,0217	0,0505	0,3364	0,0009
Olor rancio crudo	-0,7808	-0,8353	-0,7473	-0,3638	-0,9815
	(7)	(7)	(7)	(7)	(7)
	0,0383	0,0193	0,0535	0,4224	0,0001
Olor putrido crudo	-0,8373	-0,8849	-0,7978	-0,2727	-0,9792
	(7)	(7)	(7)	(7)	(7)
	0,0188	0,0081	0,0316	0,5541	0,0001
Olor tipico cosico	0,7050	0,7697	0,6285	0,4647	0,9087
	(7)	(7)	(7)	(7)	(7)
	0,0768	0,0430	0,1306	0,2935	0,0046
Olor rancio cocido	-0,7817	-0,8382	-0,7227	-0,2982	-0,9522
	(7)	(7)	(7)	(7)	(7)
	0,0379	0,0185	0,0665	0,5160	0,0009
Olor putrido cocido	-0,7639	-0,8258	-0,7036	-0,2685	-0,9293
	(7)	(7)	(7)	(7)	(7)
	0,0456	0,0221	0,0777	0,5604	0,0025
Dureza crudo	0,9343	0,9776	0,9134	0,0130	0,9469
	(7)	(7)	(7)	(7)	(7)
	0,0020	0,0001	0,0040	0,9779	0,0012
Cohesividad crudo		0,9854	0,9694	-0,0759	0,8621
		(7)	(7)	(7)	(7)
		0,0000	0,0003	0,8715	0,0126
Elasticidad crudo	0,9854		0,9697	-0,0569	0,9095
	(7)		(7)	(7)	(7)
	0,0000		0,0003	0,9036	0,0045
Firmeza crudo	0,9694	0,9697		-0,2351	0,8163
	(7)	(7)		(7)	(7)
	0,0003	0,0003		0,6118	0,0251
Firmeza cocido	-0,0759	-0,0569	-0,2351		0,2903
	(7)	(7)	(7)		(7)
	0,8715	0,9036	0,6118		0,5277
Calidad total	0,8621	0,9095	0,8163	0,2903	
	(7)	(7)	(7)	(7)	
	0,0126	0,0045	0,0251	0,5277	

Correlation
(Sample Size)
P-Value

The StatAdvisor

This table shows Pearson product moment correlations between each pair of variables. These correlation coefficients range between -1 and +1 and measure the strength of the linear relationship between the variables. Also shown in parentheses is the number of pairs of data values used to compute each coefficient. The third number in each location of the table is a P-value which tests the statistical significance of the estimated correlations. P-values below 0.05 indicate statistically significant non-zero correlations at the 95% confidence level. The following pairs of variables have P-values below 0.05:

- Tiempo and Driping
- Tiempo and CRA
- Tiempo and Firmeza
- Tiempo and a
- Tiempo and b
- Tiempo and Hue
- Tiempo and Croma
- Tiempo and Proteinas
- Tiempo and Lipidos
- Tiempo and Humedad
- Tiempo and pH
- Tiempo and Anisidina
- Tiempo and Log RAM
- Tiempo and Log enterobacterias
- Tiempo and Brillo
- Tiempo and Humedad sensorial
- Tiempo and Goteo
- Tiempo and Olor tipico crudo
- Tiempo and Olor rancio crudo
- Tiempo and Olor putrido crudo
- Tiempo and Olor tipico cocido
- Tiempo and Olor rancio cocido
- Tiempo and Olor putrido cocido
- Tiempo and Dureza crudo
- Tiempo and cohesividad sensorial
- Tiempo and Elasticidad crudo
- Tiempo and Firmeza cocido
- Tiempo and Calidad total
- Driping and CRA
- Driping and Firmeza
- Driping and Color visual
- Driping and a

Driping and b
Driping and Hue
Driping and Croma
Driping and Proteinas
Driping and Lipidos
Driping and Humedad
Driping and pH
Driping and Anisidina
Driping and Log RAM
Driping and Log enterobacterias
Driping and Brillo
Driping and Humedad sensorial
Driping and Goteo
Driping and Olor tipico crudo
Driping and Olor rancio crudo
Driping and Olor putrido crudo
Driping and Olor tipico cocido
Driping and Olor rancio cocido
Driping and Olor putrido cocido
Driping and Dureza crudo
Driping and cohesividad sensorial
Driping and Elasticidad crudo
Driping and Firmeza crudo
Driping and Firmeza cocido
Driping and Calidad total
CRA and Firmeza
CRA and a
CRA and b
CRA and Hue
CRA and Croma
CRA and Proteinas
CRA and Lipidos
CRA and Humedad
CRA and pH
CRA and Anisidina
CRA and Log RAM
CRA and Log enterobacterias
CRA and Brillo
CRA and Humedad sensorial
CRA and Goteo
CRA and Olor tipico crudo
CRA and Olor rancio crudo
CRA and Olor putrido crudo
CRA and Olor tipico cocido
CRA and Olor rancio cocido
CRA and Olor putrido cocido
CRA and Dureza crudo
CRA and cohesividad sensorial

CRA and Elasticidad crudo
CRA and Firmeza crudo
CRA and Firmeza cocido
CRA and Calidad total
Firmeza and a
Firmeza and b
Firmeza and Hue
Firmeza and Croma
Firmeza and Proteinas
Firmeza and Lipidos
Firmeza and Humedad
Firmeza and pH
Firmeza and Anisidina
Firmeza and Log RAM
Firmeza and Log enterobacterias
Firmeza and Goteo
Firmeza and Olor tipico crudo
Firmeza and Olor rancio crudo
Firmeza and Olor putrido crudo
Firmeza and Olor tipico cocido
Firmeza and Olor rancio cocido
Firmeza and Olor putrido cocido
Firmeza and Dureza crudo
Firmeza and cohesividad sensorial
Firmeza and Elasticidad crudo
Firmeza and Firmeza crudo
Firmeza and Firmeza cocido
Firmeza and Calidad total
Cohesividad and Cenizas
Cohesividad and Log RAM
Cohesividad and Olor putrido crudo
Cohesividad and Olor tipico cocido
Cohesividad and Olor rancio cocido
Cohesividad and Olor putrido cocido
Cohesividad and Dureza crudo
Cohesividad and Elasticidad crudo
Cohesividad and Firmeza crudo
Cohesividad and Firmeza cocido
Cohesividad and Calidad total
Color roche and Olor putrido crudo
Color roche and Olor tipico cocido
Color roche and Olor rancio cocido
Color roche and Olor putrido cocido
Color roche and Dureza crudo
Color roche and cohesividad sensorial
Color roche and Elasticidad crudo
Color roche and Firmeza crudo
Color roche and Firmeza cocido

Color roche and Calidad total
Color visual and L
Color visual and b
Color visual and Hue
Color visual and Croma
Color visual and Humedad
Color visual and pH
Color visual and Log RAM
Color visual and Brillo
Color visual and Olor tipico crudo
Color visual and Olor rancio crudo
Color visual and Olor putrido crudo
Color visual and Olor tipico cocido
Color visual and Olor rancio cocido
Color visual and Olor putrido cocido
Color visual and Dureza crudo
Color visual and cohesividad sensorial
Color visual and Elasticidad crudo
Color visual and Firmeza crudo
Color visual and Firmeza cocido
Color visual and Calidad total
L and Brillo
L and Olor putrido crudo
L and Olor tipico cocido
L and Olor rancio cocido
L and Olor putrido cocido
L and Dureza crudo
L and cohesividad sensorial
L and Elasticidad crudo
L and Firmeza crudo
L and Firmeza cocido
L and Calidad total
a and b
a and Croma
a and Proteinas
a and Lipidos
a and Humedad
a and Anisidina
a and Brillo
a and Humedad sensorial
a and Goteo
a and Olor rancio crudo
a and Olor putrido crudo
a and Olor tipico cocido
a and Olor rancio cocido
a and cohesividad sensorial
a and Elasticidad crudo
a and Firmeza crudo

a and Firmeza cocido
a and Calidad total
b and Hue
b and Croma
b and Proteinas
b and Lipidos
b and Humedad
b and pH
b and Anisidina
b and Log RAM
b and Log enterobacterias
b and Brillo
b and Humedad sensorial
b and Goteo
b and Olor tipico crudo
b and Olor rancio crudo
b and Olor putrido crudo
b and Olor tipico cocido
b and Olor rancio cocido
b and Olor putrido cocido
b and Dureza crudo
b and cohesividad sensorial
b and Elasticidad crudo
b and Firmeza crudo
b and Firmeza cocido
b and Calidad total
Hue and Croma
Hue and Proteinas
Hue and Lipidos
Hue and Humedad
Hue and pH
Hue and Log RAM
Hue and Log enterobacterias
Hue and Olor tipico crudo
Hue and Olor rancio crudo
Hue and Olor putrido crudo
Hue and Olor tipico cocido
Hue and Olor rancio cocido
Hue and Olor putrido cocido
Hue and Dureza crudo
Hue and cohesividad sensorial
Hue and Elasticidad crudo
Hue and Firmeza crudo
Hue and Firmeza cocido
Hue and Calidad total
Croma and Proteinas
Croma and Lipidos
Croma and Humedad

Croma and pH
Croma and Anisidina
Croma and Log RAM
Croma and Log enterobacterias
Croma and Brillo
Croma and Humedad sensorial
Croma and Goteo
Croma and Olor tipico crudo
Croma and Olor rancio crudo
Croma and Olor putrido crudo
Croma and Olor tipico cocido
Croma and Olor rancio cocido
Croma and Olor putrido cocido
Croma and Dureza crudo
Croma and cohesividad sensorial
Croma and Elasticidad crudo
Croma and Firmeza crudo
Croma and Firmeza cocido
Croma and Calidad total
Proteinas and Lipidos
Proteinas and Humedad
Proteinas and pH
Proteinas and Anisidina
Proteinas and Log RAM
Proteinas and Log enterobacterias
Proteinas and Brillo
Proteinas and Humedad sensorial
Proteinas and Goteo
Proteinas and Olor tipico crudo
Proteinas and Olor rancio crudo
Proteinas and Olor putrido crudo
Proteinas and Olor tipico cocido
Proteinas and Olor rancio cocido
Proteinas and Olor putrido cocido
Proteinas and Dureza crudo
Proteinas and cohesividad sensorial
Proteinas and Elasticidad crudo
Proteinas and Firmeza crudo
Proteinas and Firmeza cocido
Proteinas and Calidad total
Lipidos and Humedad
Lipidos and pH
Lipidos and Anisidina
Lipidos and Log RAM
Lipidos and Log enterobacterias
Lipidos and Humedad sens