

## A case of allosuckling in wild guanacos (*Lama guanicoe*)

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**Abstract** Although allosuckling, the lactation of non-filial offspring, can be a costly behavior, it has been reported in several species across a wide range of mammalian orders. Monotocous species such as ungulates exhibit this behavior less frequently than polytocous species, and most cases have been reported among captive specimens. A case of allosuckling of a free-ranging guanaco (*Lama guanicoe*) calf is reported. Allosuckling observed in this species may represent opportunistic behavior by the calf, supporting the “milk theft” hypothesis.

**Keywords** Allonursing · Allosuckling · Guanacos · Ungulates · Milk theft · Parental care

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Mammalian females have been observed to nurse non-filial offspring (behavior hereafter referred to as allosuckling). Packer et al. (1992) reported this behavior in 68 mammalian species; it is an extreme type of alloparental care (Riedman 1982). Potential costs to the mother associated with allowing allosuckling include reduction of the amount of nutrients available to her current young and compromising her future reproductive success. Even if milk production does not involve direct fitness costs, nursing activities directed towards unrelated offspring might be selected against to prevent unrelated individuals from spreading more gene copies throughout the population (Roulin 2002). In monotocous species (all ungulates, except suids) allonursing is less common than in polytocous species. It is associated with high levels of “milk theft” by parasitic infants and is more common in species where females continue nursing after they have lost their own young (Packer et al. 1992). Both adaptive and non-adaptive hypotheses have been proposed to explain the evolution of allonursing under natural conditions (Hoogland et al. 1988; Boness 1990; Pusey and Packer 1994; Murphey et al. 1995; Hayes 2000; Roulin 2002).

Another way to examine this phenomenon is through the costs and benefits accrued by the calves whenever they suck from non-maternal females. While this behavior would seem easy to explain, and is generally regarded as potentially beneficial to the allosuckler, evidence indicates that allosuckling is either not beneficial or that it is a compensation mechanism for undernourished offspring (Landete-Castillejos et al. 2000; Bartoš et al. 2001; Víchová and Bartoš 2005). In addition, allosucklers may risk injuries that result from aggressive responses by non-maternal females and experience a high risk of pathogen transmission through milk (Roulin and Heeb 1999). Herein, we report a case of allosuckling in free-ranging guanacos

(*Lama guanicoe*), a wild South American camelid common in Patagonia (González et al. 2006), with the purpose of describing this behavior and contributing to knowledge of the social and maternal behavior of this species.

A guanaco calf was observed suckling a non-maternal female at Torres del Paine National Park, southern Chile (51° 3'S, 72° 55'W, 260–360 m above sea level) early in the afternoon of 15 January 2006 (summer in the southern hemisphere). The age of the calf, based on the knowledge that births are highly concentrated in the first mid part of December in Torres del Paine (Sarno et al. 2003), was approximately one month. Based on their external appearance, both the calf and the allosuckling female seemed healthy and in good nutritional condition.

This behavior was observed once in 123 h, while the observers were recording the social and maternal behavior of the guanacos. While a female was nursing her offspring in an antiparallel position, a non-filial calf approached the female and positioned its head between the female and the filial calf, adopting a parallel position. When the non-filial calf grasped one nipple the female turned its head back and sniffed the first calf, probably her own, which was not suckling at that moment. The female did not show passive or active signs of rejection such as walking, kicking, or spitting. After sniffing her calf, the female stayed still for approximately 30 s. During this time the non-filial calf suckled her, and then walked when the rest of the group moved.

This study reports the first case of allosuckling in wild guanacos. The fact that we recorded this behavior only once in over 123 h of observation indicates that allosuckling in wild guanacos is relatively uncommon. Indeed, the frequency of allosuckling found in guanacos seems lower than that reported in other free-ranging wild ungulates, including fallow deer (*Dama dama*), in which the percentage of calves that allonurse reaches 43% (Ekvall 1998), or the Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) where 31–85% of suckling is non-maternal (Hass 1990). Given that the nutritional importance of milk to the calf is known to decrease in ungulates, including camelids (Robbins et al. 1981; Riek et al. 2007), subsequent studies should examine whether allosuckling in guanacos varies with the stage of lactation (Ekvall 1998).

While the frequency of allosuckling in wild ungulates may differ in wild versus captive populations, some species tend to exhibit this behavior under both conditions. Packer et al. (1992) reported allonursing in 15 out of 30 species examined, and six more species were reported later by other authors. These recent additions include llamas (*Lama glama*) and alpacas (*Vicugna pacos*), two domestic South American camelids (Brown 2000), fallow deer (Ekvall 1998), river buffalo (*Bubalis bubalis*,

Murphey et al. 1995) and wild mouflon (*Ovis musimon*, Reále et al. 1999). Nine of these reports involved studies conducted on wild subjects and eight were on captive subjects; four other studies included observations both in the wild and in captivity (Murphey et al. 1995; Pelabon et al. 1998; Landete-Castillejos et al. 2000; Bartoš et al. 2001; Víchová and Bartoš 2005). Allosuckling by captive guanacos has been recorded to range from 4.1 to 40% of suckling bouts (Zapata et al. 2006), supporting the possibility that this behavior may take place with varying frequency within the same species and under varying environmental conditions (Hass 1990; Ekvall 1998; Pelabon et al., 1998). The fitness costs and benefits associated with this variation are yet to be well understood in ungulates (Víchová and Bartoš 2005).

During the allosuckling event observed in this study, the female apparently did not notice the non-filial calf positioned behind her filial calf. After turning back its head the female did not show active signs of rejection such as walking, kicking or spitting. We suggest that this event could be interpreted as a case of “milk theft” (Hayes 2000; Roulin 2002). The non-filial calf approached the female and positioned itself between the female and the female’s own calf while standing in a parallel position. Thus, the non-filial calf may have used the filial calf as a barrier to avoid being detected by the mother. According to Packer et al. (1992), parasitic suckling by infants is a common explanation of allonursing in monotocous species, a life history characteristic of guanacos.

To summarize, allosuckling in free-ranging guanacos at Torres del Paine National Park seems an uncommon behavior that for the moment may represent opportunistic behavior by the calf. The influence of social stability in which calves may be in contact with the same or different females to varying extents over time should be addressed by future studies. In particular, guanaco social groups from other southern populations (Tierra del Fuego island) seem more stable (Franklin 1983), which could enable comparative approaches.

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