



Social dominance of female dairy goats influences the dynamics of gastrointestinal parasite eggs

Rodolfo Ungerfeld^{a,*}, Oscar Correa^b

^a *Departamento de Fisiología, Facultad de Veterinaria, Lasplacas 1550, Montevideo 11600, Uruguay*

^b *Departamento de Parasitología, Facultad de Veterinaria, Lasplacas 1550, Montevideo 11600, Uruguay*

Accepted 10 May 2006

Available online 5 July 2006

Abstract

In ruminants, social hierarchies determine an unequal access to resources, such as food consumption, individuals from the other gender, or shade. Related to this, physiological status is associated with the social rank, resulting in differences in reproductive success, milk yield, or health status as observed in different ruminant species. Our aim was to determine if in a dairy goat herd, the gastrointestinal parasite faecal egg count (FEC) number increases differentially in high-ranked and low-ranked does. Fifty-three does were adjudicated to three groups according to their hierarchical position [success index (SI) determined by displacement in agonistic interactions: low (<0.33), medium (0.33–0.66), and high (>0.66)]. Body weight and age were associated with social rank. Eleven days after the administration of moxidectin (day 0), overall FEC fell from 1306.0 ± 102.8 (mean \pm S.E.M.) to 17.7 ± 4.2 , without significant differences according to social rank. FEC was determined again on days 22, 36 and 50. On day 50, FEC from high SI goats was significantly lower ($P < 0.01$) than that observed in medium or low SI goats. We conclude that faecal egg count increases slower in high-ranked does than in medium and low-ranked does.

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Keywords: Goats; Gastrointestinal parasites; Parasitology; Social hierarchy

* Corresponding author. Tel.: +598 2 6286955; fax: +598 2 6280130.

E-mail address: piub@internet.com.uy (R. Ungerfeld).

1. Introduction

In ruminants, social hierarchies determine an unequal access to various resources, such as food (Barroso et al., 2000), individuals from the other gender (Hirotani, 1994; Zine and Krausman, 2000), or shade (Sherwin and Johnson, 1987). Matsuzawa and Hagiya (1991) observed that high-ranked goats have access to more food than low-ranked does. Similar to what happens in cows (Arave and Albright, 1976; Phillips and Rind, 2002), Patón et al. (1995) reported that there is a positive relation between the hierarchy and individual milk yield. In mountain goats, it was observed that dominant does have greater reproductive success than subordinates (Côté and Festa-Bianchet, 2001).

In feral sheep, it was observed that the parasite gastrointestinal load varies between individuals, and that in severe winters individuals with high parasite load were more susceptible to starvation mortality (O'Brien, 2000). In that population, parasite load in the summer preceding the harsh winters was a strong predictor of mortality (Illius et al., 1995). Animals that survive severe winters had, on average, half the parasite load of those observed in mild years (O'Brien, 2000). Although the author related differences in parasite load to population density, it may be speculated that higher-ranked individuals may have better physiological status – including a minor effect on number of parasite contaminations – to survive harsh winters. However, little is known regarding the relationship between social status and health status in farmed animals. Galindo and Broom (2000) found that lameness problems are more frequent in low-ranked than in high-ranked cows. We hypothesized that the gastrointestinal parasite faecal egg count (FEC) number would increase more slowly in high-ranked than in low-ranked does following treatment with an anti-parasitic drug.

2. Materials and methods

2.1. Animal management and herds

The experiment was carried out on a private farm located in the south of Uruguay (35 °S). The herd comprised 53 dairy goats (47.2 ± 1.6 kg; mean ± S.E.M.), from the Anglo Nubian ($n = 39$), Saanen ($n = 4$) or Anglo Nubian × Saanen ($n = 10$) breeds. For individual identification, all does were tagged, and the tag number was painted on both sides of the body. During the experiment, animals grazed on native/improved pastures and received a concentrate ration provided in feeders at the beginning and the end of the day, in the same place where they stayed overnight.

2.2. Determination of success index

The animals were observed by at least two observers for 1 h, 3–4 times/day, on seven separated days. Observation period were separate at least by 1 h periods during which the animals grazed on pasture. During the observation periods, all animals were together in one pen (10m × 10 m), and all agonistic interactions observed in the pen were recorded. Most of the times agonistic behaviour was spontaneous, but in some instances it was stimulated by food administration. All events of agonistic interaction, including threat (when a goat turned towards or approaches another individual with head down and then lunges without making contact), physical contact (e.g. butting, when the goat used the front of her head to make contact with another goat) or the mere approach of a goat accompanied by retreat or avoidance by another goat (when a goat actively moved towards another individual, causing the latter to walk or run away), resulting in the displacement of an animal were recorded. A total of 1933 interactions were registered, and the success index (SI) for each goat was calculated according to Alvarez et al. (2003):

$$SI = \frac{\text{number of individuals displaced}}{\text{number of individuals displaced} + \text{number of individuals that displace it}}$$

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