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Short Communication

Experimental infestation of llamas (*Lama glama*) with *Boophilus microplus* (Acari: Ixodidae)

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Abstract. Two llamas (*Lama glama*) were infested with approximately 20,000 *Boophilus microplus* larvae each and maintained under controlled conditions to collect the detached adult ticks. A total of 72 engorged and semi-engorged females were recovered with a mean weight of 163.0 ± 70.6 mg. Sixty-three (87.5%) of these ticks oviposited and 60 (95.2%) of the egg masses produced larvae. Six of the heaviest females laid 18,838 eggs from which 16,545 (87.8%) hatched. These results show that llamas are able to maintain a population of *B. microplus* under experimental conditions. Further studies are required to determine the role of llamas as alternative hosts for *B. microplus* under field conditions.

Key words: *Lama glama*, *Boophilus microplus*, experimental infestation

Argentina is divided into two main areas in relation to the presence of *Boophilus microplus*: the tick infested area of about 60 million hectare in the northern region, and the tick free area corresponding to the rest of the country. The infested area maintains a fourth part (about 12 million) of the cattle population and almost all the llamas (*Lama glama*) (about 130,000) raised in Argentina. Llamas are concentrated in the west of the infested area. Despite its condition, this zone is considered naturally free of *B. microplus* due to its pronounced water deficit (less than 300 mm rainfall annually) (Guglielmone and Mangold, 1987). Nowadays the llama industry is developing in other tick-free or infested areas of Argentina, mainly for wool production.

Since 1938 the Argentinean Animal Health Office has regulated the control of livestock movements from the infested to the uninfested tick areas. Animals that are considered possible hosts for *B. microplus* have to be inspected and treated with an acaricide before movement to the tick free area

will be allowed. Llamas, empirically considered in this category, are usually treated against *B. microplus* when moving out from the infested area.

Several exotic and native mammals may act as hosts for *B. microplus* in northwest Argentina (Kühne *et al.*, 1986) but the role of llamas as susceptible hosts for the common cattle tick is unknown. Australian authors (Kennedy and Green, 1993) reported that the closely related camel (*Camelus dromedarius*) can act as host for *B. microplus* after experimental infestation. In South America, two tick species are occasionally found parasitizing llamas: the argasid *Otobius megnini* (Barbará and Dios, 1918; M.M. Cafrune, unpublished) and the highly camelid-specific ixodid *Amblyomma parvitarsum* (Hoogstraal and Aeschlimann, 1982; Aguirre *et al.*, 1997). In North America, cases of tick paralysis were recorded in llamas after their natural infestation with *Dermacentor andersoni* (Barrington and Parish, 1995; Cebra *et al.*, 1996). In Australia, a case of tick paralysis in one llama caused by *Ixodes holocyclus* was reported (Jonsson and Rozmanec, 1997).

On the other hand, information about tick-borne diseases in camelids is scarce in South America. Campano and Bustamante (1991) did not find *Anaplasma marginale* in blood smears nor antibodies against this rickettsia in the sera from, respectively, 8,342 and 6,626 exported Chilean camelids (llamas and alpacas, *Lama pacos*). The inoculation of *A. marginale* in four llamas did not induce clinical symptoms, no rickettsaemia and body temperature and haematocrit index remained normal. Notwithstanding, seroconversion was demonstrated in three of these llamas between 28 and 55 days post-inoculation (Aguirre *et al.*, 1994; Aguirre *et al.*, unpublished).

In the summer of 1999, a trial was carried out to determine if the llama could serve as host for *B. microplus*, and if so, if female ticks could produce viable progeny. Two male llamas, nine months of age, without previous exposure to ticks were used. Twenty thousand *B. microplus* larvae 20-day old were released on either side of the back of each llama. After infestation both animals were maintained in isolation boxes and inspected daily to collect detached female ticks during one month. Ticks were observed attached on the llamas on similar predilection sites as on cattle.

The detached female ticks were weighed and allowed to oviposit in darkness at $27 \pm 1°C$ and 83–86% relative humidity. Seventy specimens were recovered from one llama and only two from the other one, between 20 and 30 days post-infestation. The mean weight ($\pm$ S.D.) of these ticks was of 163.0 ± 70.6 mg. Sixty-three (87.5%) of the ticks laid eggs, and 60 (95.2%) of the egg masses hatched in a minimum period (mean $\pm$ S.D.) of 20.4 ± 1.1 days. Six of the heaviest ticks (236.3 to 316.5 mg) had a mean ($\pm$ S.D.) Reproductive Efficiency Index (REI = number of eggs laid/weight of the

females in mg) (Drummond and Whetstone, 1970) of 11.3 ± 0.9. These ticks laid a total of 18,838 eggs from which 16,545 (87.8%) hatched.

The recovery of *B. microplus* female ticks from the llamas was low. However, the mean REI of the heaviest ticks was similar to those of ticks collected from cattle naturally (11.0 ± 1.5) or artificially (12.9 ± 1.3) infested in Argentina (Cafrune *et al.*, 1993). This fact, in addition to the high fertility of the egg masses, suggests that the llama is a potential host to maintain cattle tick infestation under natural conditions. Moreover, present data in comparison with those of Kennedy and Green (1993) indicate that llamas may be better hosts than camels for *B. microplus*.

Further trials are needed to know the role of the llama as an alternative host for *B. microplus*, specially under field conditions. Nevertheless, present results showed that this camelid can act as experimental host and therefore a mandatory treatment of llamas moving from tick infested to tick free area is recommended.

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