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Effect of parasite management practices on fiber growth and quality in alpacas in the U.S. Mid-Atlantic region

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Introduction

Alpaca fiber production is a more recent agricultural activity in the U.S., but the national herd now exceeds 165,000 registered animals on 15,000 farms (Alpaca Registry, 2012). There is a range of climatic zones in the U.S., all different from the indigenous environment of the alpaca, and research-based recommendations on management practices for efficient fiber production in the various zones are lacking. The characteristics of alpaca fleeces in the U.S. have been reported by Lupton et al. (2006).

Environmental conditions in the Mid-Atlantic region make gastrointestinal nematodes a major constraint for small ruminant production. While the benefit of controlling internal and external parasites on fiber yield has been demonstrated in native South American alpaca herds (Windsor et al., 1992), little is still known about the pharmacokinetics (Jarvinen et al., 2002) and dosage of anthelmintics (Geurden and Van Hemelrijk, 2005) in camelids. The effect on parasite burden in alpacas grazing pasture contaminated by lambs has been documented in New Zealand (Hill et al., 1993), and data suggested that alpacas were less affected with gastrointestinal nematodes than sheep. There is widely documented resistance of parasites to commercial de-wormers in sheep and goats (Zajac and Gipson, 2000), and the presence of resistance to two major classes of anthelmintics on llama and alpaca farms in Georgia has been reported (Gillespie et al., 2010).

Limited information is available in the U.S. on the effect of gastrointestinal nematodes on alpaca fiber production especially in the hot and humid conditions in the south eastern U.S. This experiment evaluated the effect of deworming practices on fiber production in alpacas in this region, comparing a standard deworming program at regular intervals.
largely to control meningeal worm (*Paralaphostrongylustenius*), to an ‘on-demand’ system of deworming individual animals when strongylid egg counts exceeded a pre-set limit.

**Materials and Methods**

The mature male alpacas for this research were donated to Virginia State University by regional alpaca breeders, and the research was approved by the Agricultural Animal Care and Use Committee. The 16 alpacas, following a period of quarantine and adaptation, were allocated to 2 groups of 8, blocked by body weight and fiber diameter, in March 2008. In Group 1 (‘timed’), all alpacas were treated with ivermectin (0.4 mg/kg body weight; sc) at 6-week intervals following typical industry practices in this region, whereas in Group 2 (‘on-demand’) alpacas were treated individually with moxidectin (0.2 mg/kg body weight; oral) when strongylid fecal egg counts exceeded 200 eggs/g. Alpacas were maintained on naturally parasite-infected pastures (1 ha) previously grazed by sheep and goats. Fecal and blood samples were collected and body weight recorded at 14-d intervals throughout the grazing season. Fecal egg counts were determined using a modified McMaster technique (Zajac and Conboy, 2006) and blood samples were used to determine packed cell volume (PCV). Alpacas were shorn in May 2008, and each fleece was separated into 5 regions and each weighed before fiber analysis. Fiber characteristics were determined using standard methods including the OFDA 2000 instrument for fiber diameter-related properties (Lupton et al. 2006).

In the first production cycle, groups grazed in adjacent, but separate pastures. In November the two groups were combined in a single pasture, and supplemented with medium quality hay until pasture growth resumed. Alpacas grazed as a single herd during the second production cycle, but remained on their designated parasite management. Alpacas were again shorn in May 2009. Seven male yearling Spanish and Myotonic tracer goats were placed with the alpacas in February 2009 after treatment with a cocktail of ivermectin (0.4 mg/kg) and levamisole (11 mg/kg) to remove gastrointestinal parasites. Fecal samples were collected from the goats at the same 14-d interval and used to estimate parasite contamination of the pasture, and determine differences in fecal egg counts between the co-grazed species. Data were analyzed for the effect of parasite management on fleece characteristics separately for the two production cycles using the GLM procedure of SAS (ver. 9.1).
Results and Discussion

Alpaca body weight was not different (P>0.1) between the management groups in the first (mean: 68 kg) or second cycle (mean: 71 kg), and did not fluctuate significantly except in response to shearing. Mean fecal egg counts remained low in both groups, and only exceeded 200 eggs/g in one animal in the individually treated group during the first grazing cycle and twice in the same animal in the timed group in the second cycle. There was no effect (P>0.1) of parasite management on PCV, and no fluctuations in fecal egg counts or PCV with changing seasons in the alpacas. In contrast, mean fecal egg counts in the tracer goats increased from 0 eggs/g at introduction to pasture to a high of 1,800 eggs/g by July (Figure 1).

Figure 1: Changes in strongylid egg counts in co-grazed alpacas and goats (cycle 2)

Table 1: Selected fleece characteristics of alpacas treated with ivermectin at 6-week intervals (timed) or treated individually when fecal egg counts >200 eggs/g (on-demand)

|                      | cycle 1 \( ^T \) |                  | cycle 2 \( ^T \) |
|----------------------|------------------|------------------|
|                      | timed            | on-demand        | Timed            | on-demand        |
| Clean fiber weight, kg | 2.73             | 2.56             | 2.35             | 2.16             |
| Clean scoured yield, % | 89.6             | 85.2             | 87.1             | 87.8             |
| Staple length (saddle), mm | 99               | 94               | 87               | 83               |
| Mean fiber diameter (saddle), µm | 33.6            | 33.7            | 31.8             | 31.1             |
| Comfort factor (saddle), % | 39.2             | 40.1             | 48.0             | 53.1             |

\( ^T \) differences between treatment groups within cycle were not significant (P>0.1)
Parasite management practices had no effect on fiber growth (Table 1). Fleece weight was not different (P>0.1) between groups in cycle 1 (mean: 2.64 kg) and 2 (mean: 2.26 kg), nor were staple length (cycle 1: 98 mm; cycle 2: 85 mm), or fiber diameter (cycle 1: 33.7 µm; cycle 2: 31.5 µm). There was also no difference in fiber quality characteristics (i.e. staple strength, comfort factor, medullation).

The experiment showed lower gastrointestinal nematode infection in alpacas compared to goats, in line with observations by Hill et al. (1993) when co-grazing alpacas with lambs. The level of gastrointestinal nematode infection resulting in clinical symptoms is not well documented, however, packed cell volume remained constant and within normal limits in this experiment. Although the effect of routine deworming was masked by the presence of anthelmintic resistance to ivermectin in gastrointestinal nematodes at this location, results indicate that limiting deworming to animals with increased fecal egg counts did not affect body weight, and fiber production and quality. Reducing the use of dewormers may be helpful in delaying the further development of anthelmintic resistance.

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References