Deworming efficacy of *Albizia anthelmintica* in Uganda: preliminary findings

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Abstract

This study was conducted to evaluate the anthelmintic effectiveness of *Albizia anthelmintica,* as a first step in investigating the hypothesis that livestock self-medicate. In July 2006, an observational study was conducted with 56 young female lambs, to validate *A. anthelmintica* efficacy. Faecal egg per gram for *Coccidia*, *Strongyle*-type, *Monezia*, *Strongyloides* and *Dicrocoelia* eggs were counted and analysed. Results indicate that *A. anthelmintica* is effective in controlling infection with a variety of internal parasites in lambs, *Monezia* was the most sensitive. Furthermore, treatment of *Strongyle*-type worms requires a biweekly dose of *A. anthelmintica* as an effective deworming protocol.

Key words: anthelmintic, ethnoveterinary, Karamoja, livestock, self-medication

Introduction

African traditional healers learn from experience, one another (Tabuti, Dhillion & Lye, 2003), and also from observing the behaviour of animals (Huffman, 2003). There are numerous accounts of self-medication in the great apes (e.g. Wrangham & Nishida, 1983; Huffman, 1997, 2003; Krief, Hladlik & Haxaire, 2005). Self-medication has not, however, been reported in livestock. In 2000, during a participatory deworming field trial in Uganda, we observed goats' browsing behaviours suggestive of self-medication. This observation was strengthened by a shepherd who claimed to have observed goats grazing on ekapangiteng (*Albizia anthelmintica* Brong.), followed by gross expulsion of worms in the goats' faeces. This observation was intriguing because animals generally avoid browsing the bitter leaves of *A. anthelmintica.* East Africans widely use *A. anthelmintica* to control helminth parasites in human and animal medicine in Sudan (Koko, Galal & Khalid, 2000), Ethiopia (Desta, 1995) and Tanzania (Minja, 1994).

The objective of this study was to evaluate the anthelmintic effectiveness of *A. anthelmintica,* as a first step in investigating the hypothesis that livestock self-medicate. This research forms part of a larger ethnoveterinary study of the pharmacopoeia of Karamojong pastoralists.

Methods

Study site

Karamoja is located in the northeastern corner of Uganda, bordering Kenya and Sudan. It is characterized by a relatively flat savannah with some hills and mountains rising up to 3800 m. The semi-arid environment receives 350–750 mm rain per annum. The original vegetation was characterized as dry *Acacia-Combretum-Terminalia* (Langdale-Brown, 1959). The herb layer is composed of *Hyparrhenia*, *Setaria*, *Themeda*, *Cymbopogon* and *Sporobolus* grass species. The short vegetation shows evidence of heavy grazing, in stark contrast with the neighbouring districts, where the people are less dependent upon livestock for survival.

The Nilo–Hamitic Karamojong numbering about 900,000 are transhumant agro-pastoralists widely dependent upon their cattle, supplemented by subsistence farming (UBOS, 2002). Their semi-nomadic lifestyle is dictated by the grazing seasons of their livestock. Karamojong live in circular homesteads (*manyattas*) characterized by thick, thorny, concentric fences that encompass 2–5 acres and enclose ten to 30 mud-thatched huts. Women and

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children live in the *manyatta* year-round. During the dry season, the men and youth herd livestock to migratory cattle areas, where they sleep in the open or in low grass huts. External influences are minimal and 99% of the population rely exclusively on indigenous knowledge, medicines, and practices for themselves and their livestock.

Methods

An observational study was conducted in July 2006 to validate anthelmintic efficacy of *A. anthelmintica*. Fifty-six young female lambs were locally purchased from three Karamojong subcounties. Baseline data were collected to chart out health variables and monitor changes during the field trial on each individual animal. These included: physical examination, live body weight, packed cell volume (PCV, an indicator of anaemia) and total protein (TP, a hydration status indicator) of blood samples. The numbers of parasite eggs per gram of feaces (EPG) were determined by the modified McMaster's technique (Campbell *et al.*, 1978), for five different parasites (*Strongyle*-types, *Monezia*, *Strongyloides*, *Coccidia* and *Dicrocoelia*) for each sample. Based on the baseline data, 30 lambs were distributed into three groups of ten lambs each. Groups were created to ensure an even distribution of nine factors, including total EPG and district of origin.

The three groups were: negative control (no treatment), two test groups, one with an allopathic dewormer (levamisole, Wormicid®, Cosmos Limited, Nairobi, Kenya) at label dose, and another one using shade-dried *A. anthelmintica* bark, which had been prepared by crushing to make a powder and packed into standard gelatin capsules at the traditional healers' recommended dose of 0.8 g. Treatments were given orally on day 0.

In determination of the optimal dosing schedule for *A. anthelmintica,* half of the lambs in each treatment group were re-treated on day 14. Blood was collected for determination of PCVs and TPs on days 14 and 35. Body weight was repeated on day 35.

Coccidia, *Strongyle*-type, *Monezia*, *Strongyloides* and *Dicrocoelia* eggs were identified. This preliminary study focuses on the first three parasite types, as they are the most clinically important. Anthelmintic efficacy was estimated as the percent faecal egg count reduction (FECR) using the following equation after Coles *et al.* (1992). T and C represent mean EPGs of the treated and control groups; subscript 1 refers to the EPG on day 0, and subscript n refers to EPG counts in a given week:

$$\text{FECR} = (1 - (\frac{T_n}{T_1} \times \frac{C_1}{C_n})) \times 100.$$

The FECR represents the per cent reduction change in the average EPG of animals in the treatment group, compared to the change in the average EPG of negative control animals. It is directly correlated to the efficacy of the treatment: a more effective medication correlates with a more highly positive FECR, up to a maximum of 100%. A negative FECR indicates that the animals in the treatment group showed either a smaller decrease, or a greater increase, in the average number of parasite eggs shed, than did animals in the negative control group.

Results and discussion

The FECR was positive for each of the parasite types, indicating efficacy of *A. anthelmintica* against all parasites examined in this study. As shown in Table 1, the FECR of *Strongyle*-type eggs, the most clinically important group,

Table 1 Efficacy of herbal medicine made from *Albizia anthelmintica* compared to allopathic (levamisole)

	Strongyles			*Coccidia*			*Monezia*		
Week	*Albizia*	*Albizia* redosed[a]	Levamisole	*Albizia*	*Albizia* redosed[a]	Levamisole	*Albizia*	*Albizia* redosed[a]	Levamisole
1	71.3		99.9	−30.4		−64.7	38.2		75
2	78.3		99.2	−26.1		−49.2	98.1		89.5
3	77.8	94.6	98.4	−25.1	47.3	38	99	93.9	100
4	−85.1	72.1	82	−29.3	55.4	−103.5	99.3	100	−50
5	−141.2	56	37.5	−14.9	−9.2	6.9	99.9	100	88.2

The per cent faecal egg count reductions (FECR) of three different parasites in female lambs are shown.
[a]These columns refer to data from the half of the animals in each group which were retreated on day 14.

ranged from 71% to 78% for the first 3 weeks. Animals in the re-dosed group had an average FECR of almost 95% on week 3, tapering to 72% and 56% on weeks 4 and 5 respectively.

The lambs' *Coccidia* level did not respond to herbal treatment by *A. anthelmintica* (average FECRs −15% to −30%); but re-dosed animals fared better, with averages of 47% and 55% in weeks 3 and 4. The FECR of *Monezia* eggs was consistently over 94% after the first week.

No differences were observed between groups in PCV, TP or live weight gain. This implies that the differences in worm-load had little effect on weight gain or anaemia; however data are still being collected.

Results of this study indicate that *A. anthelmintica* is effective in controlling infection with a variety of internal parasites in lambs. Furthermore, treatment of *Strongyle*-type worms requires a biweekly dose of *A. anthelmintica* as an effective deworming protocol. This study continues to further standardize the dosage according to body weight. Efficacy of *A. anthelmintica* will also be examined in other livestock species.

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