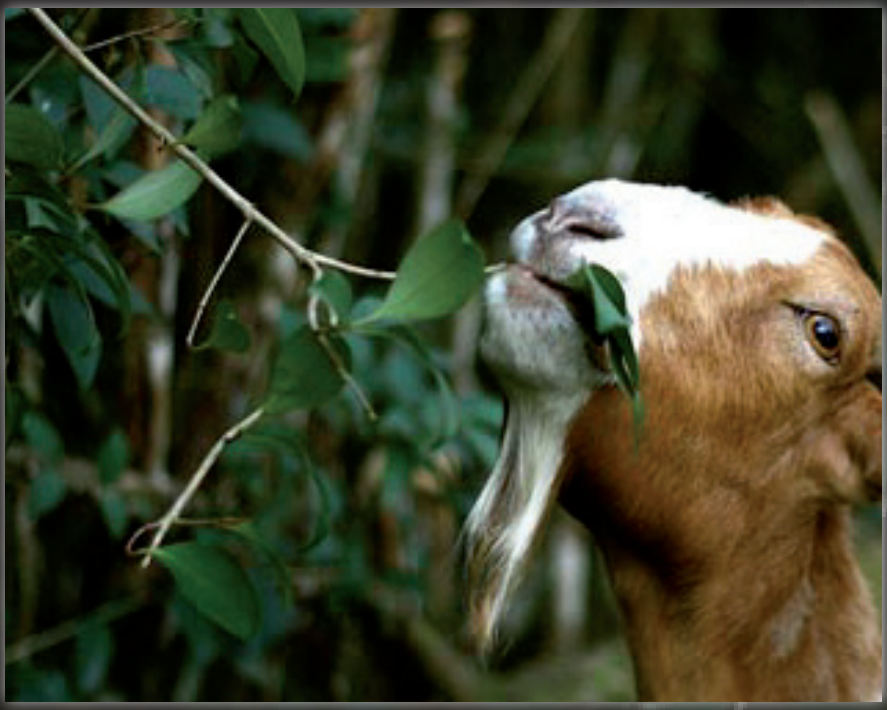
Can Indigenous Plants Be Harnessed To Control Internal Worms For Small Stock In Botswana?



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MINISTRY OF AGRICULTURAL DEVELOPMENT AND FOOD SECURITY
IMPROVING FOOD SECURITY
BOTSWANA

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Background Information

Small stock offers an opportunity to contribute to poverty reduction and to empower youth and women. Rearing of sheep and goats also opens opportunities for wealth creation, job creation and to diversify animal agriculture.

Statistics Botswana (2013) shows that 98% and 92% of goat & sheep are in the traditional sector. Therefore invigorating small stock industry in Botswana will benefit rural economies and increase rural trade.

Tswana goats have high frequency of twinning (1.7 kids/doe; Madibela et al., 2002) (Picture 1). Combined with high fertility (90%) & a short gestation period (5 months) means that more meat can be realised in a relatively short period of time.

Picture 1. Tswana goat with triplets. O. R. Madibela

However, these good attributes fail to improve production partially due to stomach and intestinal worms (Dibokwana). During the rainy season the warm temperature and presence of soil moisture promote large number of infective larvae when kids/lambs are born. At this age these young animals do not have an effective disease defence system. The problem is increased by relaxation of immunity by their mothers three weeks before birth and three weeks after birth. This result in high numbers of worms and high excretion of eggs in faeces of ewe and does. This end up contaminating the pasture and infecting the young animals. When the young ones graze, they pick the parasite larvae together with the grass. The general life cycle of worms is illustrated by Figure 1. One typical sign of infection is diarrhoea (scouring) and loss of body weight in young ones. Dags will also be visible for those with woolly or hairy backside (Picture 2).

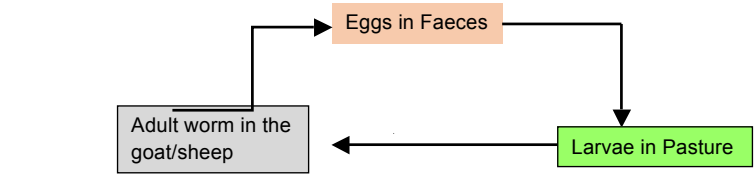


Figure 1: General worm life cycle

Picture 2. Young goat having diarrhoea and loss of body condition. O. R. Madibela

Control of internal worms

Control of internal worms is heavily reliant on anthelmintic drugs. However, resource-limited farmers may not afford these drugs. In addition, drugs may not be effective if instructions are not followed, such as infrequent use or using low doses or poor quality drugs. However, the major danger of continuous use of drugs is development of drug resistance by the worms. All these challenges call for a shift in the strategy of internal worm control. Science has proposed the use of biological control which include the use of indigenous plants and forages with medicinal properties.

Plants which contain chemicals such as condensed tannins have been proven to reduce the number of eggs excreted when the plants are fed to infected animals (Butter et al., 2000; Kabasa et al., 2000, Osoro et al., 2007).

Medicinal plants

In the context of internal worms, plants that contain condensed tannins, saponins and alkaloids are explored for their anti-parasitic properties. In

Botswana studies have shown that Viscum verrucosum (Boletswa/Boswa) and Melia azedarach (Mosalaosi/Morolwana) reduce egg excretion when fed to goats (Picture 3). When eggs were incubated with Spirostachys africana (Morukuru), Viscum verrucosum and Peltophorum africanum (Mosetlha) for 30 minutes, eggs of internal worms were all killed as indicated by lack of mobility. Studies by Tibe et al. (2013) using purified condensed tannins from Viscum to incubate worm larvae found that larval development was completely inhibited.

Effects on internal worm eggs

The diagrams below (Figure 2) demonstrate reduction of worm eggs when a diet of Viscum plant was fed to goats (A) and increases in eggs when goats were not supplemented with dried fruits of Melia plant (Mosalaosi). This suggests that reproduction or growth of worms were restricted by chemicals contained in these plants.

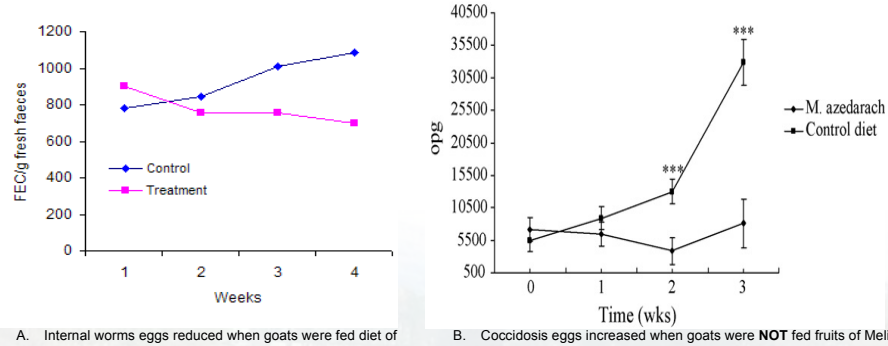
Viscum plant (Boletswa/Boswa) on Acacia tree – O. R. Madibela

Fruits of Melia azedarach (Mosalaosi) – O. R. Madibela

Spirostachys Africana (Morukuru) - Ted Woods

Peltophorum africanum (Mosetlha) - Bernard Dupont

Picture 3. Selected plants tested for efficacy in reducing internal worm eggs



A. Internal worms eggs reduced when goats were fed diet of Viscum plant (Madibela and Jansen 2003)

B. Coccidosis eggs increased when goats were **NOT** fed fruits of Melia (Madibela and Kelemogile 2008)

Figure 2. Eggs was decreased when goats are fed diet of Viscum plant but increases when goats were NOT fed fruits of Melia plant

Literature cited

1. Butter, N. L., Dawson, J. M., Wakelin, D., Buttery, P. J., 2000. Effect of dietary tannin and protein concentration on nematode infection (Trichostrongylus colubriformis) in lambs. Journal of Agricultural Science, Cambridge, 134, 89-99

2. Kabasa, J. D., Opuda-Asilbo, J., Meulen ter, U., 2000. The effect of oral administration of polyethylenel glycol on faecal helminth egg count in pregnant goats grazed on browse containing condensed tannins. Tropical Animal Health and Production, 32, 157-172

3. Madibela, O. R. and Jansen, K., 2003. The use of indigenous parasitic plant (Viscum verrucosum) in reducing faecal egg count in female Tswana goats. Livestock Research for Rural Development, 15 (9). http://www.lrrd.org/lrrd15/9/madi159.htm

4. Madibela, O. R. Mosimanyana, B. M. Boitumelo, W. S. and Pelaelo, T. D. (2002) Effect of supplementation on reproduction of wet season kidding Tswana goats. South African Journal of Animal 2002, 32 (1): 14-22

5. Osoro, K., Mateos-Sanz, A., Frutos, P., Garcia, U., Ortega-Mora, L. M., Ferreira, L.M.M., Celaya, R., Ferre, I., 2007. Anthelmintic and nutritional effects of heather supplementation on Cashmere goats grazing perennial ryegrass-white clover pastures. Journal of Animal Science, 85, 861-870

6. Statistics Botswana (2013). 2011 Annual agricultural Survey Report. Department of Research, Statistics and Policy Development. Ministry of Agriculture. Gaborone, Botswana

7. Tibe, O., Sutherland, I. A., Lesperance, L. and Harding, D. (2013). The effect of purified condensed tannins of forage plants from Botswana on the free-living stages of gastrointestinal nematode parasites of livestock. Veterinary Parasitology, 197(1-2):160-7