

The Use of Sheep Breeds Resistant to Internal Parasites

Gastrointestinal parasitism is a major problem in sheep production worldwide. A monetary value for losses from parasites is difficult to ascertain, but it can be very substantial. This publication presents an approach that can be used in combination with strategic deworming and good pasture management to control internal parasites in sheep. This approach involves breeding sheep for improved resistance to these parasites.

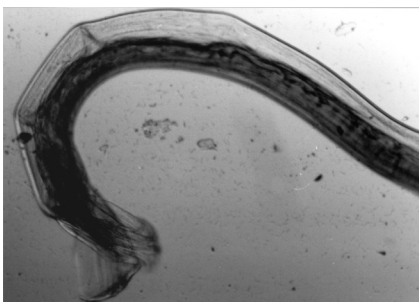


Figure 1. *Haemonchus contortus* is the gastrointestinal parasite of sheep that causes the most harm.

Loss of production, costs of dewormers, and animal death are some of the major concerns associated with the widespread occurrence of infection with internal parasites, particularly *Haemonchus contortus* (Figure 1). Chemical dewormers, or anthelmintics, are

commonly used; however internal parasites are becoming increasingly more resistant to dewormers. In addition, there is increasing awareness of environmental issues that may influence the use of dewormers as more consumers demand animal products and pastures that are free of chemical residues. Many consumers are now questioning the widespread use of chemicals in animal production because of fears of human food contamination. For these reasons, alternative approaches for controlling internal parasites are being considered. Thus far, a vaccination against gastrointestinal parasites in ruminants has not been found despite extensive research.

It is unlikely that future methods of parasite control in the sheep industry will rely on any single approach but will probably be combinations of several approaches. To some extent, this is already happening with the combination of strategic deworming and good pasture management.

Parasite Life Cycle

The life cycle of internal parasites in sheep begins when the sheep eats the infective larvae on a blade of grass. Adult parasites stay in the abomasum (true stomach) and lay tremendous numbers of eggs. *Haemonchus contortus* requires 14 days to complete this part of the life cycle, while it normally takes *Ostertagia circumcincta* and *Trichostrongylus* spp. 21 days after the infective larvae are eaten for the adult to mature and start to produce eggs. The eggs exit the host in the manure. The eggs then hatch into larvae, and the infective larvae move from the manure onto the grass. Conditions must be moist and warm in order for the eggs to hatch and move. Figure 2 shows the life cycle of gastrointestinal parasites in sheep.

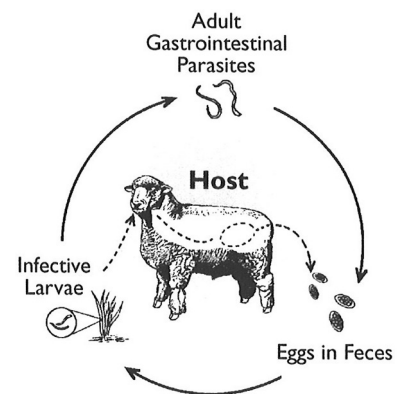


Figure 2. Life cycle of gastrointestinal parasite.

Breeding for Improved Resistance

Of the approaches to parasite control, breeding sheep for resistance seems to be the most promising application that can be used to complement the strategic use of dewormers and improved pasture management. Resistance refers to the sheep's ability to suppress the establishment and/or development of parasites. From an economic point of view, resistance allows sheep to maintain existing levels of production even if they are infected. Australian researchers have termed this ability to maintain levels of production as "resilience."

There is a substantial body of evidence that supports variation among breeds in resistance to internal parasites, particularly to *Haemonchus contortus*, *Ostertagia circumcincta*, and *Trichostrongylus* spp. For example, the Gulf Coast, also known as Florida Native, is much more resistant to *Haemonchus contortus* than are the European breeds Rambouillet and Merino as well as the Suffolk breed. In a trial conducted at Alabama A&M University, Ruvuna and Stephens (1997) observed that the egg per gram (EPG) of feces was approximately eight times lower in Florida Native ewes than in Suffolk ewes under natural conditions of infection (Figures 3 through 6).

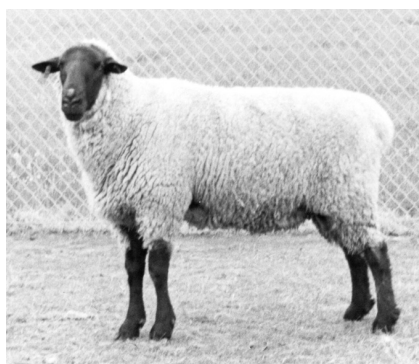


Figure 3. Mature purebred Suffolk ram

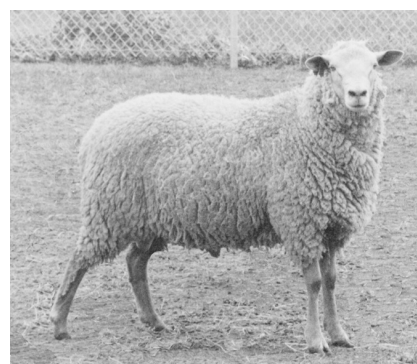


Figure 4. Mature purebred Florida Native ram

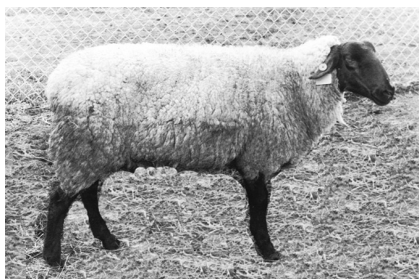


Figure 5. Mature purebred Suffolk ewe

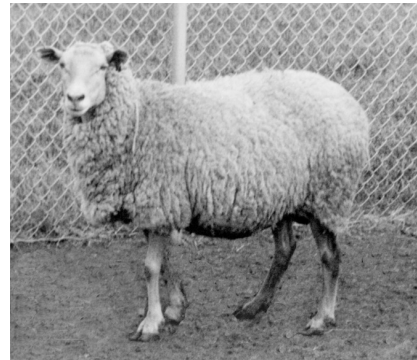


Figure 6. Mature purebred Florida Native ewe

The resistance values of Florida Native and Suffolk in this trial suggest that parasitic resistance may be improved through systematic crossbreeding of these two breeds, and other breeds may be able to be crossbred or backcrossed to the Florida Native to improve their resistance.

Albers et al. (1987) concluded that breeding for resistance to *Haemonchus contortus* may have positive effects on the production capacity of Merinos. Large international surpluses of wool and meat as well as dwindling sheep market prices require reduction in production costs. Breeders who choose to reduce costs by breeding sheep with resistance to internal parasites are more likely to see cost savings than those who choose to increase the genetic potential for more wool or meat.

There is a substantial body of evidence that supports the fact that some breeds are naturally more resistant to internal parasites in sheep than other breeds are. For example, Scrivner (1964) showed that Targhee is more resistant than Rambouillet is. Table 1 summarizes this information.

There is evidence that selection for resistance to internal parasites of sheep is feasible. Producers could reduce costs by breeding sheep such as the Florida Native or Florida Native crosses that are resistant to internal parasites

Table 1.

Sheep Breed Comparisons for Resistance to Internal Parasites

Resistant Breed	Comparison Breed	Parasite Species*	Reference
Targhee	Rambouillet	Osp, Nsp	Scrivner (1964)
Scottish Blackface	Finn Dorset	Hc	Altaif & Dargie (1978)
Border Leicester x Merino	Merino	Osp	Donald et al (1982)
Florida Native	Rambouillet	Hc	Jilck & Bradley (1969)
Florida Native	Dorset x Rambouillet	Hc, Tsp	Zajac et al. (1988)
Florida Native	Barbados	Hc	Courtney et al. (1985a)
Florida Native	Suffolk	Hc	Ruvuna & Stephens (1997)
Red Maasai	Merino Corriedale Hampshire	Hc	Preston & Allonby (1978)
Red Maasai	Dorper	Hc	Baker et al. (1994)

* Hc: *Haemonchus contortus*
Tsp: *Trichostrongylus* species

Osp: *Ostertagia (Teladorsagia)* species
Nsp: *Nematodirus* species

(Figures 7 and 8). A possible short-term alternative could be the use of independent culling levels to select for internal parasite resistance traits. A performance recording system that can handle the collection of measurements of internal parasite resistance would be a critical component.



Figure 7. Yearling purebred Florida Native ram

The most important issue producers need to face is the requirement of withholding dewormers from animals so that genetic variation for host resistance can be manifested. How-

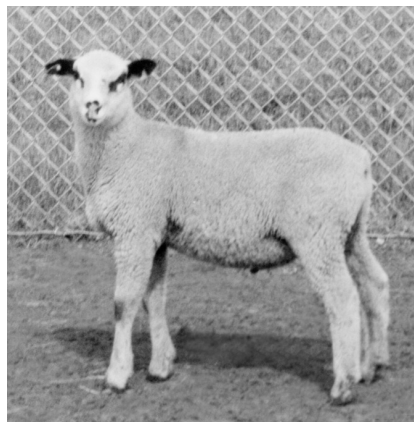


Figure 8. 2-1/2-month-old crossbred ram lamb (Suffolk ram x Florida Native ewe)

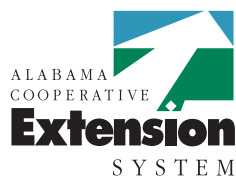
ever, since research has shown that genetic resistance of sheep to internal parasites is not able to develop until 5 months of age (Gray et al; 1992), young lambs (1 to 6 months of age) would need to be dewormed. Moreover, since the natural resistance ewes have decreases when they are pregnant, they should be given a deworming treatment about 2 weeks before lambing. This practice will prevent placing very young

lambs in a dangerous parasite environment resulting from the natural periparturient (prelambing) rise in fecal eggs.

Fecal egg count (FEC) and packed cell volume (PCV) of blood are measurements that can be used as a way to monitor parasite infection in lambs and in ewes just before lambing and during lactation. FEC is both a repeatable and heritable trait and does respond to selection (Baker et al; 1992). Ideally, each time FEC or PCV is measured, a larval culture should be taken to provide an approximate indication of which parasite species are present. Sheep producers may negotiate with a local veterinary practice for the lab work to be done. Most small animal veterinary practices have the necessary equipment and conduct these tests on pets.

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