

Strategies to Control Parasites in Goats

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The 2000 federal census revealed that one tenth of the population of the United States was born in a foreign country. Many immigrants prefer meat from goats. In fact, many immigrant groups prefer fresh meat products rather than frozen meat. This immigrant consumer market explains the strong demand for meat goats. Kentucky is geographically located to capitalize on this market which is concentrated in urban areas of the east coast. Immigrant numbers are also growing in the upper mid-west and in Kentucky with recent increases in Hispanic, middle-eastern and Indian populations.

As a result of a strong and consistent market demand for goat meat, more meat goats are being produced on Kentucky farms and more Kentucky farms are producing goats. As of September 28, 2002, 52 counties have committed county Phase 1 funds to the Goat Diversification Program approved by the Kentucky Agricultural Development Board on August 17, 2001. This program provides cost-share funding for goat breeding stock and small ruminant handling equipment.

Some Kentucky goat producers have experience raising livestock. Others do not. This provides the veterinarian and feed industry professional with several challenges in reaching potential clients who may not have used their services previously. Cattle producers who have added goats to their operations may believe that parasite control for goats is similar to that in cattle. Table 1 lists comparisons that are useful in understanding the differences between parasite control approaches for cattle and goats.

The parasites of economic concern in

goats are somewhat different from cattle. A listing of the major internal and external parasites of goats in Kentucky is provided in Table 2.

Haemonchus occurs every summer as the predominant problem parasite of pastured goats in Kentucky. Anemia, failure to gain, bottlejaw and sudden death are all associated with *Haemonchus* infection. Late summer submissions of dead goats to the Veterinary Diagnostic Center attests to the severity of this problem.

Both *Ostertagia* and *Trichostrongylus* can be considered COOL SEASON PARASITES. Both are present in Kentucky goats during the winter. These parasites are most commonly be associated with diarrhea and poor body condition.

Coccidia the protozoan that causes coccidiosis is universally present where-ever goats are raised. It is important to note that *coccidia* are species specific. *Coccidia* of goats will not infect any other species of livestock or poultry and vice-versa. This is an important practical consideration as many producers have heard of poultry coccidiosis and may think that wild birds contaminate feed sources with *coccidia*. Goats, both young and adult appear to be very susceptible to *coccidia* (Georgi's *Parasitology for Veterinarians*, seventh edition – Dwight Bowman). Coccidiosis is best described as a disease of confined animals. Both decoquinate (Deccox) and monensin (Rumensin) are approved for use in goats for the prevention of coccidiosis. These feed additives should be routinely added to all goat feeds to prevent coccidiosis. Whipworms (*Trichuris*) are a problem of confined/semi-

confined goats. Whipworm eggs survive for up to 10 years in a dirt environments. Relatively little is published about whipworm infection in goats. However, in swine, and dogs whipworm infections are known to reduce appetite and damage the lining of the large intestine.

Miningal worm (*Parelaphostrongylus tenuis*) has been found to be a problem in Kentucky. Goats may become infected when they graze poorly drained areas frequented by whitetail deer and consume snails containing the infective larvae. The larvae penetrate the central nervous system and migrate through the spinal cord. In our region, goats become infected during summer grazing and may show signs of paralysis, or a swaying gait in the fall (*Meat Goats Their History, Management and Diseases* – Stephanie Mitcham and Allison Mitcham).

Lice are included in Table 2 because they are visible. In comparison with the other parasites listed, lice are of minor economic concern.

Anthelmintic Resistance

Anthelmintic resistance is a major and widespread problem worldwide, complicating successful worm control in goats. Resistance in goats has been reported for most classes of anthelmintics. Anthelmintic resistance is a genetic phenomena. Resistance varies from farm to farm based on anthelmintic used, frequency of use, pasture stocking rates, use of closed herd, use of bio-security, etc. A product that works on farm A, B, and C may not be effective on farm D for reasons stated above.

Whenever possible anthelmintic resistance should be avoided or delayed. Once a resistant population of worms develops on a farm, regression to a none – resistant worm population many take years and may not be

possible without abandoning pastures and/or repopulating.

Several practical steps can be taken to reduce/delay the development of worm resistance.

- Determine the body weight prior to deworming. Weigh tapes can be very accurate for this purpose. Boer meat goats often weigh more than estimated from visual appraisal.
- Use correct dosage. Make sure dosing equipment is accurate. Underdosing is known to trigger anthelmintic resistance.
- Use dewormers sparingly and preventively.
- Keep stocking rates low.
- Rotate herd if possible to different sites and/or different pastures, periodically. This move can help break the worm life cycle and prevent re-infections
- Test flock using FERCT test if product failure occurs and/or if resistance is suspected.

Fecal Egg Count Reduction Test (Fecrt)

The World Association for the Advancement of Veterinary Parasitology has adopted the Fecal Egg Count Reduction test as the authoritative test for anthelmintic resistance.

The FERCT test is both practical and inexpensive. It's purpose is to evaluate an anthelmintic to determine if it is actually effective against worms found on a specific farm.

- Collect fecal samples at time of deworming.
- Collect fecal samples 7-10 days later.
- Count worm egg count before and after deworming.
- Less than a 90 % reduction in number of worm eggs shows the deworming treatment was **NOT EFFECTIVE**.
- If less than a 90 % reduction occurred

review deworming program. Consider changing to a different chemical class.

According to Dr Tom Craig, Veterinary Parasitologist at Texas A&M, anthelmintic resistance is a major and widespread problem of Texas meat goat farms. Kentucky veterinarians and feed industry professionals should consider that large numbers of meat goats are currently being imported into Kentucky from Texas and other states. The importation of strains of *Haemonchus* and other nematodes that are resistant to one or several classes of anthelmintics has occurred and is continuing to occur in Kentucky. Loss of valuable goats occurs each year as a result of undetected worm resistance and delays in problem recognition and diagnosis. Parasite control recommendations for purchased goats are described below. This program is designed to prevent the introduction of new, possibly drug resistant strains of gastro-intestinal nematodes. (Kentucky Agricultural Development Board, Goat Diversification Program. August 17, 2001).

Step 1) Deworm with two products of different chemical classes upon arrival.

Step 2) Collect fecal samples 7-10 days later for worm egg count analysis.

Zero worm egg counts post-treatment indicate that good control exists in the purchased animals and that new worm introductions have been minimized. This program is being successfully used in Kentucky and elsewhere.

When resistance occurs it occurs to all products in the chemical class. Thus care must be taken when changing products. Rotate to a different class, not just to a different trade name. Producers often rotate to a different trade name when they suspect a worm

resistance problem and ASSUME they are now using a product that is effective.

To date, two anthelmintics have been approved for use in goats. Panacur is approved for meat goats with an eight day withdrawal time. Rumatel is approved for lactating goats with a zero withdrawal time for milk and a 14 day withdrawal time for slaughter purposes. Cattle dewormers are popularly used in goats. However, cattle products have not been extensively evaluated for safety and efficacy in goats. In addition, goats metabolize drugs in a manner that is different from that of cattle.

Since we have only four classes of dewormers available to us we should seek to conserve these valuable products and not abuse them. This is why SLOW rotation is NOW being recommended by parasitologists and veterinarians.

Strains of worms that have developed resistance to several different classes of dewormers exist (multiple drug resistance). Anthelmintic control strategies are threatened by the increasing prevalence of multiple drug-resistant parasites. (Kaplan and Ware, 2001 "Proceedings of the American Association of Veterinary Parasitologists", abstract # 84). Strains that are resistant to two or more dewormer classes can be successfully treated with a product from a third class. Therefore it is important to detect multiple-resistant strains if suspected.

Host Resistance

Host resistance to nematode infection is known to be transferred genetically. In fact, in sheep and cattle the heritability of resistance to worm infection is estimated to be moderately high (20-30%). Australian and New Zealand sheep producers routinely select breeding stock with host resistance in mind. Some American sheep producers are starting

to select for worm resistance. What about goats ?

Goats are browsers not grazers. Practically speaking this means that goats have spent millions of years evolving as brush eaters not grazers. Goats prefer browse but will eat grass when they run out of browse. This means that goats evolved AVOIDING worm infections because they were browsing up high instead of grazing down low where the worm larvae exist (bottom few inches of the grass blades). As a result, goats have few body defenses to protect them from worm infection and are more affected by worm infection than true grazers such as cattle or sheep. Host resistance is known to vary from animal to animal and can be expected to occur in goats. Once goats with host resistance are identified, then these traits can be inserted into commercial goat populations using traditional breeding programs and technology. To date no scientific data supporting “Parasite Resistance” claims of goat breed associations exists (Dr Will Getz personal communication – Fort Valley State University)

Grave/concrete/dirt

Experience, common sense and limited available research indicates that a variety of pasture management practices can help control *Haemonchus*, *Ostertagia*, and *Trichostrongylus* by reducing numbers of infective larvae on pasture. On pasture most species of infective larvae survive for months. During cool wet weather, survival may be 6-8 months; certainly through a winter. During hot dry periods survival times are reduced.

Infective larvae require moisture and shade to survive. Infective larvae do not feed and have limited energy reserves. Each day infective larvae migrate vertically on grass blades. During hot weather energy supplies are used up faster than during cool periods (J.C. Williams, *Epidemiologic Patterns of*

Nematodiasis in Cattle, in *THE Veterinary Clinics of North America – Food Animal Practice*, 1986).

Stocking rates play a major role in determining the numbers of goats a piece of ground can sustain profitably for the long term. The initial stocking rate may differ from the long term rate because the browse (a worm free forage due to its height) is consumed first by goats. Sustainability and effective use of forages are keys to the long term success of the Kentucky Goat Industry. The lower the stocking rates the lower the levels of worm contamination that develop. From personal experience a stocking rate of three adult goats per acre of pasture of cool season pasture is sustainable long term.

Forage height is a factor in parasite control programs for goats. Producers should be encouraged to grow tall forage crops. Johnson grass is an excellent example of a tall forage readily consumed by goats. It is PARASITE SAFE because most of the forage is above the level of the larvae, 2-4 inches above the ground.

Rotation of pasture with crop land is a practical consideration for many producers.

Use of small grain cover crop on tobacco ground provides goats access to PARASITE SAFE PASTURE. Taking a cutting of hay also reduces contamination by allowing sunshine and ultraviolet rays to reach the base of the forage stand where infective larvae reside. The time necessary for re-growth to occur further reduces contamination levels.

Allowing cattle to graze goat pastures reduces levels of goat worm contamination. Cattle benefit from this arrangement because goats remove brush and browse cattle do not normally consume, thereby allowing for less weed competition for grasses and clovers. Goat manure has high value as a fertilizer.

Goats and beef cattle complement each other in terms of forage production. Goats add additional cash flow to beef cattle operations.

Rotational management (moving goats to different pastures with lower levels of worm contamination) can be a useful worm control practice, particularly when pastures are allowed to rest for 60 days during periods of summer heat. This practice is used successfully in the developing countries to avoid losses due to *Haemonchus*.

Once through grazing is a concept that may have merit in some operations. The idea here is to graze a specific paddock only once per grazing season. Research conducted with organic livestock producers indicates that this practice can keep worm egg counts low and prevent serious worm infections (Murphy, B., R. Shepherd, and G. Myers. 2002. Grazing strategy for managing parasites of organic lambs.. Sheepsium, Trandolh, Vermont. Nov. 2,).

An Oklahoma veterinarian once said “ to successfully raise goats in Oklahoma you must raise them on gravel “. This advice has merit for small pure-bred goat breeders in Kentucky. Gravel prevents grass growth thereby creating a parasite safe environment.

Holding pens for valuable young goats allow them to survive and grow without suffering from worm infection.

In summary, every livestock operation has a unique mix of physical resources, management and goals. The information provided should be viewed as tools a combination of which will provide the ingredients for industry professionals to work with goat producers to design farm specific control programs. A mix of management tools and minimum use of anthelmintics to maintain their effectiveness will allow for

long term sustainable goat production.

MININGEAL WORM

Losses among small ruminants have been diagnosed in recent years in Kentucky due to the meningeal worm, *Parelaphostrongylus tenuis*. The pre-patent period is 60-90 days.

Adult worms inhabit the meninges of the surface of the brain of white-tailed deer. The parasite is reported to be non-pathogenic to deer. However, when infective larvae in snails (intermediate host) are consumed by small ruminants, elk and llamas, the infection is often lethal because larvae damage the spinal cord and brain causing severe inflammatory reactions to the central nervous system. In-coordination, paralysis and death typically occur. Presence of white-tailed deer in an ecosystem containing poorly drained areas may severely limit the economic production of goats.

Ivermectin and fenbendazole at routine dose levels are reported to be effective against migrating larval stages of *P. tenuis* but are not effective against adult parasites. Thus, a routine anthelmintic treatment program using these products during the summer when larval transmission occurs can be expected to reduce the severity and prevalence of problems due to meningeal worm infection.

Table 1 - Comparisons Between Cattle and Goats

<u>CATTLE</u>	<u>GOATS</u>
Grazer	Browser/Grazer
One offspring/year	Multiple offspring
9 months gestation	5 months gestation
Food Animal	Food Animal
Numerous FDA approved parasiticides	Few approved
Sub-clinical problem	Clinical Problem
Moderate worm susceptibility	High worm susceptibility
Moderate coccidia susceptibility	High coccidia susceptibility
No anthelmintic resistance	Anthelmintic resistance
2 dewormings/year/cow	4-8 dewormings/year/doe

Table 2. - Parasites of Kentucky Goats

<ol style="list-style-type: none"> 1. Haemonchus 2. Ostertagia 3. Trichostrongylus 4. Coccidia 5. Whipworm 6. Meningeal Worm 7. Lice

Table 3 – Popular Trade Names and Chemical Class

TRADE NAMES	CHEMICAL CLASS
PANACUR*/SAFE-GUARD/VALBAZEN	Benzimidazole
RUMATEL*/TRAMISOL/GOLDEN BLEND	Levamisole
VOMEK/DECTOMAX	Avermectin
CYDECTIN/QUEST	Moxidectin

* Approved and labeled for use in goats

Table 4. – Management and Worm Control for Goats

<u>HELPS Worm Control</u>	<u>HURTS Worm Control</u>
Low Stocking Rate	High Stocking Rate
Mixed Species of Livestock	One Species of Livestock
Tall Forage	Short Forage
Hay Cutting	
Pasture Followed by Crops	Continuous Pasture
Once Through Grazing (only graze paddock once during grazing season)	Rotational Grazing
Rotational Management*	Continuous Management
Gravel and/or Concrete	

*Rotational management refers to moving goats to different pastures with lower levels of worm contamination.