

Gastro-Intestinal Parasite Survival Kit For Goats

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It is spring and parasite season is here. It is time to start planning for parasite management for 2004. Please note that we purposely stated “management” and not “control”. The days of adding a list of drugs to an instructional paragraph is over. By now, we have seen that dependence on one method of control (De-wormers) is quite ineffective in Kentucky. The Kentucky parasite season starts early in the year and intensifies as available moisture and seasonal temperatures progress. Furthermore, it is safe to say that there is no single element of control that can be effective in this challenge.

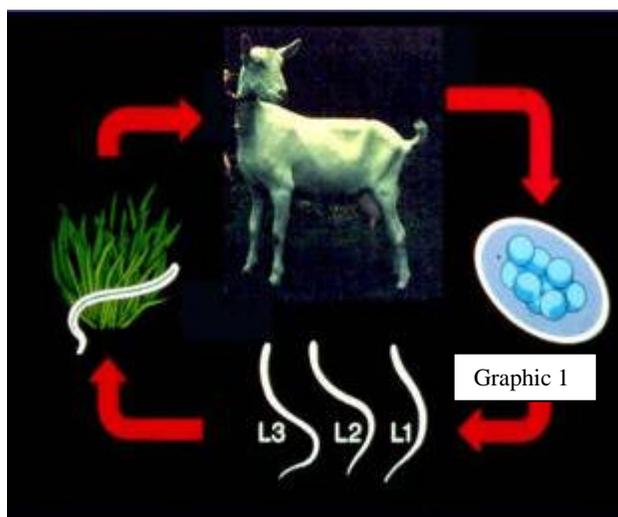
Know Your Opposition

The two parasites of primary concern are *Ostertagia* species (new name *Teladorsagia*) and *Haemonchus contortus*. Both these parasites are in the family of trichostrongylodes. The primary difference between these two types is related to their temperature requirements for growth and development.

Ostertagia is a cool season parasite and is stimulated to produce eggs when temperatures reach the 40s°F. These cool season parasites are known for their ability to survive extreme winter conditions on pasture. In addition, *Ostertagia* can survive as infective larvae for 30 to 90 days during hot dry conditions. Type I infections occur in the spring when

goats graze areas where overwintered infective larvae are present. Type II infections occur when arrested immature larvae located inside the host, mature and begin producing eggs during mid-winter as well as 1 week prior to and 4 weeks post kidding. On the other hand, hot dry conditions that occur in Kentucky during July and August may kill *Ostertagia* larvae on pasture. New infections occur in the fall from parasite eggs produced from adults that emerged from arrested 4th stage larvae. The host ingested these larvae in early summer.

Arrested immature larvae or *hypobiosis* is a cessation of development of the worm within the host. Larvae in the early stages of development (early 4th stage) become metabolically inactive, they no longer feed but remain within the



host in an inactive state until more favorable conditions, occur in the host or environment for their development and the subsequent survival of their offspring.

The *Haemonchus* has a lifecycle similar to *Ostertagia* with the exception of temperature requirement.

Haemonchus is a warm season parasite and is stimulated by increases in the ambient temperature. *Haemonchus* eggs will not germinate at temperatures of 50°F or less. The optimum temperature is 86° – 95°F. The predominant method of overwintering for *Haemonchus* is in the arrested state within the animal. However, it is possible for the parasite to pass through the winter on pasture.

The importance of both these parasites is primary, when they are compared to other parasites of lesser importance who commonly take up residence within goats. The reason for their importance is their reproductive ability. *Haemonchus* females can produce more than 5000 eggs/ female/day and it is not uncommon to have as many as 3 to 4 generations each year. A large number of deaths in goats can be attributed to *Haemonchus* infections each summer. This parasite feeds vigorously in the small intestines of both adult and young goats. High populations of *Haemonchus* can deplete as much as 1/10 of the total blood volume of an infected goat each day. *Haemonchus* is the number one cause of death in goats in Kentucky. Due to the narrow temperature requirements for *Haemonchus*, the majority of infections occur from June through September. *Haemonchus* becomes arrested in the late fall and winter.

General Lifecycle

1. Egg stage: female worms residing within the host goat release eggs. The eggs are encapsulated by the fecal pellet excrement and expelled from the infected host. The eggs germinate within 1 -2 days. The free-living L1 larvae stage readily molts into the L2 or second stage larvae. Both larvae stages feed upon bacteria from within the fecal pellet. The L1 and L2 stages are the larval feeding stages that will store energy that will be utilized by the non-feeding, L3 infective larvae.
2. Larval stage: The latter stage of larval development, the L3 is the only infective stage. The pellet must be moist (soft and pliable) for the L3 to emerge from the pellet. If the pellet dries, and becomes hard, it must become once again moistened by rainfall before emergence can occur. The L3 stage may become arrested under these conditions. The larva has the potential to wait for appropriate moisture and/or temperature before emerging from the fecal pellet. The larvae can live from 1 to 3 months in this condition. Due to the large number of eggs produced each day (5000 x each female), L3 larvae production in the spring is exponential in nature. The initial number of parasites produced in the spring determines the future infectivity of the pasture environment.
3. Infection stage: Once the L3 has emerged, it climbs upon growing grass and waits to be eaten by the host. The L3 is completely encased by the skin of the

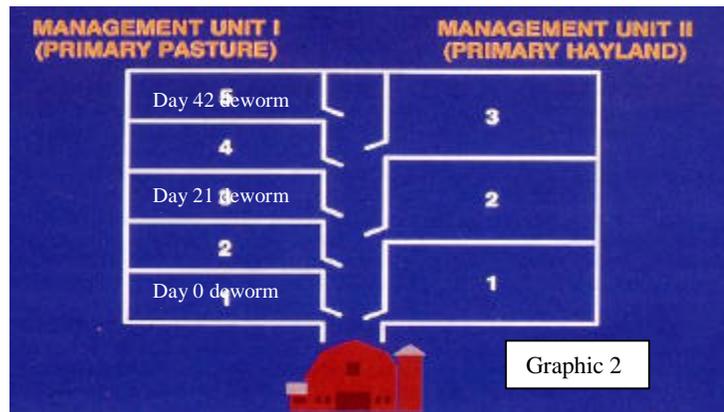
L2 stage and is somewhat resistant to desiccation. However, the L3 cannot feed in this condition and must rely on energy stores from the L1 and L2 feeding stages. The length of survival is directly related to the ambient temperature and the amount of stored energy. At very high temperatures, larvae may only survive for 30 days while with more ideal temperatures 85 – 95°F, (*Haemonchus*) the larvae may survive for up to 90 days in summer and 180 days in fall and winter (*Ostertagia*). Furthermore, survival is enhanced by a slow release of infective larvae from disintegrating fecal pellets. This permits some larvae to persist on pasture as long as 1 year.

4. Sexual reproduction stage: Under ideal environmental conditions, and upon entering into the host, the L3 will molt into the 4th stage larvae followed by a 5th molt into an adult. The male and female copulate and the female produces eggs in abundance. Egg production occurs in 14 to 20 days following ingestion of L3 larvae. If conditions are not favorable, the L4 can become arrested and wait for more favorable conditions. Factors that stimulate the molt from L4 into adulthood are greening of grass, temperature moderation, rain following a drought and increases of estrogen levels within the host at kidding.

Managing the Parasite Population Reduce-Avoid-Rotate-Educate

- ? **Reduce** parasite dewormer resistance on KY farms
 - o Quarantine all new additions to the herd
 - o Deworm on arrival with a dewormer containing 2 class of anthelmintic
 - o Conduct a fecal egg count before and after deworming and look for at least a 95% reduction in egg count and, if egg reduction is less than 95%, change dewormer(s)
- ? **Reduce** parasite worm eggs on pastures
 - o Keep worm eggs off pastures
 - o Infective L3 stage larvae develops exponentially in the spring (Graphic 1)
 - o Deworm before going on pasture and every 3rd week, 3 consecutive times (Graphic 2)
 - o Deworm prior to breeding
 - o Deworm 2 weeks before or within 1 week after kidding
 - o Avoid total herd deworming when it is not necessary; deworm those animals having high egg counts or pale membrane color of the lower eyelids. (100 or more eggs/gram of feces for the direct count method)
 - o Observe goats at least monthly during parasite infection season and identify chronic parasite carriers by the pale-pink to gray color of the membrane of the lower eyelids. Slowly eliminate these animals from the herd and develop more genetic resistance within the herd.
 - o Use fecal egg counts to confirm membrane color diagnosis
 - o Dry lot goats for 48 hours during deworming

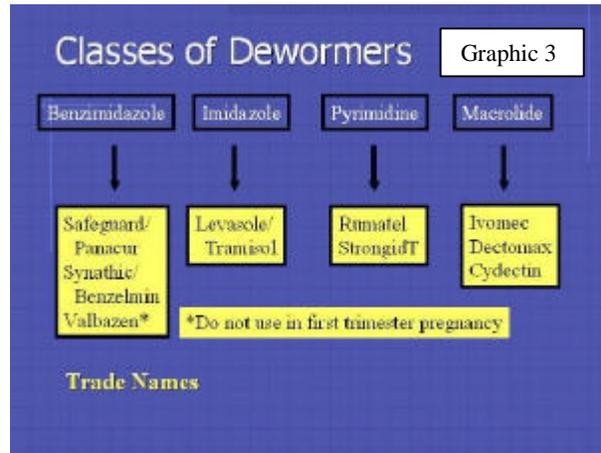
- ☞ Fast goats for the first 12-24 hours
 - ☞ Deworm and maintain in dry lot for 8-12 hours (this process keeps eggs off pasture and increases contact time between parasite and dewormer)
 - Deworm all goats 3 weeks after a rain event following a period of dry weather (See lifecycle).
- ? **Rotate** pastures for optimum production, intake and parasite avoidance.
 - Subdivide large fields into small fields, graze goats for 7 to 14 days and move forward, away from fecal matter and parasite eggs (Diagram 2).
 - Do not regraze these fields again for 90 days in the summer or 180 days in the fall and winter unless there is a hay making operation or co-grazers, such as cows, steers, and horses cleaning up the pasture behind the goats (See comments in lifecycle):
 - ☞ Steers, horses or cows need to graze the regrowth down to 2 inches behind grazing goats
 - Avoid grazing goats close to the ground
 - Take advantage of the high quality growth of the cool season pastures April 15 – July 1. July through September is the peak *Haemonchus* season, move goats off perennial pasture.
 - July 1 move goats to browse areas facilitating consuming plant material above parasite infection level
 - Or onto perennial pastures such as alfalfa, lespedeza or upright warm season grasses
 - Or summer annuals such as sorghum sudangrass, soybean, or millet
 - Graze these areas for 60 to 90 days before returning to the perennial pasture
 - Apply 50 lbs N on perennial cool season pasture in August
 - Bring goats back to perennial cool season pasture in October – December.
- ? **Educated** goat farmers are informed and skilled
 - In order to prevent build up of a dewormer resistant parasite population, treatments must be based on knowledge of parasite infection level
 - Goat producers must learn to do fecal egg counts
 - Or obtain training in FAMACHA, a method of assessing anemia in goats which can be related to the need for deworming
 - Indiscriminant or scheduled deworming is a prescription for disaster



Graphic 2

- Use a deworming product for 1 year or until it stops working. Frequent rotations have resulted in multiple resistance among the parasite population for a number of dewormers

- Use the fecal egg count (FEC) reduction test for determination of parasite resistance to a drug. (Obtain a FEC, deworm the animals and obtain a second FEC sample in 10 days. There should be a 95% reduction in egg numbers per gram of feces. If not, there is possibility of resistance occurring on your farm.



- Avoid terminal use of Cydectin due to the fact that it is affective and may soon be the only effective product remaining on the market

? Anthelmintic product use

- Rates are 2 times the cow dosage per unit body weight for all products except Lavisol at 1.5 times the cow rate.
- Progression of off label use:
 - ✍ Off label use must be overseen by your veterinarian Progression of use:
 - ✍ 1st Sheep products,
 - ✍ 2nd cattle products and
 - ✍ 3rd horse products
- All dewormers should be administered by mouth only
- Make dewomer treatments based on the heaviest animal within an animal class