TECHNICAL BULLETIN

The Control of Gastro-Intestinal Nematode Parasites of Hoofed Wildlife in North America

By Donald H. Bliss, Ph.D.
MidAmerica Ag Research
Verona, WI 53593

Parasitologists have long studied internal parasitic infections in the various hoofed wildlife species and have documented the existence of a wide variety of parasitic organisms. Parasites in hoofed wildlife are especially diverse and abundant. Among wild ruminants, 54 different species of worm parasites have been identified from the abomasum, 28 species from the small intestine and six different species from the large intestine. The major internal parasites of hoofed wildlife are divided into four distinct groups: nematodes (stomach, intestinal and lung-worms), cestodes (tapeworms), trematodes (liver flukes) and protozoa (coccidia and giardia). The gastro-intestinal parasitic nematodes are the primary concern for this discussion.

Parasites are Very Important to Wildlife: Parasites cause a multitude of problems for wildlife and although it often appears that wildlife have adapted to the presence of parasites, they haven't adapted to the adverse effects of parasitism. Parasites have been shown to exist in wildlife both as a clinical and subclinical condition. Clinical parasitism is a condition where parasite numbers have reached a point that the negative effects of parasitism are visible with the naked eye. Animals with stunted horn growth and poor body condition are examples of problems due to clinical parasitism. Subclinical effects are difficult to see and measure (i.e., reduced growth rates, reduced reproductive ability, reduce milk production for the young, and a reduced ability of an infected animal's immune system to fight off other disease conditions).

Research in wild ruminants has demonstrated that high worm burdens reduce forage intake with reduced feed efficiency and growth rates. Gastro-intestinal parasites can also exacerbate the effects of malnutrition and food availability during periods of drought or severe winters. Synergism of food shortage and immuno-suppression by parasites may result in pathogenic infections often resulting in death.

Parasite life cycles: Primarily, gastro-intestinal nematode parasites of hoofed wildlife have a direct life cycle. The adult parasites lives in the gastro-intestinal tract of the animal, which lay eggs that pass out in the feces. At this stage, eggs embryonate into infective larvae, which move onto the vegetation. Animals are re-infected as they graze. To become infective, the larval stage must undergo several molts (L1⇒L2) before developing into an infective (L3) larva. Once infective, these L3 larvae are very mobile. Infective L3 larvae following moisture trails from the fecal pellets onto the vegetation in order to re-infect wildlife. Key transmission time is early morning or late evening when dew is on vegetation and animals are grazing.

Parasite development outside the animals is seasonal. Development of the egg and larvae only takes place when weather conditions are warm and moisture is present. Once the larvae reach infective L3 stage, these organisms can live from one to several years in the environment. The L3 larvae and eggs are fairly weather resistant and can survive relatively severe weather (such as hot dry summers or freezing winter conditions).

Transmission of Parasites: In most parts of the country, parasite development and transmission to the animals take place from early spring to late fall. When conditions are right for vegetation growth, conditions are also right for parasite development. Parasitic larvae that survive winter conditions become active in early spring as temperatures warm. Larvae then move onto vegetation where they are consumed by grazing wildlife. Transmission depends upon parasite contamination of the environment. Transmission occurs around areas where wildlife find water since moisture is important in parasite development and for movement of infective larvae onto the vegetation. Also, creeks, ponds and other watering areas are often where wildlife congregate and, therefore, contamination is at a higher level here compared to wide-open areas.

A dynamic link occurs between animal population density and parasite density. The more concentrated wildlife are in a given area, the greater the chance for increased parasite contamination of the environment. Several studies from Louisiana show that food plots provide increased nutritional input for wildlife but also cause an increase in animal population. Subsequently, parasite contamination of the food plots increase because of increased animal density. Therefore, for food plots to successfully increase nutrition for wildlife, the increase in parasite contamination must be controlled to make sure the value of the plot is not diminished by the increased parasite challenge.

Control of Parasites in the Wild: Millions of dollars are spend every year on deworming products for cattle, sheep, goats, companion animals and pets for the control of parasitism. These animals all benefit greatly through improved health and well being because the dewormers on the market today are both safe and highly efficacious. Controlling parasites in wildlife is much more difficult because of the inability to handle the animals for treatment. Although, zoos, wildlife parks and wildlife held in captivity are routinely dewormed, deworming free-roaming and range wildlife is only in its infancy.

A FDA Approved Dewormer for Hoofed Zoo and Wildlife Animals: One of the most universally used deworming compound in the United States for domestic animals over the past 20 is a highly efficacious product called fenbendazole (SafeGuard®/ Panacur® - Intervet, Inc.). Fenbendazole is now approved as a medicated pellet for hoofed zoo and wildlife animals at the recommended dose of 7.5mg/kg (3.4mg/lb) to be fed over a period of three to five days.

Most important for wildlife, fenbendazole has a FDA safety rating of 100X, which means one animal can consume 100 times the recommended dose with no adverse reaction. This is critical since intake is hard to control when fenbendazole is fed free choice to wildlife. Also fenbendazole is safe for both for the target hoofed wildlife species but also for all other wildlife species such as wild turkeys, squirrels, and rodents that might consume the product incidentally.

Secondly, fenbendazole has a unique characteristic that allows a single dose to be fed over a varying period of time. This is important because it is most often impossible to control or know when wildlife will visit a treatment area. By spreading the dose over a three to five day period, chances are increased that sufficient time will be provided such that a large number of animals can receive their recommended dose. Safe-Guard® containing is the only deworming product on the market with this FDA approved label claim.

Cumulative dose effect is very important for the mass treatment of free-ranging animals or animals consuming product in a free-choice situation. A key to its success is that an individual animal doesn't need to consume its recommended dose all at one time. Animals can come to the treatment area, consume some product, leave and then come back a few days later and consume more product. Once consumed, fenbendazole stays with the parasites until sufficient product is present to destroy the parasites.

Estimating Herd Size & Required Dose: For effective treatment, two things are important to know about the herd. How many animals might frequent the treatment area? And, what is their approximate weight? Weight estimate will vary depending upon the time of the year since the weight of the fawns should be added to the overall approximate herd weight. Since one pound of 0.5% Safe-Guard® will deworm 750 pounds of Wildlife, the formula for calculating amount of Safe-Guard® needed is simple:

1. <u>Estimated number of animals</u> X <u>Average weight</u> = <u>lbs of wildlife to be dewormed.</u>

2. <u>Pounds (lbs) of 0.5% Safe-Guard® needed</u> = <u>lbs wildlife/250 lbs</u>.

Strategic Wildlife Deworming Program™ with Safe-Guard® Successful deworming requires a seasonal program. A single deworming is important to reduce any parasite build-up in the animals; however, animals become re-infected as soon as they begin to graze again. A successful program is one that's designed to reduce the number of parasites in the animal as well as to reduce the parasite contamination in the environment. Recommendations for strategic deworming are as follows:

1. Hoofed wildlife should be dewormed with Safe-Guard® in the winter when they group-up. This maximizes the number of animals within the herds that are treated. Winter deworming removes parasite burdens acquired during the previous summer grazing season and helps winter survivability and maximizes available energy for spring horn growth. Winter deworming also helps reduce parasite contamination of the environment by preventing parasite eggs being passed during the winter and into early spring.

2. To reduce the overall parasite contamination of the environment, two spring dewormings with Safe-Guard® should be given one month apart. This helps to reduce the contamination of parasite eggs in the environment. As animals pick up infective larvae in early spring, they are killed with the first treatment. More larvae are consumed but are killed by the second treatment; Preventing eggs from being shed for two three months in early spring helps to significantly reduce parasite contamination for the entire season.

3. An important Safe-Guard® treatment should be given in late summer or early fall prior to the breeding season. This deworming keeps the immune system strong and provides for a successful breeding season.

Procedure for Parasite Monitoring: A simple and effective way to check parasite control is to conduct a fecal worm egg count analysis. The parasites live in the gastro-intestinal tract and the eggs pass out of the animals in the feces. A simple way to check for parasites or to check whether parasite control has been achieved is to have a fecal worm egg count analysis completed. 1). Using a sealed bag, invert the bag like a glove and pickup several fresh fecal pellets for each bag. 2). Re-invert bag being careful to keep outside of bag clean, seal, writing on the bag the date and location of the sampling. Multiple samples provide more accurate information than a single sample. 3). Samples can be kept for several weeks if refrigerated. Refrigerate before shipping and then ship with a freezer pack or frozen water bottle (no ice! please) to the following address:

MidAmerica Ag Research
3705 Sequoia Trail
Verona, WI 53593
Midamericaagresearch.net

Make sure to include name, address, phone/fax number or e-mail address with a check for $5/each sample sent. Results can be expected within a week of sending samples.