Tools for Managing Internal Parasites in Small Ruminants: Sericea Lespedeza

A Publication of ATTRA - National Sustainable Agriculture Information Service • 1-800-346-9140 • www.attra.ncat.org

By Linda Coffey, Margo Hale, Tom Terrill, Jorge Mosjidis, Jim Miller, and Joan Burke

NCAT/ATTRA and Southern Consortium for Small Ruminant Parasite Control

2007

Goat grazing sericea lespedeza. Photo by Jean-Marie Luginbuhl.

Contents

Introduction 1
Sericea Lespedeza 3
Sericea Lespedeza Results 4
Using Sericea Lespedeza 5
Resources 6
References 6

Introduction

Control of internal parasites, especially of *Haemonchus contortus* (barber pole worm, stomach worm), is a primary concern for the majority of sheep and goat producers. These parasites have become more difficult to manage because of increasing resistance to nearly all available dewormers. A severe infection of barber pole worm causes anemia, bottle jaw, and—if not treated—death of infected sheep and goats.

Mature parasites breed inside the host and "lay eggs," which pass through the host and are shed in the feces. After the eggs pass out of the host, they hatch into larvae. Warm, humid conditions encourage hatching of the eggs and development into infective larvae. The larvae need moisture, such as dew or rain, to break open the fecal pellet and move. They migrate out of the feces and up blades of grass (usually 1 to 3 inches). When an animal (sheep or goat) grazes, they may take in parasite larvae along with the grass blade. Parasite numbers increase over time when conditions are favorable (warm, wet).

Parasites are now developing resistance to anthelmintics (dewormers). Drug resistance is the ability of worms in a population to survive drug (deworming) treatment of the animal at the prescribed dosage. Over-use of dewormers has led to resistance, and many available dewormers are now ineffective.

Ideas and research were generated by the Southern Consortium for Small Ruminant Parasite Control (*www.scsrpc.org*) and funding support for this work was provided by USDA, CSREES, Integrated Organic Program, and Capacity Building Grants Program (Award No. 2005-38814-16429). Mention of trade names or commercial products in this manuscript is solely for the purpose of providing specific information and does not imply recommendation or endorsement by the U.S. Department of Agriculture.

ATTRA—National Sustainable Agriculture Information Service is managed by the National Center for Appropriate Technology (NCAT) and is funded under a grant from the United States Department of Agriculture's Rural Business-Cooperative Service. Visit the NCAT Web site (*www.ncat.org/agri.html*) for more information on our sustainable agriculture projects.

NCAT

Producers can no longer rely on anthelmintics alone to control internal parasites. It is important to use multiple management practices to control internal parasites.

The following are tools that can be used to manage internal parasites. For more information see ATTRA's *Managing Internal Parasites in Sheep and Goats.*

Pasture Management

- Maintain forage height greater than 3 inches (beware of patch grazing)
- Provide areas of browse (brush, shrubs, small trees, etc.)
- Maintain low stocking rate
- Graze sheep and goats with cattle, or in a rotation with cattle or horses
- Provide tannin-rich forages, such as sericea lespedeza
- Harvest hay from pastures
- Avoid wet patches in pasture, such as from a leaky water trough

Selective Deworming

- Use a visual system (FAMACHA©) for classifying animals based on levels of anemia
    - o FAMACHA© is only effective for diagnosing infection by *H. contortus* (barber pole worm)
    - o Treat only animals that are anemic (a sign of parasitism)
    - o Reduces the use of dewormers
    - o Helps slow down drug resistance problems
    - o Saves money

Selecting Resistant Animals

- Several breeds show ***resistance*** to internal parasites (that is, when exposed to parasites, the animal immune system does not allow the parasites to be established in its body). Select a resistant breed if it fits your system.
- Select individual animals that demonstrate resistance to parasites
- ***Resilient*** animals can host a parasite burden and not be negatively affected by the parasites (don't show signs of parasitism, and they remain productive); however, they may be shedding high numbers of parasite eggs and causing illness in other animals.
- Cull animals that are most susceptible to parasites and those that contribute most to pasture contamination.

Alternative Treatments

- Copper Oxide Wire Particles (COWP) boluses
- Garlic and other botanical materials and formulations (being tested)
- Nematode-trapping fungus (not commercially available yet)
- Condensed-tannin (CT)-containing supplements (such as sericea hay)

Condensed tannins and, in particular, the high-CT forage sericea lespedeza are discussed in this paper. An overview of current research on the topic, as well as additional resources and references, are provided. Producers can use this information to keep their animals healthier.

Tannins

- Tannins are plant compounds that bind to proteins and other molecules.
- Tannin is related to "tanning", as in preserving hides, and tannins are found in many plants.
- There are two main types of tannins; hydrolyzable (HT), some of which may have toxic effects on animals, and condensed tannins (CT), which are found in forage legumes (including sericea lespedeza) and other plants.
- Effects of tannins vary depending on type of tannin, concentration, and on the animal consuming the tannins.

- Negative effects may include reduced intake and reduced digestibility, leading to a decline in animal productivity. Negative effects are seen more often when CT concentration is high (above 55 g CT/kg DM in the forage). (Min et al., 2003)
- Positive effects may include an increase in by-pass protein (causing the animal to use protein more efficiently), a reduction in bloating, increased milk production, and a reduction in internal parasite numbers, egg output, and hatchability.

For more information on tannins, see the references listed at the end of this publication and the Resources section, especially <*www.ansci.cornell.edu/plants/toxicagents/ tannin*>.

According to Min et al. (2003), low concentrations of CT (20-45 g CT/kg DM) are helpful to animals, while high forage CT concentrations (>55 g CT/kg DM) may have negative effects. Results vary according to CT concentration and structure and the animal that is grazing the forage, however.

Researchers have shown that big trefoil, sulla, sanfoin, and sericea lespedeza are useful in controlling internal parasite infection in sheep and goats. Providing condensed-tannin-containing forages is one way to boost the health of sheep or goats.

Sericea lespedeza is a high-tannin forage that has been scientifically proven to reduce parasite loads in sheep and goats.

Table 1. Condensed tannin (CT) content in different forage species.*
(Adapted from Min and Hart, 2003 and Min et al., 2005).

Forage	CT, g/kg of DM	%DM
Birdsfoot trefoil	48	4.8
Big trefoil	77	7.7
Sanfoin	29	2.9
Sulla	51–84	5.1–8.4
Lucerne (alfalfa)	0.5	.05
Sericea lespedeza	46-152	4.6–15.2
Perennial ryegrass	1.8	0.18
Chicory	3.1	0.31
Crabgrass/tall fescue mixture	3.2	0.32

*The standard used for analysis will affect the results. For these studies, a Quebracho standard was used.

Sericea Lespedeza

Sericea lespedeza is a high-tannin forage (4–15% DM) that has been scientifically proven to reduce parasite loads in sheep and goats. The mechanism of action is not yet known. Researchers believe that the plant tannins may affect parasites either directly or indirectly (or both). Tannins may react directly with adult worms by attaching to their "skin", causing them distress, or indirectly by improving protein nutrition of the goat and boosting the immune system. In addition, tannins appear to reduce the hatching of fecal eggs and development of larvae, perhaps by binding to the larvae. (Min et al., 2005). The tannins could also bind with feed nutrients and possibly prevent bacterial growth in the feces (larva feed on bacteria) and so limit the feed available for larval growth, or in some other way inhibit larvae growth and movement. Adult worms

Goat grazing sericea lespedeza. Photo by Margo Hale.

residing in animals that are grazing sericea lespedeza shed fewer eggs, and the eggs that are produced have reduced hatching ability. However, when animals are moved off sericea lespedeza pastures and on to other forages, egg counts go back up, indicating that mature worms were inhibited but not killed in the short term. As animals are fed with sericea for longer periods of time, research has shown a reduction in mature worms as well (Min et al., 2005, Shaik et al., 2006, Lange et al., 2006). Reducing pasture contamination and animal worm burdens will help sheep and goats to be healthier and more productive.

Things you should know about sericea lespedeza

- Sericea lespedeza is a legume that grows in low fertility and acid soils and was widely planted to rebuild eroded and depleted soils. It is one of the most commonly used species for planting on surface mine spoils, road banks, and other disturbed or eroding areas.
- Sericea is listed as a noxious weed in some states (Colorado and Kansas, at the time of this writing) and may become invasive or weedy in some areas.
- Where sericea is considered a noxious or invasive weed, sheep and goat grazing can help to control the plant while also helping sheep or goat parasite problems. It will not be invasive when grazed and prevented from producing seed.
- Sheep and goats may need time to adjust to grazing sericea if they are not familiar with the forage; however, they will graze it readily once they go through the adjustment period. Cattle will graze sericea if it is not too mature.
- No adjustment period is needed for feeding sericea hay, as it is readily consumed by all classes of livestock.
- Researchers are investigating the performance of animals grazing sericea or being fed sericea hay or supplement.
- Research has shown that sericea is effective against internal parasites when grazed or when fed in dried forms, such as hay or pellets.

Sericea Lespedeza Results

There have been several research trials studying the effects of sericea lespedeza on internal parasites in sheep and goats. The following table summarizes the results. References are included in the last column.

Animals Used	Treatment	Results	Notes
Spanish wether goats, grazing	15 days grazing sericea or rye/crabgrass, switch to other forage 15 days	Fecal egg counts (FEC) reduced (2500 vs. 710 eggs per gram), percentage of eggs developing to larvae reduced (99% vs. 58.2%)	FEC increased after switching to rye/crabgrass; tannins seemed to have short residual effect (Min et al., 2004)
Goats, confined and fed hay	Ground hay–sericea or bermudagrass– 4 week trial, all on bermudagrass hay for 3 weeks following	Reduced fecal egg counts (FEC) for sericea-fed goats (significant in 3rd and 4th weeks of trial)	FEC not significantly different once animals were taken off sericea, but still numerically lower (Shaik et al., 2004

Animals Used	Treatment	Results	Notes
Goats, confined and fed hay (75% of diet) and grain (25%)	Ground sericea (0, 25, 50, 75%) and/or bermudagrass (75, 50, 25, 0%) in combinations equaling 75% hay; levels testing dose of SL needed, 6 weeks	FEC reduced for those fed SL at all levels, greater reduction as % SL increases and with time; at 6 weeks, 75% SL hay, 91.9% reduction	Optimum level of SL hay appeared to be 50-75% of total diet (Dykes et al., 2006), but 25% was also beneficial, reducing number of adult barber pole worms in the stomach by 58% (unpublished data)
Goats, confined and fed hay and grain	Sericea hay or bermudagrass hay, 7 weeks	FEC reduced, number of adult worms reduced, hatchability of eggs into L-3 larvae reduced in goats fed sericea hay	Egg counts dropped by about 80% one week after sericea feeding started; reduction increased to almost 90% by end of trial. Both abomasal and small intestinal worms reduced and female worms reduced more than male worms. Male and female *H. contortus* were reduced by 61 and 76%, respectively (Shaik et al., 2006)
Lambs, fed hay; natural and experimental *Haemonchus contortus* infections	Sericea hay or bermudagrass hay, 7 weeks, bermudagrass an additional 2 weeks	FEC reduced for those receiving sericea (67-98%); FEC increased after sericea feeding stopped. Sericea also reduced worm numbers.	SL fed as hay reduced naturally infected worm burdens 67%; reduced establishment of incoming larvae 26%. (Lange et al., 2006)
Angora does, grazing	Sericea or crabgrass/tall fescue grazing, 81 days	Goats on sericea had reduced FEC and fewer adult worms. Inhibited larval activity. Improved weight gain and immune responses. No adverse effect on does and kids (3.6 kg/kid).	Goats grazing sericea reduced both *H. contortus* (89%) and *Trichostrongylus* parasites (50%). (Min et al., 2005)
Kiko-Spanish kids fed ground hay and pellets; natural infection	Sericea hay in ground and pelleted forms, ground bermudagrass hay	Pelleted sericea reduced FEC 78%; increased PCV 32% compared with bermudagrass	Pelleting increased effectiveness of sericea hay against parasitic worms; reduced adult *H. contortus* 75% (Terrill et al., 2007)

Using Sericea Lespedeza

Producers should not rely on sericea as the sole method for controlling internal parasites. However, sericea can be useful as one part of a complete parasite management strategy. Sericea has been shown to reduce hatchability and fecundity (egg laying ability) of internal parasites, and in that way it will help reduce pasture contamination with larvae. Also, when used for longer periods of time, it can reduce the number of adult worms. Researchers are working to determine the most effective and economical ways to use sericea lespedeza as a substitute for anthelmintics, or as a "deworming pasture." More information will be available as the research is done. Continue to check the Southern Consortium for Small Ruminant Parasite Control Web site at *www.scsrpc.org* for updates.

Resources

Managing Internal Parasites in Sheep and Goats
www.attra.ncat.org/attra-pub/parasitesheep.html
This concise paper includes information gathered from the research of the Southern Consortium for Small Ruminant Parasite Control (see below) and includes helpful information and pictures explaining many of the concepts needed for an integrated parasite control program.

Southern Consortium for Small Ruminant Parasite Control
www.scsrpc.org
The Consortium is a group of researchers and educators who are working on the parasite problem. This site includes publications, upcoming events such as FAMACHA® trainings, contacts for Consortium members, and many other items helpful to producers and educators. This is the place to look for current research results and information about the latest recommendations for sustainable parasite control.

Tannins
www.ansci.cornell.edu/plants/toxicagents/tannin
An interesting look at the properties and uses of tannins.

Sericea Lespedeza
www.aces.edu/dept/forages
Alabama forages site; this includes link to Alabama forages lespedeza page, as well as access to articles and experiment station results from Auburn University. The lespedeza page includes three articles; titles are listed below.

- AU Grazer - A Sericea Lespedeza that Tolerates Heavy Grazing
- Invasive Plant Misconception
- Sericea Lespedeza: A Pasture, Hay, and Conservation Plant

www.ag.auburn.edu/agrn/mosjidis/sericea1lespedeza.htm
This links to the research page; includes the articles above and an article about establishing lespedeza stands. Exploring the buttons on the left will yield information about cultivars and about Auburn research.

www.aces.edu/pubs/docs/A/ANR-1318/ANR-1318.pdf
Sericea Lespedeza: A Pasture, Hay, and Conservation Plant. Extension publication, 4 p. Written by Don Ball and Jorge Mosjidis, this concise paper includes information about establishment, management, varieties, and use for internal parasite control.

http://plants.usda.gov/factsheet/pdf/fs_lecu.pdf
USDA Plant Fact Sheet: Chinese lespedeza. 2 p.

http://plants.usda.gov/java/profile?symbol=LECU
From the USDA Plants database. Lots of information, including a map showing distribution, links to other sites, pictures, taxonomy and other specific information.

References

Dykes, G.S., T.H. Terrill, S.A. Shaik, J.E. Miller, B. Kouakou, G. Kannan, J.M. Burke, R.M. Kaplan, and J.A. Mosjidis. 2006. Effect of sericea lespedeza hay on gastrointestinal nematode infection in goats. In: Proceedings of the 2006 Conference of the American Forage and Grassland Council. March 10-14. San Antonio, Texas. Volume 15. p. 245–249.

Hale, M. 2006. Managing Internal Parasites in Sheep and Goats. ATTRA publication. *www.attra.ncat.org/attra-pub/parasitesheep.html.*

Lange, K.C, D.D. Olcott, J.E. Miller, J.A. Mosjidis, T.H. Terrill, J.M. Burke, and M.T. Kearney. 2006. Effect of sericea lespedeza (*Lespedeza cuneata*) fed as hay, on natural and experimental *Haemonchus contortus* infections in lambs. Veterinary Parasitology 141. p. 273–278.

Min, B.R., and S.P. Hart. 2003. Tannins for suppression of internal parasites. Journal of Animal Science 81 (E. Suppl. 2):E102–E109.

Min, B. R., T.N. Barry, G.T. Attwood, and W.C. McNabb. 2003. The effect of condensed tannins on the nutrition and health of ruminants fed fresh temperate forages: a review. Animal Feed Science and Technology 106. p. 3–19.

Min, B. R., W.E. Pomroy, S.P. Hart, and T. Sahlu. 2004. The effect of short-term consumption of a forage containing condensed tannins on gastro-intestinal nematode parasite infections in grazing wether goats. Small Ruminant Research 51. p. 279–283.

Min, B.R., S.P. Hart, D. Miller, G.M. Tomita, E. Loetz, and T. Sahlu. 2005. The effect of grazing forage containing condensed tannins on gastro-intestinal nematode parasite infection and milk composition in Angora does. Veterinary Parasitology 151. p. 105–113.

Shaik, S.A., T.H. Terrill, J.E. Miller, B. Kouakou, G. Kannan, R.K. Kallu, and J.A. Mosjidis. 2004. Effects of feeding sericea lespedeza hay to goats infected with *Haemonchus contortus*. South African Journal of Animal Science. Volume 34 (Supplement 1). p. 248–250.

Shaik, S.A., T.H. Terrill, J.E. Miller, B. Kouakou, G. Kannan, R.M. Kaplan, J.M. Burke, and J.A. Mosjidis. 2006. Sericea lespedeza hay as a natural deworming agent against gastrointestinal nematode infection in goats. Veterinary Parasitology 139. p. 150–157.

Terrill, T.H., J.A. Mosjidis, D.A. Moore, S.A. Shaik, J.E. Miller, J.M. Burke, J.P. Muir, and R. Wolfe. 2007. Effect of pelleting on efficacy of sericea lespedeza hay as a natural dewormer in goats. Veterinary Parasitology 146, p. 117–122.

Related ATTRA Publications

- Managing Internal Parasites in Sheep and Goats
- Tools for Managing Internal Parasites in Small Ruminants: Copper Wire Particles
- Integrated Parasite Management for Livestock
- Small Ruminant Sustainability Checksheet

Notes:

Tools for Managing Internal Parasites in Small Ruminants: Sericea Lespedeza

By Linda Coffey, Margo Hale, Tom Terrill, Jorge Mosjidis, Jim Miller, and Joan Burke

NCAT/ATTRA and Southern Consortium for Small Ruminant Parasite Control, 2007

This publication is available on the Web at:
www.attra.ncat.org/attra-pub/sericea_lespedeza.html
or *www.attra.ncat.org/attra-pub/PDF/sericea_lespedeza.pdf*

IP316
Slot 315
Version 112007