The Fungus Is Coming

By Susan Schoenian

_Duddingtonia flagrans_ is a naturally-occurring fungus that traps and kills infective worm larvae. When it is consumed by grazing livestock, it reduces pasture infectivity; thereby, lowering fecal egg counts and worm burdens in livestock.

After more than 20 years of study, an animal health company in Australia has commercialized the fungus. It is being sold under the trade name BioWorma®. Another product called Livamol® with BioWorma® is also being marketed.

According to the product label, BioWorma® contains 34.6% fungus (500,000 units/gram). Due to EPA restrictions, its distribution is limited to veterinarians, feed mills, and premixers. Livamol® with BioWorma® is a nutritional supplement that contains 2.2% fungus (30,000 units/gram). It will be available over-the-counter to end users (producers).

It is recommended that BioWorma® be consumed daily by livestock.

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Events Well Attended; Flash Drives Available

All Worms All Day
The Delmarva Small Ruminant Conference All Worms All Day, held December 8, 2018, in Keedysville, Maryland, was attended by approximately 70 people. In addition to providing the most up-to-date information on parasite control to producers, the all-day school provided five hours of continuing education for veterinarians and veterinary technicians.

All topics pertained to internal parasite (worms + coccidia) in small ruminants. All speakers are members of the American Consortium for Small Ruminant Parasite Control (ACSRPC; wormx.info). Some of the presentations from the conference will be recorded and uploaded to the UME Small Ruminant YouTube channel.

Proceedings and materials from the conference are available on a flash drive. To get your flash drive, send your name, address, and $10 check (payable to the University of Maryland) to AWAD Flash Drive, Western Maryland Research & Education Center, 18330 Keedysville Road, Keedysville, MD 21756. For more information, send an email to sschoen@umd.edu.

(Continued on page 3)
WMREC is the acronym for Western Maryland Research & Education Center. It is one of several University of Maryland research and education centers. The first small ruminants were grazed at WMREC in 2004. For 11 years, a meat goat performance test was conducted at the research center. Last year, the center transitioned to sheep research.

The first sheep research project was a comparison of ram, wether, and short-scrotum “rams.” A short-scrotum ram is a ram lamb whose scrotum, but not testicles have been banded. A short-scrotum ram still maintains a source of testosterone (for growth), but lacks the thermoregulation required for spermatogenesis. Short-scrotum “castration” is easier to do and less painful that (full) castration.

In the 2018 study, short-scrotum rams were heavier and gained faster than wether lambs, while wether lambs produced carcasses with more back fat. The short-scrotum rams had similar sexual behavior (libido) as the ram lambs, but were deemed infertile, due to their lack of viable sperm. The testicles of the short-scrotum rams were considerably smaller in size.

The lambs (East Friesian x Lacaune) used in last year’s study were provided by Shepherd’s Manor Creamery (Mike & Colleen Histon), Maryland’s first and only licensed sheep dairy. The Histons will be providing lambs for the 2019 study. The study will be repeated to see if the results are similar.

The 2019 project will start in mid-April. During the study the lambs will graze mixed pastures and be supplemented twice daily with a complete grain ration. They will be handled every few weeks to determine body weights and the need for deworming. Last year, no lambs required deworming. All of the lambs will be slaughtered at the end of the project to obtain carcass data.

Campus lamb
All sixty lambs in last year’s project were purchased by University of Maryland Dining Services and served to students and faculty in the dining halls. Some of the meat (braised leg of lamb) was featured at the university’s Fall Harvest Festival. Dining Services has made a commitment to purchase the 2019 lambs. The 2018 lambs were harvested at Hamzah Slaughterhouse in Williamsport. The 2019 lambs will be harvested by Old Line Meats in Baltimore.

Youth Involvement
Two youth programs will be held in conjunction with the 2019 sheep research program © (Continued on page 4)
Events Well Attended; Flash Drives Available (continued from page 1)

Lambing & Kidding School
Despite threats of wintry weather, the Lambing & Kidding School was held January 19 at the Howard County Fairgrounds in West Friendship, Maryland. All topics in the conference pertained to lambing and kidding. The school featured concurrent programs for adults and youth (11-18). Presentations from the adult program were recorded; videos will be uploaded to the UMD Small Ruminant YouTube channel.

The main speaker was Kevin Pelzer, DVM, from the Virginia-Maryland Regional College of Veterinary Medicine. Other speakers included Dr. Angela Black from the University of Maryland College Park; Dr. Kwame Matthews from Delaware State University, and Maegan Perdue from University of Maryland Extension. The youth program was organized and taught by Chris Anderson and Ashley Travis from University of Maryland Extension. Karen Holloway from the Mill of Bel Air (millbafs.com) was an invited speaker.

The school received financial support from the University of Maryland Beginning Farmer Program (extension.umd.edu/newfarmer). Door prizes were donated by Premier I Supplies (premier1.com), Sterling Technology (sterlingtechnology.com), and Sheepman Supply Company (sheepman.com). Sheepman Supply set up a display during the school.

Proceedings and materials from the school are available on a flash drive. To get your flash drive, send your name, address, and $10 check (payable to the University of Maryland) to LK School Flash Drive, Western Maryland Research & Education Center, 18330 Keedysville Road, Keedysville, MD 21756. For more information, send an email to sschoen@umd.edu.

Change In Labeling of Dewormers

The U.S. Food and Drug Administration has requested that animal drug companies voluntarily revise the product labels for their approved anthelmintics used in livestock (cattle, sheep, goats, poultry and swine) and horses to add information about antiparasitic resistance.

The new labeling information is intended to help end-users, including veterinarians, livestock producers, and animal owners, better understand the proper use of anthelmintics and ways to monitor and slow down the development of antiparasitic resistance at the farm level.

Antiparasitic resistance, specifically nematode resistance to anthelmintics in cattle, small ruminants, and horses, is both a health and welfare issue for U.S. grazing livestock and potentially threatens animal agricultural production.

FDA’s Center for Veterinary Medicine (CVM) is committed to promoting and protecting animal health by ensuring safe and effective drugs are available for animals.

Source: FDA, 12.06.18
The Lambs Are Coming Back (continued from page 2)

WMREC: 4-H Small Ruminant Research Academy and 4-H Entrepreneurship Program.

4-H Small Ruminant Research Academy
The 4-H Small Ruminant Research Academy is open to older 4-H youth between the ages of 15 and 18. In this program, youth will be directly involved with the sheep research program at WMREC. They will conduct their own literature review and form a hypothesis. They will observe and assist in the collection of data. They will put together a scientific poster to be exhibited at the Maryland State Fair. In 2018, three youth participated in the pilot program. The program will be expanded in 2019; enrollment is limited.

4-H Entrepreneurship Program
The 4-H Entrepreneurship Program is new. It is open to youth between the ages of 13 and 18. In this project, youth will develop their own marketable product: finished sheep pelts from the lambs in the research project. They will learn how to write a business and marketing plan and manage finances. The project should generate a profit for each of the youth involved.

Who’s Guarding The Flock?

By Susan Schoenian

Predator management is an integral part of any sheep or goat enterprise. According to USDA statistics, predators, mostly coyotes and domestic dogs, accounted for 30-40% of sheep deaths and 25% of goat deaths in 2015.

There are numerous ways to manage predator risk. Like most problems, a multi-pronged approach is usually necessary. On our mostly smaller Delmarva farms, predator control starts with a good fence. Livestock guardians can add another layer of protection. A good livestock guardian stays with the flock without disrupting it and represents a viable threat to predators.

There are three types of livestock guardian animals: dogs, llamas, and donkeys. There are pros and cons to each and not all make suitable guardians. When choosing a guardian animal, it is important to match the characteristics of the guardian to the farm where it will be used.

Livestock guardian dogs have been used for centuries, mostly in Europe and Asia, to protect livestock. Globally, there are more than 30 livestock guardian breeds. Breeds most common to the US include Great Pyrenees, Akbash, Maremma, Komondor, and Anatolian Shepherd. The Great Pyrenees is the most popular and probably best suited to our small, often “residential” farms, as it is the least aggressive breed.

(Continued on page 5)
One of the advantages to livestock guardian dogs is they can be effective against a variety of predators, including birds of prey. In recent years, larger, more aggressive breeds have been imported to handle larger predators (mostly Out West), such as wolves and bears. However, research has found little differences in behavior between breeds. Conclusion: the individual is more important than the breed. Gender and neutering have also not been found to have an effect on guardian success.

The key to having an effective livestock guardian dog is starting with a puppy that has been raised on a farm with sheep and/or goats. It is important that the pup be bonded to stock at a young age (<16 weeks). Bad behaviors, such as biting, chasing, and wandering, need to be corrected early. Guardian dogs need to be socialized, but they cannot double as the family pet.

Donkeys and llamas can also make effective guardians because they are herding animals that have a natural dislike of canids. They are best suited to smaller flocks and pastures and even terrain. They have numerous advantages over dogs. They are longer-lived and consume similar diets as sheep and/or goats. They don’t dig, bark, or roam.

Size is important when selecting a guardian llama or donkey. Alpacas are generally not big enough for guardian duties. Miniature donkeys are likely to be less effective than standard sized donkeys. Unlike guardian dogs, donkeys and llamas should be deployed singly, to make sure they stay with the flock. Geldings and especially females are preferred to intact males, which may be too aggressive and interfere with breeding.

No guardian animal should be trusted with lambing or kidding, until they have proven themselves to be trustworthy.

The Missouri Department of Conservation has a good publication on livestock guardians. The publication is dated (1996), but the information is still valid. It can be downloaded from http://icwdm.org/PDF%27s/ MOguardanimals1996.pdf.

*This article was originally published in the Delmarva Farmer and Lancaster Farming.*

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**China’s “Mega-Sheep”**

by Susan Schoenian

In November 2018, I was one of several international speakers at a Symposium on Sheep Industry Development in Tianjin, China. While there, I got to visit a couple of really big sheep farms. The seedstock farm I visited had 6,000 ewes (11,000 sheep total) and raised imported terminal sire breeds: Dorper and Australian White. The commercial farm had 20,000 ewes of the native Chinese Hu breed.

The Hu is a fat-tailed sheep with origins in Mongolia. It is known for its outstanding maternal characteristics, including early sexual maturity, aseasonality, and prolificacy. In fact, the FecB gene which is responsible for high ovulation rates and litter sizes in Booroola Merino sheep has been identified in the Hu.

Most people are familiar with the Dorper, a muscular “hair” sheep from South Africa. The Australian White is another composite “hair” breed. Its make-up includes White Dorper, Texel, Poll Dorset, and Van Rooy. The Van Rooy is a South African hair breed (fat-tailed).

(Continued on page 6)
China’s “Mega-Sheep” (Continued from page 5)

The Australian White is called the “Wagyu of the sheep world,” as its meat is considered to have superior eating satisfaction, due to the lower melting point of its intramuscular fat. At least one US farm (in Alabama) is now importing Australian White genetics.

China is the largest producer (by far) and consumer of sheep meat in the world. While the majority of producers (~88%) have fewer than 30 animals, there are great efforts to intensify sheep production in China to meet the growing demand for protein. Per capita consumption of sheep meat is much higher in China than the United States: 3.5 vs. < 0.5 kg (1 kg = 2.2 lbs.). The Chinese do not seem to differentiate between lamb and mutton.

China’s largest sheep farm has 100,000 ewes. Wow! I did not visit it. On these “mega” farms, the sheep are raised in buildings, similar to pigs. They are kept in social groups, except for the few days ewes and lambs spend in “oversized” lambing jugs. Some animals (e.g. rams) have outside lots. In fact, the rams at the seedstock operation were taken out for exercise daily.

Breeds which adapt well to confinement are raised. Lambing is accelerated (every 8 months). Some artificial insemination and embryo transfer is practiced. Detailed records are kept. Electronic ID is used. Lambs are marketed when they are about 4 months of age and weigh about 50 kg live (110 lbs.).

The sheep I saw were healthy, productive, and well-fed. I did not witness any stereotypies (abnormal behaviors due to confinement). While a few sheep had hoof issues, the majority appeared sound. The sheep are fed silage-based diets according to the requirements of each stage of their production cycle. Lambs are fed pelleted diets. Biosecurity was impressive.

Some people may scoff at this kind of production system, calling it “factory farming” (a term I despise). While many producers keep sheep (and goats) confined, these kinds of farms (also in US and Canada) take it to a new level. Some sheep never get to go outside. Though they consume largely forage diets, they do not graze or browse.

Confinement offers many advantages. Sheep are protected from predators, parasites, weather, theft, and inadequate nutrition – all factors which not only erode profit margins, but negatively impact animal health and welfare. In exchange, they do not get to “free range. It’s about trade-offs. Most dairy goats (commercially-raised) are kept in total confinement.

Source: https://www.sheepandgoat.com/chinamegasheep
Using Goats and Sheep to Recycle Christmas Trees

It is common to use sheep and especially goats to “recycle” Christmas trees, but is it safe?

Sheep and especially goats love Christmas trees. They are a source of nutrients. But while many people feed sheep and goats pine needles with no adverse effects, pine needles can be toxic if sufficient quantities are consumed. Pine needles have also caused abortions in cattle, which seem to be more susceptible.

Read what Susan Kerr from Washington State University wrote about feeding Christmas trees to goats (on eXtension) at https://ask.extension.org/questions/159811.

It’s probably okay to feed Christmas trees (without fake snow and tinsel, of course) in moderation to sheep and goats, but to be on the safe side, avoid feeding them to pregnant females.

Other concerns
While some producers may choose to avoid feeding trees that have been sprayed with colorants (to make them look greener or another color), the colorants are not toxic. This seems like a reasonable claim, since it’s not uncommon for cats, dogs, and even kids to consume Christmas trees in the home. If you’re not sure, you can check the Material Safety Data Sheet (MSDS) for the product used.

According to one of the university’s weed specialists, you need not be worried about pesticide residues (on Christmas trees), due to the time of the year and pesticides commonly used in Christmas tree production. Of course, trees that are sprayed with synthetic pesticides would not meet organic standards.

A SARE Study: “Putting Lambs Out to Pasture”

By Andrew Keller
Vista View Farm
Damascus, Maryland

The most common health problem of domestic sheep, particularly pastured young lambs, is internal parasites. These parasites are ingested while grazing. Thus, the idiom “Put Out to Pasture” has multiple meanings for shepherds: (1) to put the sheep out to pasture to graze and/or (2) to dismiss, retire, or use a sheep sparingly. So the question is, can lambs be allowed to graze without “putting them out to pasture”?

With this in mind, two Sustainable Agriculture Research and Education (SARE) projects were conducted to evaluate: using rate of gain to identify lambs that required drenching (deworming), simultaneous use of drenches, maintaining anthelmintic susceptibility, and putting pastured lambs into dry lot after they require deworming (versus keeping them on pasture). Here are a few practical takeaways for you to consider before putting your lambs “out to pasture”.

Lambs need to be identified for drenching.
Even if you use rotational grazing and other best management practices to mitigate parasites, you should have a plan in place to identify and responsibly use anthelmintics should the need arise. Identification of which lambs to drench is critical so that the susceptible lambs receive the care that they need, and so that the parasites in otherwise healthy lambs are not unnecessarily exposed to anthelmintics. Using rate of gain can be a valuable tool for large flocks where analysis of each individual animal may not be practical. To implement this method, producers will first need to know

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their expected rate of gain for both
ram and ewe lambs. In our stud-
ies, lambs that did not gain 60% of
their expected rate of gain over a
two-week period were drenched.
These lambs were also evaluated
with the “gold standard” FAMA-
CHA® method. Other 70% of the
time, these methods were in
agreement.

Lambs need an effective drench-
ing regimen.
There are currently only three
classes of anthelmintic drugs ap-
proved for use in sheep in the
United States. Know in advance
which drench(s) you will use and
how to properly use them. For
example, for weight-based
drenches, you need to have an accurate scale for
your animals. These SARE studies used all three
classes of anthelmintics simultaneously when a
lamb required drenching. The drenches were not
mixed.

Each oral drench was given according to the label
directions independently, but sequentially, on the
same date. Fecal samples were collected from
lambs on the date of treatment, as well as two
weeks later. All lambs treated in this manner had
egg counts of zero eggs per gram at the two-week
collection. This indicated that the combined an-
thelmintic treatment was effective. For lambs return-
ing to pasture, egg counts did increase and they
may have required additional treatment following
repeated exposure to parasites.

Lambs that do not have worms do not need to be,
and should not be, drenched.
While this seems obvious, producers may be tempt-
ed to re-drench a lamb that continues to not meet
an expected rate of gain or appears anemic. In gen-
eral, it took animals at least two weeks to improve
their rates of gain and FAMACHA® scores. In our
studies, the fecal egg count conducted at two-
weeks demonstrated that this slow recovery of
the lambs was not due to additional parasites. Thus,
drenching would not have improved the health of
these lambs. Producers may instead focus on the
meeting the lambs nutritional needs during this
recovery phase.

Lambs without worms put into a dry lot can con-
tinue to be worm “free”. In our 2018 study when a
lamb in the dry lot (after pasture) group required
drenching it was removed from pasture and put into
dry lot (e.g., a barn or run in where the area is
devoid of vegetation). These lambs continued to
have a zero eggs per gram egg count for up to 10
weeks. In addition, when comparing the dry lot
(after pasture) group to the pasture-only group, the
survival rate of treated lambs increased by 40% when
lambs that required treatment were moved into a dry
lot rather than returning them to pasture.

Lambs in a dry lot can be more profitable than
those out on pasture.
Pounds of lamb available for market was higher in
the dry lot (after pasture) group than the pasture-
only group. This was true even though only the
lambs that required drenching were put into the dry
lot. In our 2018 study, 61% of lambs in the dry lot
(after pasture) group were not treated and remained
on pasture the entire growing season. Even with
higher feed costs, the feed per pound of marketable
lamb was reduced from $0.84 to $0.76.

While healthy lambs on pasture are picturesque, the
reality of increased exposure to parasites and higher
rates of mortality is not. The use of barns or other
dry lots should be perceived as a compassionate
means of raising lambs until their systems are better
developed to combat gastrointestinal parasites. For
producers that would like to maintain at least a par-
tial pasture-based operation, these results indicate
that lambs that do not require treatment may still
thrive on pasture. This experience also demonstrat-
ed that it is best to take lambs requiring treatment off
pasture for their well-being, and for the producers’
profitability and psychological wellness. After all,
we don’t put lambs out to pasture for them to go
“out to pasture”. 

Bluefaced Leicester lambs (Image by Andrew Keller)
The 2019 Junior Sheep & Goat Skillathon will be held Sunday, May 5, 9 am to 2 pm, at the Maryland Sheep & Wool Festival. The Festival is always held the first full weekend of May at the Howard County Fairgrounds. It is sponsored by the Maryland Sheep Breeders Association. Parking is free. There is a small entrance fee.

The skillathon is open to any youth between the ages of 8 and 18. Individuals and teams from any county or state may participate. Youth compete according to their ages as of January 1, 2019: junior, 8-10; intermediate, 11-13; and senior, 14-18.

A skillathon tests the youth’s broad knowledge of a topic. At the sheep and goat skillathon, all stations will obviously pertain to sheep and goats. Stations in the past have included breed ID, feed/forage ID, meat ID and/or judging, equipment ID, hay judging, fleece (wool) judging, sheep judging (wool or dual-purpose breed), fiber ID, and a written test. There have also been stations pertaining to animal health (general disease and parasites).

The Maryland Sheep Breeders Association provides ribbons and premiums to the top 10 individuals in each age category. Members of the top three teams in each age category receive festival t-shirts. University of Maryland Extension usually provides additional prizes.

In 2019, there will be a small registration fee to enter the contest. Primarily, this will cover the cost of providing lunch (provided; pizza + sodas).

To register, go to https://2019skillathon.eventbrite.com. For more information, go to https://www.sheepandgoat.com/skillathon or contact Susan Schoenian at sschoen@umd.edu or (301) 432-2767 x343.

A series of online quizzes have been developed to help youth study for the sheep and goat skillathon (www.sheepandgoat.com/online-quizzes). Unfortunately, the quizzes cannot to used on mobile devices.

“Learn by doing”
The product can be top-dressed or incorporated into a feed supplement or mineral product. The label recommends BioWorma® “for use during periods when conditions are conducive to larval development and transmission onto pasture at temperatures above 40°F.” It should be fed to the most worm-susceptible animals: periparturient females and young lambs and kids (especially weanlings). A minimum feeding period of 60 days is recommended (Miller & Burke, ACSRPC).

It is important to emphasize that BioWorma® has NO effect in the animal. Clinically-parasitized animals will still require treatment with effective dewormers. BioWorma® is a feed-through product, intended to reduce pasture contamination. The fungal spores pass through the animals’ digestive systems unaffected. The action is in the manure. After the fungus kill the worm larvae, they die.

BioWorma® is not known to have any detrimental effects on the environment or non-targeted species (earthworms, insects, bacteria, or other fungus). It is safe to feed to animals and does not cause any harmful residues.

BioWorma® has some limitations. It cannot get wet or it loses its activity. It cannot be put into a pellet. Its shelf life is about two years. BioWorma® is only effective against roundworm (nematode) larvae. It has no effect on the life cycles of coccidia, tapeworms, or flukes. It has no effect on larvae that have already emerged on pasture.

BioWorma® is currently being sold in Australia and New Zealand. Its approval in Europe is pending. It was approved last spring in the United States; however, state-by-state approvals are necessary before the product can be marketed. As of December 2018, BioWorma® had been approved in 45 states, including Maryland, Virginia, and Delaware.

The first container load of BioWorma® products left Australia (bound for the US) in mid-December. It is not known when products will be available to veterinarians and producers or how long it will take for BioWorma® to be incorporated into commercial feed and mineral products. Probably, sometime this spring-fall. Stay tuned!

While the cost of BioWorma® and Livamol® with BioWorma® is not yet known, it is expected that product will be costly. Consequently, it will be important to use it strategically and according to the recommendations of the manufacturer and American Consortium for Small Ruminant Parasite Control (ACSRPC).

BioWorma® is not a “silver bullet.” It is simply another tool that producers can use to help control worm parasites in their flocks and herds. All producers will need to do a cost-benefit analysis before deciding if/when to use the product(s).

For more information about BioWorma®, go to www.bioworma.com or visit www.wormx.info.

This article was originally published in the Delmarva Farmer and Lancaster Farming.

Test Your Knowledge:

What is Duddingtonia flagrans?

A naturally-occurring fungus that eats and kills intestinal worm larvae. See page 1
Upcoming Events

**February 8-9, 2019**
Maryland Sheep Shearing School (beginners)
Dale Lehman’s Farm. 8202 Kavanglen Lane,
Fairplay MD
Info: mdsheepshearingschool@gmail.com

**March 7-9, 2019**
Appalachian Grazing Conference
Morgantown Marriott at Waterfront Place Hotel
Morgantown, WV
Info: www.wvagc.com

**May 4-5, 2019**
Maryland Sheep & Wool Festival
Howard County Fairgrounds, West Friendship, MD
Info: www.sheepandwool.org

**May 5, 2019**
Junior Sheep & Goat Skillathon
Howard County Fairgrounds, West Friendship, MD
Info: https://www.sheepandgoat.com/skillathon
Register at https://2019skillathon.eventbrite.com

**June 19, 2019**
Twilight Tour & Tasting
Washington County Ag Center, Boonsboro, MD
Info: Susan Schoenian at sschoen@umd.edu or (301) 432-2767 x343

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More Information On Sheep & Goats Can Be Accessed

http://mdsheepgoat.blogspot.com  https://www.youtube.com/c/MarylandExtensionSmallRuminantProgram
https://www.instagram.com/umesheepgoat/

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