What’s New in Internal Parasite Management

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Fecal Fungus

- There are over 100 species of *Nematophagous* (nematode eating) fungi
- These fungi are normally present in the feces and parasitize the nematodes.
- Most researched species is *Duddingtonia flagrans*
- Research in 6 countries on this fungus
Fecal Fungus

- By feeding moderate levels of fungal spores (10,0000 spores/lb of bodyweight) L3 infective larvae in feces were reduced by 80-90%.
- Problem is fungal spores have to be fed every day.
- Other problem is no source of fungal spores.
- Technology to produce fungal spores is well worked out.
Fecal Fungus

- Great potential, just no source of fungus.
- Would be nice to have a slow delivery capsule in the rumen.
New Class of Dewormer

- Zolvix (monepantel) by Novartix in Australia and New Zealand.
- In the FDA approval process here in the US for 3 years.
- In amino-acetonitrile derivative class.
- Kills almost all worms resistant to current dewormers.
New Class of Dewormer

- Worms can develop resistance to it like other classes of dewormers.
- First new class of dewormer in over 25 years.
- Fairly expensive; Australians have found that using a 3 way combination of old dewormers costs \( \frac{1}{4} \) of using new dewormer.
- The only use of this dewormer should be used for replacing resistant worms with susceptible worms.
Replacement of Worms

- Highly resistant worms can be replaced with worms susceptible to dewormers.
- A few sources of worms such Georgia and South Africa worms are susceptible to all dewormers, only Haemonchus.
- Requires resting of pasture 6 months for most larvae and eggs to die on pasture.
Replacement of Worms

- Requires effective dewormer to clean your animals out of worms.
- Reinfect with 5,000-10,000 infective larvae.
- Will require working with parasitologist in some capacity to source worm larvae and to work on cleaning pastures.
- May be best to rent pasture and graze rented pasture to let larvae die off.
Vaccines

- Have been working toward vaccines for 25 years.
- Have working vaccine, but it takes cutting the gut out of 200 worms and homogenizing them to have enough vaccine for one animal.
- Ten years of genetic engineering to try to produce the antigen have failed.
- A vaccine would also require a booster and last 3-6 months.
Vaccines

- If you have to give 2 injections 3 weeks apart and pay the cost of two doses of vaccine, it is not likely to be any more cost effective than two doses of an effective dewormer.
Tannins

- Tannins are a group of compounds and the tannins of some plants have been found to be effective for controlling worms.
- Several tannin containing plants have been shown effective for controlling worms:
  - Sericea lespedeza, birdsfoot trefoil, sainfoin, Chicory, Panicled tick clover and willow have been shown to be effective against worms.
Tannin Containing Plants

**Sericea lespedeza**
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**Birdsfoot trefoil**
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**Sainfoin**
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Tannins

- We were able to graze Angora goats and their kids (very susceptible to worms) the whole summer without deworming. When grazing sericea lespedeza.

- Some tannins have been shown to be ineffective such as Oak and peanut skins.

- Sericea lespedeza tannins have also been shown to be effective in controlling coccidiosis and reducing methane emission.
Tannins

- Tannins reduce egg output of worms by 50-80% and under some cases gradually kills the worms.
- Tannins reduce the ability of eggs to develop to infective larva by 50-80%.
- Tannins reduce the ability of larva to develop to adult worms in the rumen and reduces infection from infective larva.
We do not know how much of the diet needs to be tannins to be effective.

One study indicated that lambs selected more tannin when they were parasitized than when they were not.

Maybe animals will select an adequate amount of tannins from a mixed pasture.
West Virginia just got a large study funded to investigate the use of birdsfoot trefoil tannins for parasite control.

As part of that study, Tatiana is coordinating a set of field studies to investigate how to best utilize birdsfoot trefoil in the field.

Field studies have great potential to learn how birdsfoot trefoil can be incorporated into grazing systems and control parasites.
Recent research has shown that sericea lespedeza hay is effective for controlling parasites as is Sainfoin.

Some work with making sericea lespedeza pellets for controlling worms looks good.

Pelleted sericea lespedeza may be available next spring.

Recent research indicates that sericea lespedeza is effective against coccidia.
Copper Oxide Wire Particles

- Copper oxide wire particles were developed as a slow release source of copper for sheep on copper deficient soils.
- Observed a reduction in fecal egg counts on a trial.
- Much research shows the efficacy of copper oxide wire particles.
Copper Oxide Wire Particles

- Only effective against Barberpole worm (Haemonchus contortus) and not effective against arrested worms.
- 1-2 g dose for lamb or kid and 2-4 gram dose for doe or ewe.
- Will need to limit to 2 doses/year for sheep depending on copper status. Will likely need to limit to 3-4 doses/year for goat.
Copper Oxide Wire Particles

- Mechanism is unknown.
- Seems to work poorly in animals that are stressed or run down.
- Not effective in just weaned kids or lambs.
- Very effective, killing 75-95% of worms.
- Cornell just got a grant to develop guidelines on the use of Copper Oxide Wire Particles in the Northeast.
Selection of Animals for Resistance to Worms

- Very large study in Australia 10 years ago was very effective in developing a resistant line of sheep. Some studs are now selecting resistant animals. They have ewes grazing pasture for 10 years that have never been dewormed.

- Goats have a weaker immune response to worms because they originated in the desert where there were no worms.
Selection of Animals for Resistance to Worms

- All research on selection of animals for resistance to worms has utilized several fecal egg counts over the season.
- The Katahdin hair sheep organization has a protocol for taking one fecal egg count during the summer on lambs as part of their animal improvement program.
- One of the Kiko organizations is adopting a similar program.
Selection of Animals for Resistance to Worms

- Only about 3 research studies exist on selecting goats for parasite resistance as compared to more than a dozen for sheep, some of them very comprehensive.
- There are $5.00 fecal egg counts available or you can do your own.
- An alternative is to keep track of FAMACHA scores and number of times dewormed.
Selection of Animals for Resistance to Worms

- When using FAMACHA, some individuals will be resistant and others will be resilient, i.e. make blood faster than other animals but have a higher fecal egg count.
- Using FAMACHA for selection will still improve resistance of the herd.
Selection of Animals for Resistance to Worms

- Langston University just received a grant to study the use of a buck/ram test as a tool to select for parasite resistance. There is a field part of the study where does will be selected based on FAMACHA and fecal egg count to increase parasite resistance.

- We will attempt to identify genetic markers so that a blood test could be used to identify resistant animals.
Herbal dewormers

- Some research with herbal dewormers.
- None consistently effective.
- May depend on stimulating immune system which may not be able to respond due to some stress such as worms.
- Most research investigates a single herb.
- There are over 300 plants effective against parasites in literature.
Herbal dewormers

- A large study in Pakistan where they interviewed local bush "doctors" and identified plants used for parasites.
- Tested 30 plant species in vitro and identified 8 with most activity.
- Three of the 8 were effective in animals, and the top two worked very well.
- Need more research, but funding is not available.
Herbal dewormers

- Several plants have anthelmintic activity.
- Lots of hype and little evidence for most herbal dewormers.
- If you use them, back them up with FAMACHA and/or fecal egg counts.
- Great potential for herbal dewormers, but it will not be realized without a great expenditure of research effort.
Conclusion

- Genetic selection and pasture management are the two most effective tools in the near future to control worms.
- Some may have to resort to replacing their resistant worms with susceptible worms.
- Copper oxide wire particles are useful to control resistant worms.
- Fungus and herbs have a lot of development before we have consistently effective product.