



# Alternative Compounds to Commercially Available Anthelmintics to be Used in Sheep and Goats

For the last 6 years, researchers at the UMES Small Ruminant Farm have been studying alternative (natural) compounds to manage infestations of gastrointestinal parasites in sheep and goats. The compounds tested include: high tannin sorghum, papaya seeds, ginger, garlic powder, and pumpkin seeds. So far none of the alternative compounds have shown an effect on parasite burdens in sheep and goats.

## Who cares and why?

- ✓ Helminthosis (worm burdens) is a problem within itself in ALL agro-climatic zones in the world. Most economic losses are due to what is known as “sub-clinical nematodosis,” which is not immediately observed and not even measured by sheep and goat ranchers
- ✓ In addition, anthelmintic resistance is a global problem that threatens the welfare of sheep and goats and represents a challenge in eroding the productivity of small ruminants, thus affecting the survival of the small family farms
- ✓ Anthelmintic resistance is identified when a previously used anthelmintic ceases to kill an exposed worm population at the therapeutically recommended dosage
- ✓ In the United States, all the major groups of the commercially available anthelmintics have been reported to have developed variable degrees of resistance when used to protect small ruminants.
- ✓ Efforts to reduce production losses caused by Gastrointestinal Nematode (GIN) parasitism in small ruminants (sheep and goats) have led to the investigation, development, and implementation of a number of control methods *to complement or replace* commercially available anthelmintics, i.e. *Integrated Parasite Management Practices*

**The Barber Pole Worm:** A blood-sucking parasite that pierces the mucosa of the abomasum (ruminant “stomach”), causing blood plasma and protein loss to the sheep or goats.



## What has the project done so far?

Over two consecutive years, several investigations were conducted to evaluate the effect of ground pumpkin (*Cucurbita sp.*) seeds on *Haemonchus contortus* infections in meat goat kids and lambs. Young kids and lambs, females and castrated males, were used. Following a 2-week adjustment period, the experimental animals were randomly allocated to individual pens with slotted floors and *ad libitum* access to water. Individual feed intake was adjusted up to 4% body weight to minimize orts and recorded daily. The kids and lambs were dewormed with albendazole (Valbazen® 10mg/kg) and Cydectin® (0.2mg/kg). After a 21-day dewormer withdrawal period, all the goat kids and lambs were orally inoculated three times, every other day, with a larval inoculum containing 1,450 *H. contortus* larvae (stage L3). Then, a pelletized commercial 15% crude protein diet was fed as the control feed to selected lambs and kids. The treatment feed was formulated with similar ingredients as the control diet plus 21% pumpkin a seed, calculated to be similar in protein and energy content and it was fed to groups of kids and lambs. To minimize feedstuff selection and sorting, the pumpkin seeds were ground and incorporated into the pelletized mixture. The experimental diets were fed

for 8 consecutive weeks. Weekly, the kids and lambs were weighed, and rectal fecal (FEC) and blood samples (jugular venipuncture) were collected. A modified McMaster Technique was used to determine fecal egg counts (eggs per gram), and hematocrit (% Packed Cell Volume) was determined in whole blood. The SAS statistical package was used to analyze the data. FEC+100 was natural log-transformed to stabilize variance. After 8 weeks of continuous feeding of the experimental diets, overall body weight was similar in the kids and lambs eating the control feed and the treated feed ( $p > 0.05$ ). The mean fecal egg counts were similar ( $p > 0.05$ ) between the control and treated groups of lambs and kids. Also, the values for percent packed cell volume were similar ( $p > 0.05$ ). Ground pumpkin seeds fed at a level of 21% incorporated into a pelletized diet failed to affect *H. contortus* burdens in goat kids expressed as fecal egg counts and hematocrit.

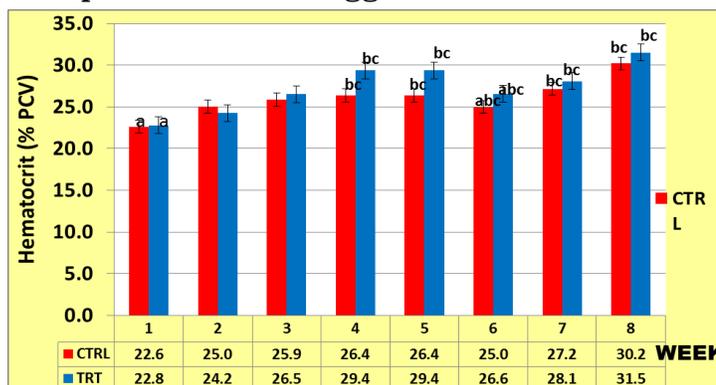


Figure 1. Weekly least square means of Hematocrit (% PCV) of meat goat kids eating CTRL or TRT diets.

Mixed models procedure of SAS software (SAS 9.2)  
Means with different letters differ ( $P < 0.0001$ )

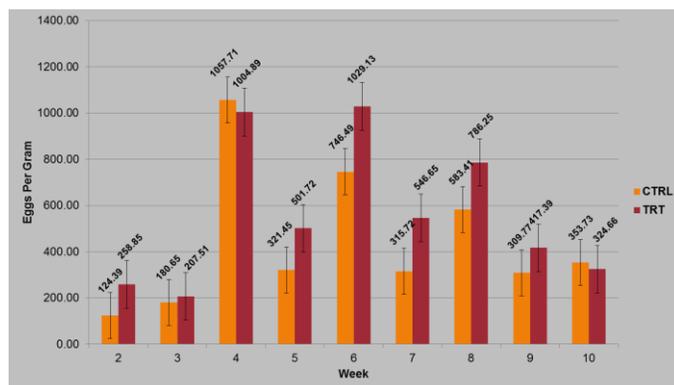


Figure 2. Weekly least square means and standard error of fecal egg counts (EPG) of lambs eating CTRL or TRT diets. (There were no significant differences between the means ( $P < 0.05$ ))

### What future research is needed?

- Taking into account that the list of reports on the use of so called “alternative” anthelmintics for use in sheep and goats is overwhelming, the methods for analysis are ingenious but not standardized.
- Develop accurate and specialized in-vitro protocols because it seems that the compounds tested may reduce larval activity in-vitro; but when tested in-vivo, the results from treated animals are not different than results from the control ones.
- Another underlying situation exists when researchers need to decide between running an in-vitro trial or an in-vivo trial. Both complement each other providing information to better understand the results in the field and to make recommendations.
- One difficulty that is very common is the proper identification of the plants and the parts of the plants used. The plant’s scientific name plus the variety or cultivar should be included in the reports.
- Develop collaborative studies seeking the contribution of
  - chemists,
  - botanists, and
  - animal scientists

In order to identify alternative compounds to control worm burdens in sheep and goats.

### Impact Statements

- The studies conducted at UMES have concurrently indicated that the “natural anthelmintic” is elusive.
- The experience on parasitism gained while conducting multiple trials at UMES has afforded an outreach effort that was carried out by the University of Maryland Extension at UMES, training sheep and goat producers while focusing on integrated parasite management practices. That focus has changed from relying on commercial anthelmintics only.
- UMES scientists, graduate students, and small ruminant specialists have become proficient in designing, implementing and analyzing trials to determine factors affecting fecal egg counts and hematocrit.

### Want to know more? Call or e-mail....

Dr. Enrique Nelson Escobar  
University of Maryland Eastern Shore  
Princess Anne, MD 21853  
Tel. (410) 651-7930  
enesobar@umes.edu

### ACKNOWLEDGMENT

This study was sponsored by USDA/NIFA Evans-Allen grant MDX-AS21.