Title: Cornell Farms Parasite Management SOP

I. PURPOSE:

A. To describe the methods of management and screening for internal parasites in University of Michigan sheep housed at Cornell Farms. This SOP does not take into account breeding, lambing, and weaning activities as these are not currently conducted with University of Michigan animals housed at Cornell Farms.

II. DEFINITIONS:

A. Anthelmintic – A pharmaceutical used to destroy and eliminate intestinal parasites.
B. Anthelmintic resistance – A term used to describe an intestinal parasite which is not 90% cleared following treatment with a specific anthelmintic.
C. FAMACHA – A visual system using the color of the conjunctiva of sheep to assess the need for deworming, via the severity of anemia, to aid in prevention of anthelmintic resistance.
D. McMaster test – A diagnostic method to provide quantification of intestinal parasite eggs in feces, reported as eggs per gram (EPG).

III. RESPONSIBILITY:

A. The Cornell Farms manager is responsible for scheduling and conducting prophylactic anthelmintic administration, collection of parasite screening fecal samples, and daily monitoring for signs of animal parasitism.
B. The ULAM veterinary staff is responsible for submission of fecal samples to the Animal Diagnostic Laboratory (ADL), filing of ADL results, prescription of anthelmintic based on FAMACHA system in clinical cases.

IV. PROCEDURES:

A. Selection of Anthelmintics

1. The following table summarizes the anthelmintic coverage provided by the different classes of anthelmintic drugs:

<table>
<thead>
<tr>
<th>Organism</th>
<th>Life stage</th>
<th>Ivermectin</th>
<th>Albendazole^a</th>
<th>Levamisol^b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemonchus</td>
<td>Adult</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Immature</td>
<td>+</td>
<td>+</td>
<td>+/- (most)</td>
</tr>
<tr>
<td>Ostertagia</td>
<td>Adult</td>
<td>+</td>
<td>+</td>
<td>+/- (some)</td>
</tr>
<tr>
<td></td>
<td>Immature</td>
<td>+</td>
<td>+</td>
<td>+/- (most)</td>
</tr>
</tbody>
</table>
**Trichostrongylus colubriformis**

<table>
<thead>
<tr>
<th>Adult</th>
<th>+</th>
<th>+</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immature</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Lung Worms**

<table>
<thead>
<tr>
<th>+</th>
<th>+</th>
<th>+</th>
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**Tapeworms**

<table>
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<tr>
<th>-</th>
<th>+</th>
<th>-</th>
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</table>

**Nasal Bots**

<table>
<thead>
<tr>
<th>+</th>
<th>+</th>
<th>-</th>
</tr>
</thead>
</table>

*Table adopted from University of Georgia and Ft. Valley College Cooperative Extension*

*Do not administer albendazole to pregnant ewes within the first 45 days of gestation.*

*Levamisol can be toxic if given at greater than 25% of the recommended dose. Contact a veterinarian if clinical signs, such as foaming at the mouth and tremors are observed.*

2. Three classes of anthelmintics, represented by albendazole, ivermectin, and levamisol will be utilized. One anthelmintic will be preferred for deworming and rotated annually. Additionally, based on spectrum variation between annual anthelmintics, as described above, different anthelmintics will be used for the fall and spring dewormings. The following chart outlines the anthelmintic regimen:

<table>
<thead>
<tr>
<th>Year</th>
<th>Preferred Anthelmintic</th>
<th>Fall Deworming (November)</th>
<th>Spring Deworming (April)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Ivermectin</td>
<td>Ivermectin</td>
<td>Albendazole</td>
</tr>
<tr>
<td>2013</td>
<td>Albendazole</td>
<td>Ivermectin/Levamisol</td>
<td>Albendazole</td>
</tr>
<tr>
<td>2014</td>
<td>Levamisol</td>
<td>Levamisol</td>
<td>Albendazole</td>
</tr>
<tr>
<td>2015</td>
<td>Ivermectin</td>
<td>Ivermectin</td>
<td>Albendazole</td>
</tr>
</tbody>
</table>

3. Moxidectin, or combination anthelmintic treatment, will be used to treat resistant populations of parasites and its use will be reserved for treatment of sheep with resistant parasites.

**B. Prophylactic Anthelmintics**

1. New arrivals

   a. All new arrivals will be dewormed with the preferred anthelmintic upon intake into Cornell Farms.

2. Fall & spring deworming

   a. All animals housed at Cornell Farms will be dewormed in November and April with the appropriate anthelmintic as described in the table above.

3. If feasible, keep sheep off feed for 24 hours prior to oral anthelmintic treatment to prolong the presence of the anthelmintic in the digestive tract. Water should be provided *ad libitum*.

**C. Fecal Examinations**

1. Monthly examinations will be performed on feces randomly collected from 20% of the herd population. The animal identification numbers should be recorded for reference, if possible.
a. The ULAM veterinary staff is responsible for filing electronic copies of fecal examination results from the Animal Diagnostic Laboratory (ADL) on the ULAM Bluestorage Drive:
W:\ULAM_General-Veterin\Sheep Farms\Cornell Farms\Fecal Results

2. The McMaster test will be utilized for quantification of parasite burden.
   a. Nematodes >1000 EPG will be used to indicate additional clinical assessment is needed.
      i. Clinical assessment of the individual animal and/or herd will utilize the FAMACHA system to assess the severity of anemia. Housing environment and additional clinical signs of parasitism, such as poor growth, poor wool quality, ill-thrift, diarrhea, inappetance, or edema (‘bottle jaw’) will be used to determine when anthelmintic treatment is necessary.
         • FAMACHA system – The FAMACHA scoring card is used to assess the color of the conjunctiva, and therefore potential anemia, of the sheep. A FAMACHA score of 3 or above indicates the need for anthelmintic treatment.
   b. If treatment is prescribed, a follow-up McMaster test will be completed 10-14 days post-anthelmintic treatment. Less than a 90% reduction in parasite load following anthelmintic treatment will be deemed as resistance.
      ii. Moxidectin or combination anthelmintic treatment will be administered to animals in need of deworming with resistant parasites.

D. Coccidiosis

1. Coccidiosis will be diagnosed in sheep having >2000 coccidia per gram of feces with the presence of diarrhea.

2. Options for coccidiosis treatment include sulfonamide, sulfaquinoxaline, or amprolium for a period of five days.

3. A coccidiostat, such as monensin, lasalocid, or decoquinate, can be used regularly to reduce coccidia contamination of the environment.
**Recommended Anthelmintic Doses**

*Always refer to the product label prior to administration of the anthelmintic*

**Albendazole (Valbazen)** - drench; 7.5 mg per 1 kg of body weight
NOTE: Do not administer Albendazole to pregnant ewes within the first 45 days of gestation as the drug is known to be a teratogen during this stage of gestation.

**Moxidectin (Cydectin) (5mg/ml)** - Dosage: 5 ml per 110 lbs (1 ml per 22 lbs) body wt orally.

**Ivermectin (Ivomec)** - 3ml/26 lbs when given by drench; 1cc/110# (200ug/kg) when administered by SQ injection.

**Levamisol (Tramisol)** - drench; mix 544.5 g bottle in 3 liters of drinking water and administer as single drench at 1 ml (0.365 g)/50 lb body weight.

**Sulfonamide/Sulfadimethoxine (Albon)** - Day 1- drench; 25 mg/lb (55mg/kg)
Days 2 to 5- drench; 12.5 mg/lb (27 mg/kg)

**Sulfaquinoxaline** - 20% solution; Mix in drinking water to final concentration of 0.015%

**Amprolium (Corid)** - 1.25% crumble, 9.6% solution, or 20% soluble powder; 50mg/kg

**Monensin (Rumensin)** - feed additive; 1 mg/kg

**Lasalocid** - feed additive; 1 mg/kg for 6 weeks

**Decoquinate** - feed additive; .5 mg/kg for 28 days

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**On-line References**

Maryland’s Small Ruminant Page: [www.sheepandgoat.com](http://www.sheepandgoat.com)
   Medicine Cabinet for Sheep and Goat Producers
   [Coccidiosis in lambs - Michigan State University](http://www.scsrpc.org)

University of Nebraska-Lincoln: [www.ianr.unl.edu](http://www.ianr.unl.edu)
   Cooperative Extension

Government of Alberta: [www.agric.gov.ab.ca](http://www.agric.gov.ab.ca) (Dr. Des Hennessy, CSIRO Animal Production Center)

Southern Consortium for Small Ruminant Parasite Control: [http://www.scsrpc.org](http://www.scsrpc.org)