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Project Update from Cornell University/Cooperative Extension Research Team

The Effect of Birdsfoot Trefoil Forage on Barber Pole Worm in Sheep and Goats in Northern NY

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One of the most devastating parasites for sheep farmers in northern New York is Haemonchus contortus (Barber pole worm), a blood-sucking parasite that lodges in the abomasums of the host animal. It reproduces very quickly, laying 5,000-10,000 eggs per worm per day. Each worm can drink approximately 0.05ml of blood daily, causing severe anemia. This parasite can overwhelm and kill a host lamb or goat kid in as little as four weeks.

Chemical dewormers have traditionally been used to kill these parasites, but rising occurrences of dewormer resistance have prompted researchers and farmers to look for other means of protecting their flock. Forage-based parasite control has started to emerge as a promising new field in parasite management. Studies in warmer regions of the U.S. have determined that round worm infections (including barber pole worm) are reduced in sheep and goats grazing the forage *Sericea lespedeza* (Lespedeza) for four weeks or more. This reduction in infection is attributed to the condensed tannins in Lespedeza.

However, Lespedeza does not winter well in northeast climates. Therefore, our study was set up to test the effect of Birdsfoot Trefoil (*Lotus corniculatus*, BFT), a legume forage containing condensed tannins that grows well in the Northeast U.S., on round worm infection in grazing lambs in Northern New York.

Lambs were split into three groups at weaning (at around 90 days) for an eight-week grazing study. One group of 16 lambs was placed on a "parasite-free" mature BFT pasture. Another group of 16 lambs were placed on a "parasite-free" new conventional pasture (CVP). Both pastures had been established on tilled land in 2014. Neither pasture had been grazed by livestock earlier in 2015 because our objective was to determine whether grazing uninfected BFT could help reduce worm loads in lambs as compared to grazing clean CVP pastures.

Figure 1: Study lamb grazing BFT pasture at Extension Learning Farm, Canton, NY. Photo: Conor McCabe

We were unable to mow either pasture before grazing in July due to the weather. Thus both the BFT and CVP pastures were quite mature at the beginning of the grazing trial. When the lambs were first put on the BFT

** tatiana is spelled with lower case t*

pastures, the forage was fairly mature and "matt like" although it contained an abundance of leafy material. The percentage of BFT in the total dry matter biomass of the BFT pastures ranged from 42.8 to 57.5% throughout the grazing trial.

It took the lambs a couple hours to adjust to this new forage. The seeding of CVP pasture was a grass and clover mix with an appreciable amount of ragweed and thistles. Both groups were moved approximately every five days depending on the forage remaining. The size of the grazing paddocks varied and was determined by how much forage appeared needed to comfortably feed the lambs in each group for 5 days. Although the goal was to not back graze we ended up re-grazing an area near the water in the BFT pasture at the end of the study as well as a small alley of the conventional pasture that led to the water source.

A third group of 60 lambs was housed in a barn and kept off all pasture after weaning. Instead these lambs were fed second cut grass-hay ad lib (13.5% crude protein, 64% total digestible nutrients on dry matter basis) and approximately one pound/head/day of concentrate feed (15.4% CP, 77%TDN as dm). Eight representative lambs from this group were selected and sampled throughout the study. Each group had access to water and minerals.

Half of the lambs in each pasture group and the entire hay/grain group also received a one-gram bolus of copper oxide wire particles (COWP) orally two weeks prior to weaning to evaluate its effect on Barber pole worm infections in lambs on different nutritional diets.

All study lambs were weighed two weeks before weaning, at weaning (July 22) and on the last

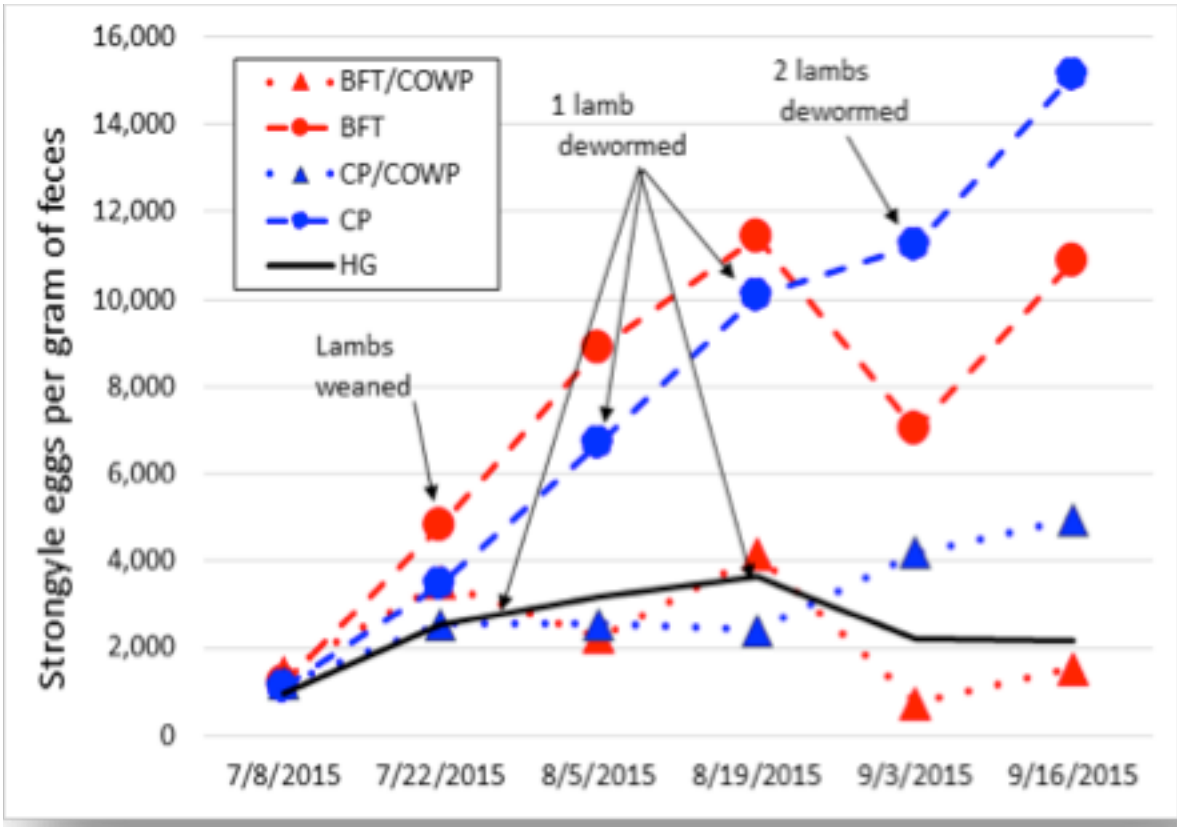

Figure 2: Round worm egg count by treatment

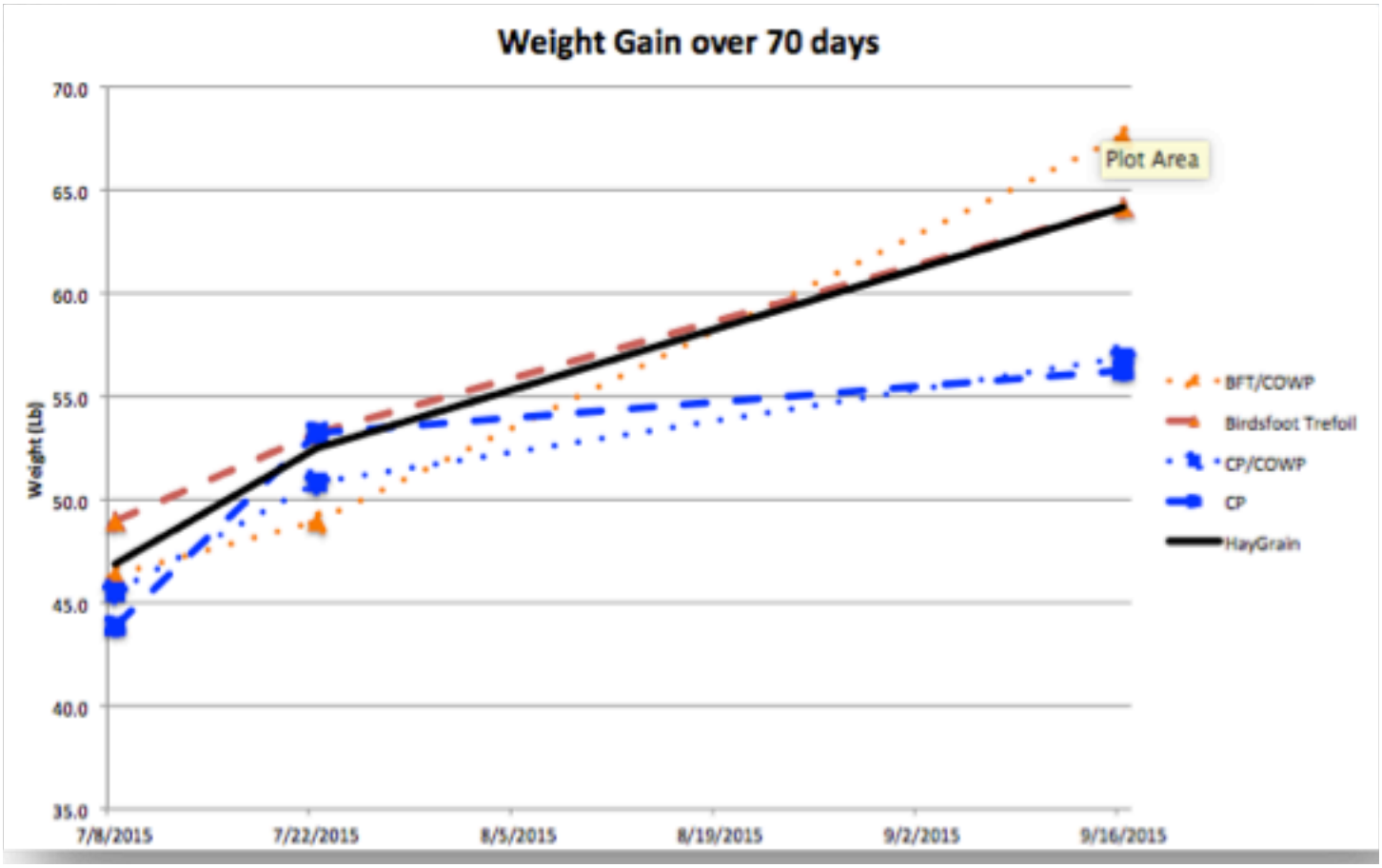

Figure 3: Weight gain over 70 days by treatment. Weaning ocurred on day 14.

day of the 8-week grazing study to compare weight gains. Fecal samples were collected from each lamb every two weeks to determine total round worm (strongyle) egg counts per gram and barber pole worm egg counts per gram; FAMACHA scores were also taken at concurrently every two weeks to check for anemia. Barber pole worm eggs were distinguished from other strongyle eggs by using a PNA assay to stain the eggs.

During the study several lambs had to be dewormed because they were too anemic from barber pole worm infection and their health was endangered. Fecal samples for these lambs were no longer included in the study after deworming. However, their weight gains were still tracked. In total, 4 of eight lambs that had not received COWP had to be dewormed in the CVP pasture treatment and two of eight lambs that did receive COWP had to be dewormed in the Hay/Grain group. Possibly the sudden diet change from conventional pasture and milk when grazing with their dams to eating hay and grain altered the pH of the true stomach and rendered the COWP less effective in the Hay/Grain lambs. In contrast none of the 8 lambs receiving COWP and grazing CVP pastures needed deworming as did none of the 16 lambs on the BFT pastures regardless of whether or not they had received COWP 2 weeks prior to weaning.

Conclusions Yet to Come; A Preliminary Look

Thus far (as of Feb. 2016) we have only calculated raw means for the different treatments. Further statistical analysis will be completed this spring to determine whether treatment differences are significant.

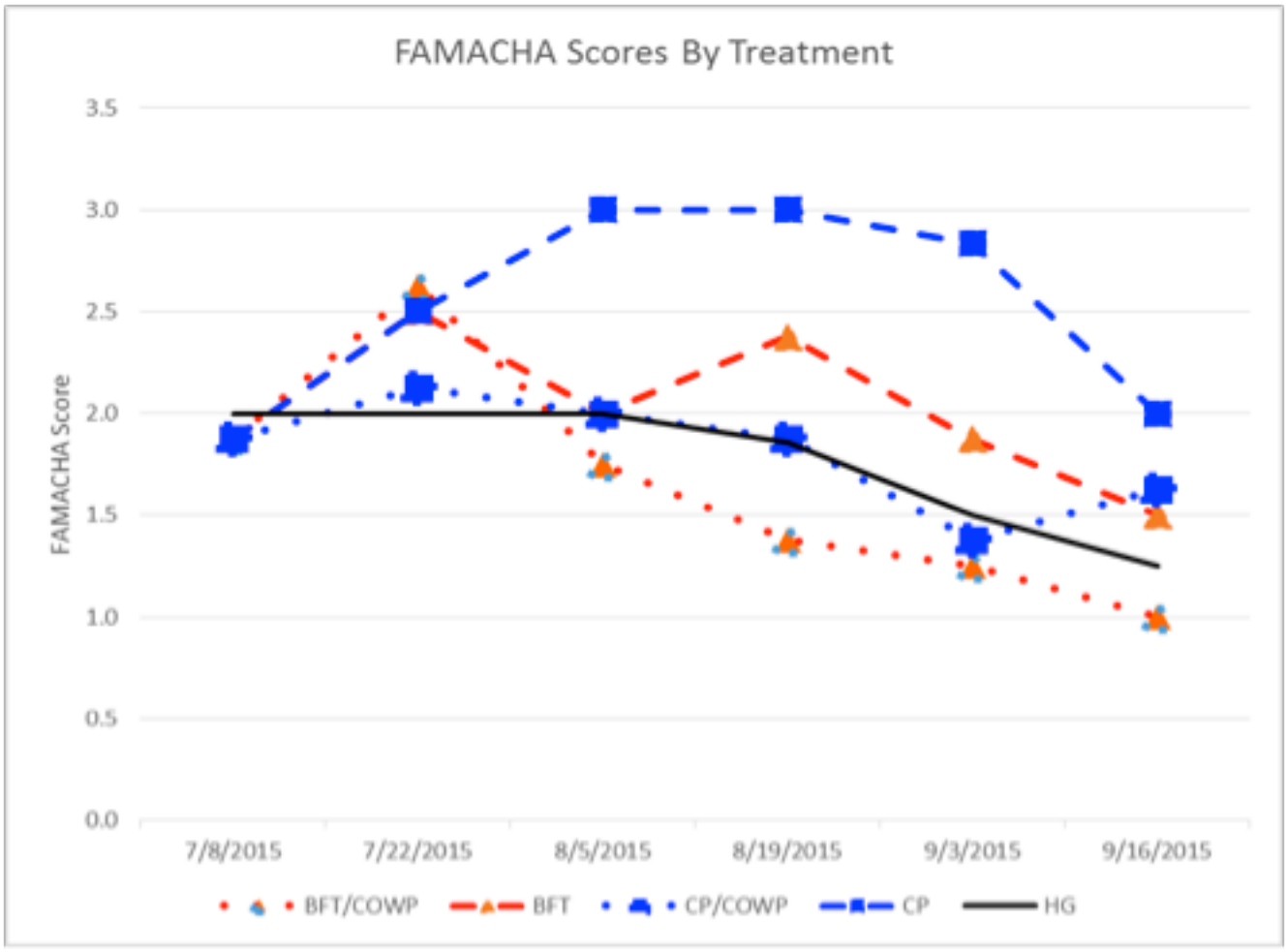

Figure 4: FAMACHA scores by treatment.. Lower scores are correlated with less anemia.

Treatments with COWP appeared to have lower worm egg counts throughout the study (Figure 2). However, this is a sheep flock where COWP had appeared to be highly effective to reduce barber pole worm infection in lambs in studies conducted there the previous 2 years. Effectiveness of COWP may vary widely among farms. Thus, these results may not be repeatable in your own flock if management conditions are very different. On studying raw means for barber pole worm egg counts in this study, it appeared that the changes in roundworm egg counts observed in Figure 2 were caused primarily by changes in the barber pole worm egg population. We were excited by the dip in worm egg counts for the two BFT groups 6 weeks into the grazing trial although it was temporary.

Daily weight gains (Figure 3) from 2 weeks pre-weaning to 8 weeks after weaning were 0.3, 0.25, 0.22, 0.18 and 0.16 lbs. for the BFT + COWP, Hay/Grain, BFT only, CVP only and CVP + COWP treatments respectively. Despite the CVP treatment that also received COWP having relatively low round worm egg counts (Figure 2), it had the lowest weight gains. Weight gains were also low for the CVP treatment that received no COWP. However half of these lambs had been dewormed by the end of the study and this probably helped keep their weigh gains similar to those of the CVP + COWP lambs. Lambs on BFT regardless of whether they received COWP averaged similar weight gains to those on Hay/Grain despite 2 of the 8 lambs on Hay/Grain had been dewormed during the study.

Visit the website at http://www.nnyagdev.org/index.php/2015/07/02/nnyadp-new-small-livestock-pasturing-options-research/ to learn more about the pasture trials at Asgaard Farm and Goat Dairy. Photo: Rhonda Butler, Asgaard Farm and Goat Dairy

Raw means based on fecal sampling (Figure 2), weighing (Figure 3), and FAMACHA scoring (Figure 4) indicate that the treatment group receiving both COWP and BFT pasture averaged faster weight gains and better FAMACHA scores (corresponding to less anemia) after weaning than any of the other treatments. Total round worm and barber pole worm egg counts were lower for this treatment than other treatments in week 6 and 8 of grazing. Rate of weight gain after weaning as compared to 2 weeks prior to weaning actually improved in the treatment receiving both COWP and BFT. Anecdotally, lambs on this treatment also appeared to have the best body condition and wool coat at the end of the study.

In our study, lambs given both COWP and BFT appeared to grow better and outperform lambs receiving both COWP and Hay/Grain. Further analysis is needed to determine whether total round worm egg counts and barber pole worm egg counts are significantly different between lambs grazed on BFT and lambs grazed on conventional pastures.

More information will be posted as available on the Northern New York Agricultural Development Program website at www.nnyagdev.org.

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Sources:

Establishing Birdsfoot Trefoil for Pasture and Hay: A guide for USDA OREI Project Demonstration Farms, April 2014: http://web.uri.edu/sheepngoat/files/BFTestablishment_OREI-demo-farms_April20141.pdf

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Case studies of BFT planting and grazing trials on 3 farms enrolled in the OREI USDA grant on Forage Based Parasite Control in Sheep and Goats in the Northeast US: http://web.uri.edu/sheepngoat/files/NYdemofarms_BFT-