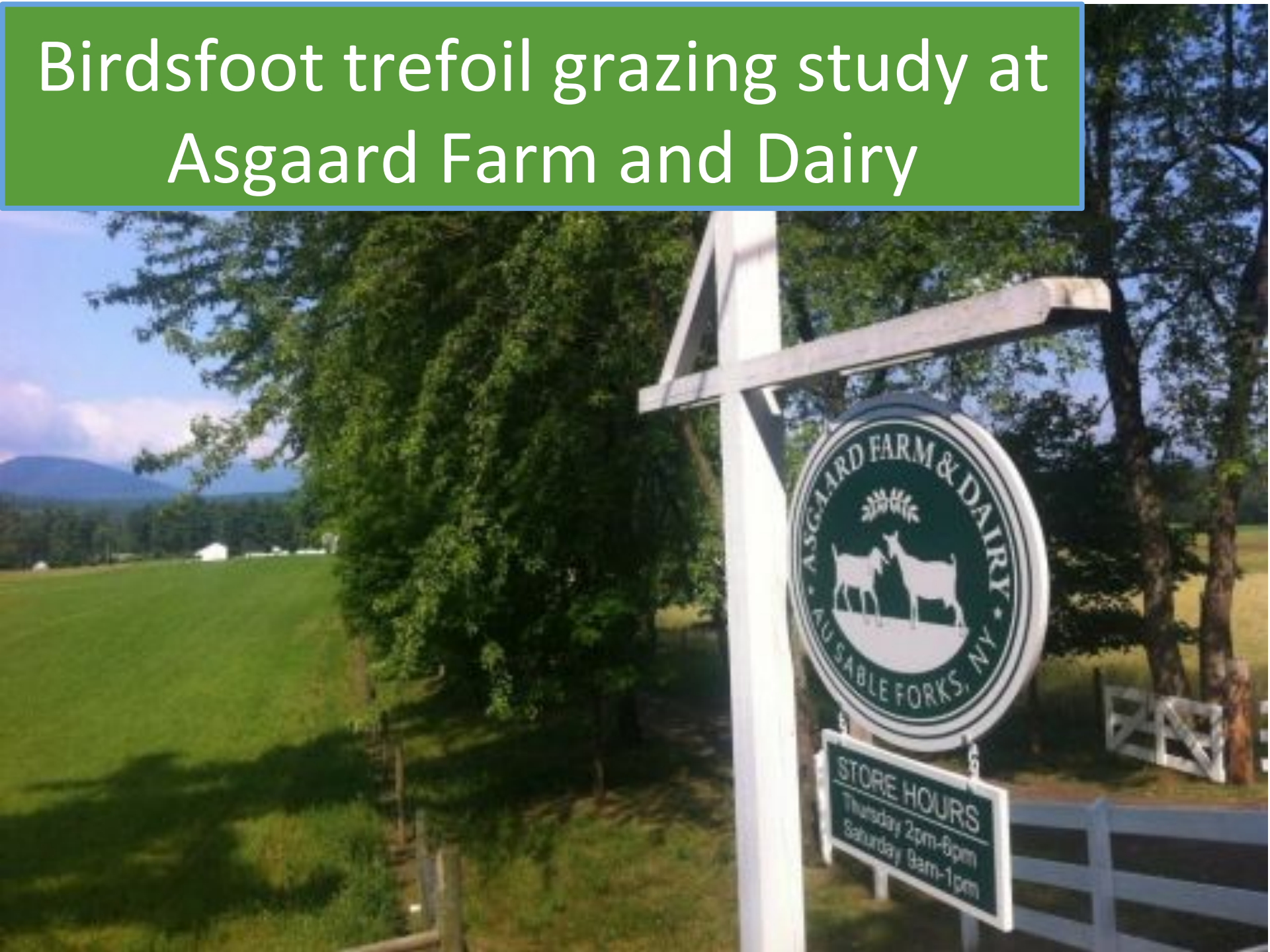
Birdsfoot trefoil grazing study at Asgaard Farm and Dairy



2.5 Acre Field Birdsfoot Trefoil
AuSable, NY
Clinton County

- **Soil Type: Adams**
- **Soil pH: 7.2**
- **P: 511 lbs/acre**
- **K: 675 lbs/acre**
- **Ca: 5494 lbs/acre**
- **Mg: 808 lbs/acre**
- **% OM: 5.2%**

Soil Preparation and Planting

- Plowed and disked June 9th, 2014
- Planted barley cover crop (2 bushels/acre) on June 15, 2014
- Grazed by cattle (45 head) for 3 days starting July 14th

- Disked stubble under on Aug 1st

- Inoculated and scarified BFT seed using cement mixer and planted on Aug 2nd – planned to seed ~12 to 15 lb. per acre of Pardee BFT but seeder could not be adjusted so low and spread more like 20 to 30 lb./acre. Ended up adding additional Empire BFT seed available on farm to the middle of field
- germination started Aug 4th

- "Frost seeded" additional 25 lbs. of Pardee BFT on Apr 16th, 2015
- Grazed 1/3rd of field with 24 steers on June 6th
- Percentage of BFT in grazed portion and ungrazed portion was 41% and 50% respectively on June 8th
- The farmer felt that both portions were ready to graze again by early July and was concerned at how mature it had gotten and how much was starting to set seed. During the actual study much of the BFT was in seed and goat kids readily ate the seeds.
- When the goat grazing trial started on July 21st, percentage of BFT, CP (crude protein) and Total Digestible Nutrients (TDN) were 62%, 19.0% and 65%, and 65%, 21.8% and 66% for the cattle grazed and ungrazed portions, respectively.
- Kids were initially started on the ungrazed portion.

Comparison of cattle grazing on 6/7/2015 versus no grazing

1/3rd of BFT field grazed by 28 steers 6/7/2014	DM Yield (lb/acre)			BFT	Crude Protein	Total Digestible Nutrients
	BFT	Non-BFT	Total	%	%	%
07/08/2015 Grazed BFT paddocks	299	430	729	41.0	19.0	65
Ungrazed BFT paddocks	616	608	1224	50.3	21.8	66
07/21/2015 – start of study Ungrazed BFT paddocks	1162	709	1871	62.1	12.8	60
Grazed BFT paddocks	2220	1187	3407	65.2	15.1	61

- Cattle may have preferentially eaten BFT on 6/7/15 based on BFT%
- As expected, grazing on 6/7/15 maintained quality better (%CP and %TDN) on 7/21/15 probably because of postponing maturity but also reduced dry matter yields per acre
- Farmer prediction that the BFT pasture was getting mature and losing quality by early July and would have benefited from grazing again then was probably correct

Kid Management

- Dairy x Kiko kids (wethers and doelings) were born Mar 6-15th. Kids were taken from dairy doe dams shortly after birth and artificially raised on a separate property. Weaned May 18th .

- Preliminary testing indicated no strongyle worms in the kids. Farmer then exposed them to the milking herd (which had worms) in an attempt to infect them with some worms. This was done by grazing the future BFT group (kids destined for the future Control group were inadvertently not exposed) with the milking herd during the last week of June and first week of July. However, evasive grazing was being practiced by rotating the milkers on clean pastures and only leaving them in a grazing paddock for 1 to 2 days. Therefore, the farmer was unsuccessful at getting the future BFT group infected with worms by exposure to the milking herd. Instead, the kids probably should have followed the does to ensure they consumed infectious L3 larvae by grazing kids in fields the mature does had grazed 6 to 8 weeks previously.

- During the grazing study, kids in both treatments received ½ to 1 pound of Poulin meat goat pellet each per day plus sodium bicarb and Sweetlix meat maker minerals free choice. During the first 2 wks. of the study all kids were accidently fed hay free choice because the farmer was under the impression that hay was necessary in order to prevent bloat.

The goats were incredibly tame!!

Unfortunately, despite previous efforts to infect them, they had no strongyle worms!!

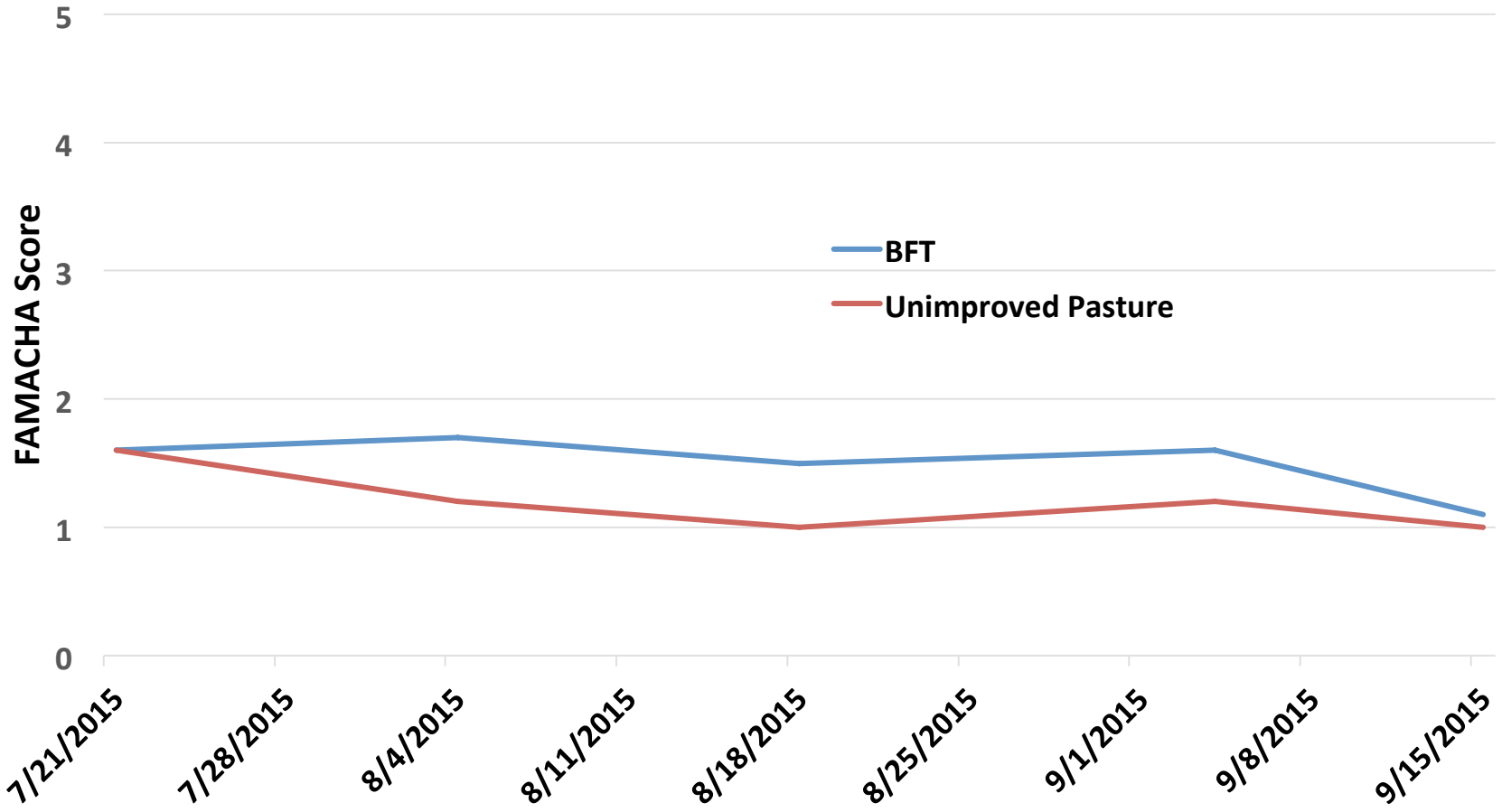
The BFT group consisted of 7 doelings and 3 wethers moved weekly.
First 2 weeks they got a new ½ acre plot (too large) each week. After that, they were reduced to ¼ acre fields weekly until the last week when they were on a ½ acre field of regrowth.

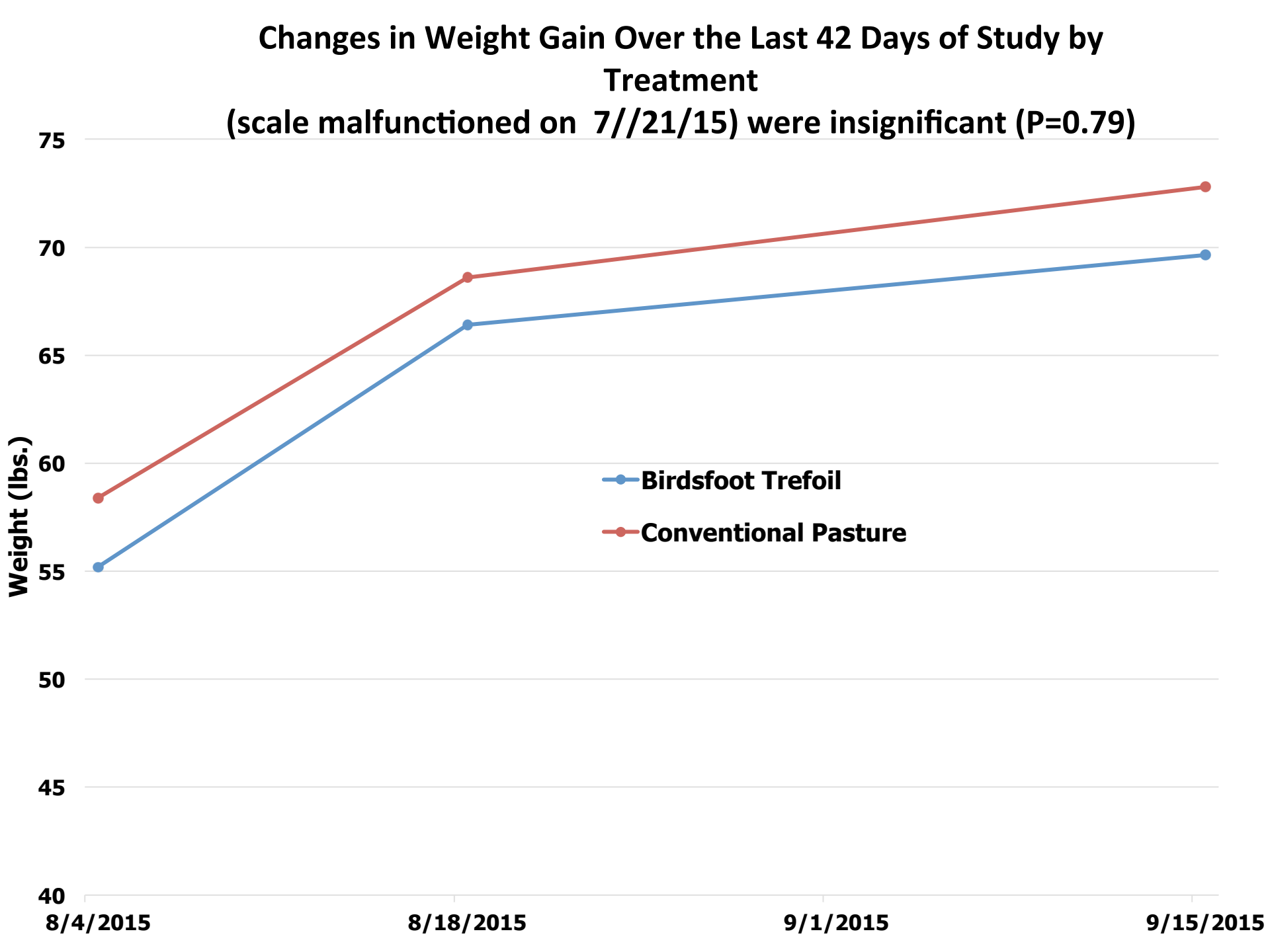
The Control group was 7 wethers and 3 doelings subsampled out of a group of 20 kids. The kids were moved ~weekly over a 5 acre pasture, ~ ¼ to ½ acre per move. Half of the pasture was un-improved and half had been reseeded in an organic pasture mix (perennial rye, orchard, clovers). The Control group was housed next to the intern housing and could possibly have Unintentionally received extra hay or grain.

Forage Yield and percent BFT, Crude protein (CP) and Total Digestible Nutrients (TDN) for BFT grazing paddocks as compared to conventional paddocks (CV)

DM Yield (lb/acre)				%	%	%
	BFT	Non-BFT	Total	BFT	CP	TDN
07/21/2015 BFT paddocks	2220	1187	3407	65.2	12.8	60
CV paddocks			3167		12.6	60
08/04/2015 BFT paddocks	1441	1655	3097	44.4	12.8	61
CV paddocks			1615		12.3	60
08/18/2015 BFT paddocks	2088	2200	4288	48.7	11.2	60
CV Paddocks			1709		9.9	59

Differences between FAMACHA Score by treatment were insignificant (P= 0.17)




Changes in Weight Gain Over the Last 42 Days of Study by Treatment
(scale malfunctioned on 7//21/15) were insignificant (P=0.79)
Weight (lbs.)
75
70
65
60
55
50
45
40
8/4/2015
8/18/2015
9/1/2015
9/15/2015
Birdsfoot Trefoil
Conventional Pasture

Conclusions

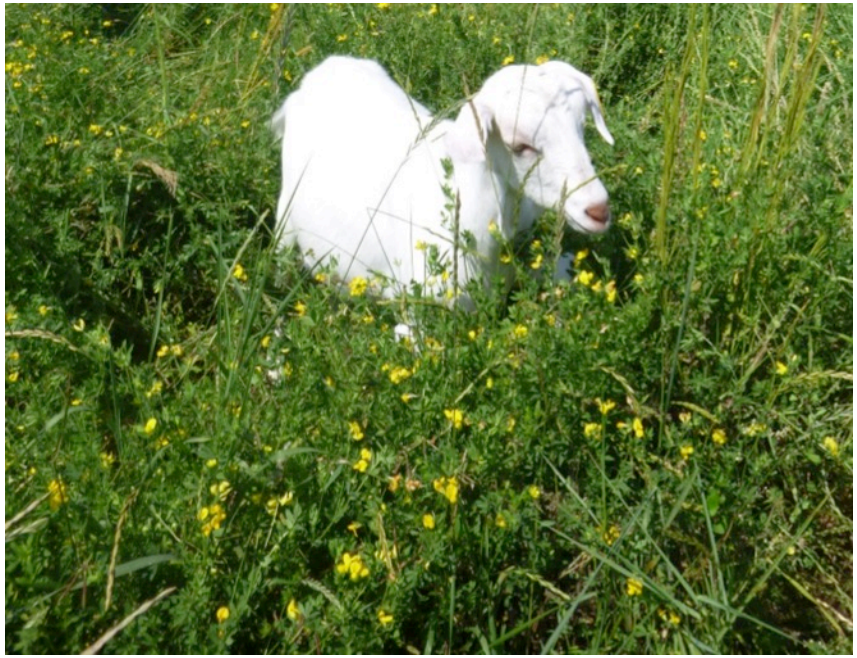
- The strategy of separating the kids from dams shortly after birth and putting kids in clean housing and on land that had never been grazed by adult goats, resulted in no measurable strongyle worm infection in kids

- Because no strongyle worm eggs were observed in the fecal samples of kids, we could not evaluate the effect of grazing Birdsfoot trefoil (BFT) forage on worm infection

- Weight gains were similar between kids grazed on BFT and kids grazed on a conventional pasture (CV) with similar nutritive value. This may have been because the BFT was quite mature or because the amount of grain fed daily (1/2 to 1 lb. per head) was sufficient to supplement the pastures despite pasture quality

- Although the CV pasture was similar in nutritive value to the BFT pasture, it generally had less dry matter per acre and many more kids grazing on it per acre. **However, the amount of total pasture area grazed per day per herd was similar for the two forages.**

- This indicated that either 1) the kids were being offered more pasture at a time than necessary when getting the amount of grain they were getting daily OR 2) that the CV group was being supplemented by interns with more grain than the BFT group or with hay (on the 3rd sampling day we still observed hay in the CV group's manger despite having asked that they receive no more hay after the hay had been noted on the second sampling date in both the BFT and CP herds).



Sustainability of the BFT pasture

We observed a lot of BFT seed production and consumption during the study to the point that fecal samples were often "crunchy" from all the seeds in them.

Our assumption was that these seeds would remain viable and that the percentage of BFT in the field the following year would be excellent.

- However, farmer reported that the BFT came back poorly the following spring despite our expectations. Reasons for poor survival could be:
  - It is strongly recommended that BFT not be grazed within 1 month before the first frost to ensure survival of BFT plants over the winter. The average date of 1st frost at this location is Sept 21-30th with hard frosts by October 15th. Thus, we definitely grazed within the vulnerable time period which may have been detrimental to plant survival.
  - Agronomists on the study noted that past experiments with BFT (Douchette et. al, J. Range Manage. 54: 575–581 September 2001) suggested that we were incorrect in our assumption that a large percentage of readily germinating BFT seed can be recovered after rumen digestion and should have run germination tests. There could also have been a lot of hard seed in the seed crop that may germinate in later years.