



Northern NY Agricultural Development Program 2021 Project Report

Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed

Project Leader:

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BACKGROUND

Sheep producers in Northern New York tend to lamb in the spring to take advantage of the grass season which starts in early May. As the summer progresses, parasites can build up on the pasture and infect the lambs, which have no immunity. Hot, dry weather can cause a decline in the quantity and quality of pasture available. Ewe milk production tends to drop off after 10 weeks. Labor is scarce because most sheep farmers work off the farm and are haying during the summer. Additionally, predation increases toward the end of the summer.

The purpose of this project in 2021 was focused on comparing the growth of lambs weaned at 8 weeks and fed a full grain diet to lambs that remained on pasture with their mothers. The added cost for feeding the grain diet needed to be considered and how it compared to potential increase in lamb growth and other factors. If lambs could grow faster and be ready for the processor before the fall rush that could be an advantage to those farmers who direct market their lambs, a typical method for making a little more money on a lamb crop.

This project was focused on addressing the issue of parasite build-up in pastures over the summer months, often resulting in some lamb losses in July during very hot weather. Ewes have more resistance, especially when they are not nursing lambs. Removing the lambs could allow the producer to spend less time checking and treating for parasites and cut losses due to internal parasites. Sometimes just having the lambs in a safe place, where an eye can be kept on them, is an advantage for lamb survival. Also, having lambs on pasture is not labor free. Pastures need to be rotated and fencing moved, pastures clipped, and animals monitored for parasites. Without the lambs on pasture, there is more feed for more ewes and the dry ewes won't consume as much feed.

METHODS

The experiment replicated a project run during the summer of 2020, which actually favored lambs on pasture. However, much like a family farm, that trial in 2020 had variables we couldn't control, e.g., hot weather, variable labor, the COVID-19 pandemic impact, and drought. With so many factors influencing the quality of the data, it made sense to repeat the trial in 2021 for the data comparison. In 2020, we learned that the lambs fed the complete diet in the barn need to be brought up on feed more slowly; some of them consumed too much of the diet in the first day or two and had to recover from the resulting acidosis.

The 2021 trial included 41 lambs born at the end of April at the CCE Extension Learning Farm in Canton, New York. Lambs were born between April 24 and May 18 (49 days to 67 days of age at weaning). Half the lambs were weaned at approximately 8 weeks of age, on June 30, and fed in the barn on grain designed to be full-fed. The actual ages of these lambs were 49 to 67 days at weaning. The other half of the lambs remained with their mothers on pasture until August 19, 2021. The trial lasted 50 days.

All lambs were weighed and FAMACHA (a system developed for scoring small ruminants for parasite management) scored every two weeks. Fecal samples were collected from a subsample of animals from each group of lambs. FAMACHA scores and fecal samples were used to assess the parasite load. Animals needing deworming were treated and the treatment recorded.

Feed analysis was done on the grain, forages, and pasture (see Figures 2 and 3 and Table 5) being fed to determine whether nutrition is one of the variables affecting the outcome. Pellets and hay were weighed in and out to determine the amount of feed consumed by the barn-fed lambs. Data sets collected and compared are for lamb growth on grain/barn-fed diet and on pasture, FAMACHA scores, parasite treatments, and costs for grain versus the growth of the lambs. Questions in focus included: Would the lambs in the barn thrive on the grain diet and grow faster than their pastured counterparts? Would they require less de-wormer treatments because they are inside, saving labor, and preserving growth? Would they grow OK in the heat of the summer or grow better outside? Would the ewes be in better body condition and therefore easier to breed back?

Hannah Braun, our Cornell Extension Intern, Cornell University honors thesis candidate, and a resident of Northern New York, was the primary person responsible for collecting data and making sure the lambs had the right feed at the right time. This study is the focus for her Cornell University senior honors thesis (graduating in 2022). She will update this initial report with additional statistical analysis available later in 2022.

RESULTS

Lamb Weight and Average Daily Gain

- The barn-fed lambs gained an advantage about mid-July: their average weights and average daily gains (ADG) were similar until the third sampling date.
- By the end of the study, the difference in the average weight was 19.24 pounds.
- ADG for barn lambs was 0.70 pounds per day at the end of the study. They gained as much as 1.04 pounds per day during the study period.

- Pasture lambs were gaining 0.32 lbs per day at the end of the study; ADG had been even lower the sampling period before.

TABLE 1. LAMB WEIGHTS AND AVERAGE DAIRY GAINS ON SAMPLE DATES; Comparing Summer Lamb Feeding Strategies: Barn-Fed Vs. Pasture-Fed, NNYADP project, 2021.

Sample Date	Barn Average Weight (lbs)	Pasture Average Weight (lbs)	Barn ADG (lbs)	Pasture ADG (lbs)
6/30/2021	45.04	46.51	-	-
7/13/2021	56.79	57.34	0.90	0.83
7/27/2021	67.71	62.86	0.78	0.39
8/6/2021	78.07	64.13	1.04	0.13
8/20/2021	87.89	68.65	0.70	0.32

Lamb Feed Intake: Barn lambs were offered free-choice grain after a couple days of adjustment period. As per the Table 2, you can see that the grain intake increased from 1.51 lbs per day per lamb to 4.07 lbs/lamb/day at the end of the study. Lambs were offered one flake of average quality first cut hay once a day for the whole group (21 lambs). Pasture lambs remained on pasture with their mothers. No grain was fed to the ewes or lambs on pasture. Water and sheep minerals were provided. Pastures were rotated every 3-7 days.

TABLE 2. LAMB WEIGHTS AND FEED INTAKE; Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed, NNYADP project, 2021.

Sample Date	Barn Average Weight (lbs)	Pasture Average Weight (lbs)	Barn ADG (lbs)	Pasture ADG (lbs)	Grain Consumed (Barn)	Grain Consumed per Day	Grain Consumed per Day per Lamb	Pound Gain per Pound Grain
6/30/2021	45.04	46.51	-	-	-	-	-	-
7/13/2021	56.79	57.34	0.90	0.83	411	31.62	1.51	0.60
7/27/2021	67.71	62.86	0.78	0.39	961	68.69	3.27	0.24
8/6/2021	78.07	64.13	1.04	0.13	812	81.29	3.87	0.27
8/20/2021	87.89	68.65	0.70	0.32	1195	85.39	4.07	0.17

Cost of Extra Grain Fed Vs. Income From Extra Pounds Gained

Extra Cost: Total grain consumed by lambs in barn

- 3,381 pounds total
- 161 pounds per lamb
- 66 pounds per day for the group
- Cost per pound of grain: \$.228 per pound, \$456.70/ton
- 3,381 pounds grain x \$.228 = \$770.87 cost for 21 lambs
- \$36.70/lamb

Extra Income from Barn-Fed Lambs

- 19.24 lbs heavier x \$2.70/lb at New Holland Auction (from early fall of 2021)
- Potentially about \$52.00 dollars more per lamb
- Cost was \$36.70 in grain

Difference: Extra income – Cost per lamb: \$52.00 - \$36.70 = \$15.40/lamb in extra income.
A lamb price of \$1.90/lb would be the break-even price.

Fecal Egg Counts, FAMACHA Scores and Treatments

Fecal egg counts were done on 8 individuals from each group of lambs. Fecal samples were collected directly from each lamb and a fecal egg count was done in the lab at the farm. All 41 lambs were FAMACHA scored at each sample date. FAMACHA compares the color of the mucus membrane of the inside lower eyelid of a sheep to a card with a scale of 1 (no anemia) to 5 (very anemic). This scoring correlates to infection by barberpole worms that suck blood from the abomasum of the sheep, causing anemia. FAMACHA results do not necessarily correlate with the fecal egg counts.

The lambs on pasture required more treatments and monitoring. Treatment decisions were based on the FAMACHA scores and general appearance of the lambs. Any lamb with a 3 or higher score was observed and a decision whether to treat or not was made looking at the diarrhea around the tail, body condition, and their likelihood of getting worse (more likely to treat the pasture lambs).

Pasture Lambs:

- 14 lambs from the pasture group were treated over the course of the project.
- There were ten 3 scores, two 4 scores (not all 3s were treated).
- Two lambs with a score of 2 were treated due to signs of diarrhea.

Barn Lambs:

- One lamb, with a FAMACHA score of 4, was treated in the barn group. Two others with a score of 3 were not treated based on other observations.

Table 3 shows the average FAMACHA scores for the barn and pasture lambs on each sample date. Scores from treated lambs were not removed from the averages. The scores of the pasture lambs increased and remained higher (tending toward anemia) than those of the barn lambs from mid-July on (Figure 1).

TABLE 3. AVERAGE LAMB FAMACHA SCORES ON SAMPLE DATES; Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed vs. Barn-Fed, NNYADP project, 2021.

Sample Date	Famacha Barn	Famacha Pasture
6/30	1.57	1.6
7/13	1.9	1.75
7/27	1.67	2.3
8/06	1.38	2
8/20	1.48	1.68

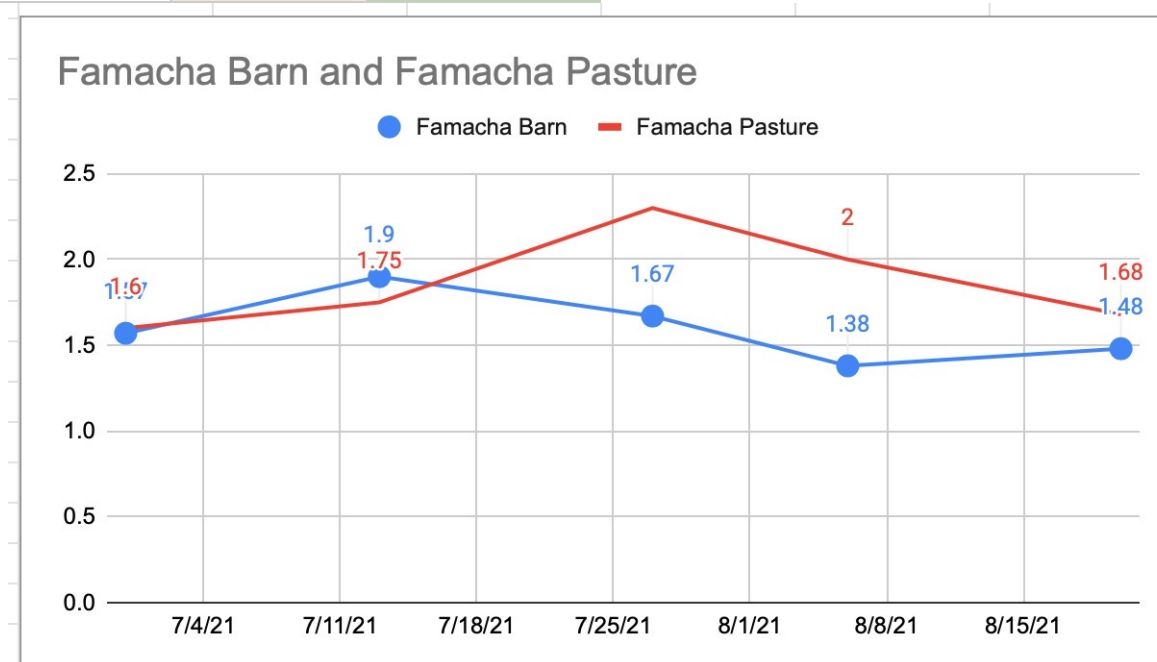


FIGURE 1. FAMACHA SCORING OF BARN AND PASTURED LAMBS; Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed, NNYADP project, 2021.

Table 4 charts the fecal egg count data of 8 lambs from each group. Note: Lamb 46 was treated on 7/13 with Valbazen Drench (a de-wormer). His count did not decrease as expected. From that point on, lambs were treated with Cydectin Drench (a de-wormer) with better results. Valbazen was initially used because we had observed tapeworm in the lambs' feces previously. (Lesson: Don't assume your dewormer is effective.)

Fecal counts were very high at times for both groups. Barn lamb FECs did not decrease as would be expected considering they should not have been getting re-infected.

TABLE 4. LAMB FECAL EGG COUNTS AND TREATED LAMBS; Comparing Summer Lamb Feeding Strategies: Barn Fed vs. Pasture-Fed (orange=barn-fed, green=pasture lambs, pink=treated lambs); NNYADP project, 2021.

Lamb ID	6/30/2021	7/13/2021	7/27/2021	8/6/2021	8/20/2021
16	700	4000	6300	4450	3700
22	950	13000	17500	19200	18100
28	850	4050	4500	3000	3600
37	550	7450	26300	17500	6650
42	1000	400	1200	900	750
46	1050	15650	14350	13050	4050
50	200	450	1150	700	350
55	1950	-	1650	650	600
13	700	1850	6000	11200	0
19	1150	6550	13550	150	100
24	350	1700	4550	7500	50
29	7200	5800	7500	4500	0
35	250	1800	2050	250	1000
40	900	1200	2500	3700	2900
44	650	6450	9400	4550	200
52	650	400	450	350	250

Pasture and Grain Diets

Both groups of lambs and ewes received free-choice sheep minerals from the local feed store and produced at Harbor Point. Lambs fed in the barn on the ad libitum grain diet received a mash formulated and made at the local feed mill. The grain was designed to be fed ad libitum. Ingredients were designed to provide fermentable fiber in the diet (Appendix: Figure 3). First-cut hay was purchased in small square bales from a local farmer. Lambs ate from a self-feeder kept full of grain. It was refilled and checked daily to avoid bridging. One flake of hay was fed in a feeder for the whole group. The lambs cleaned up the hay in a matter of minutes. The full grain feeder attracted many flies, which we attempted to control with large sticky traps.

Grain consumption figures are in Table 2: Lamb Weights and Feed Intake. Intake maxed out at approximately 4 pounds per head per day. Lambs on the grain diet gained well and showed no ill effects from eating an all-grain diet. Table 5 shows the forage analysis of the grain and first-cut hay fed to the barn lambs.

TABLE 5. ANALYSIS OF AD LIB-FED GRAIN AND FIRST-CUT HAY ON DRY MATTER BASIS; Comparing Summer Lamb Feeding Strategies: Barn-fed vs. Pasture-fed, NNYADP project, 2021.

Nutrient	Grain	First Cut Hay
% Adjusted Crude Protein	19.7	13.3
% aNDF	16.6	60.7
% TDN	81.6	56
Ca %	1.5	0.68
P %	0.5	0.34

Pasture lambs remained with their mother ewes, allowing the lambs to continue to receive their mothers' milk, and to graze. Pastures at the beginning of the trial were becoming mature. Clipping took place soon after the beginning of the trial and the pasture regrowth became higher in nutrients and more palatable. Figure 2 shows the progression of the pasture nutrient levels over the summer. Data on the percentage of grasses, legumes and forbes for the pasture will be discussed in the expanded future version of this project report. The pasture group – ewes and lambs – were moved from paddock to paddock every 3-7 days depending on the size of the paddocks and the pasture growth. There was some backgrazing and return to paddocks with a short rest period, which may have contributed to parasite loads.

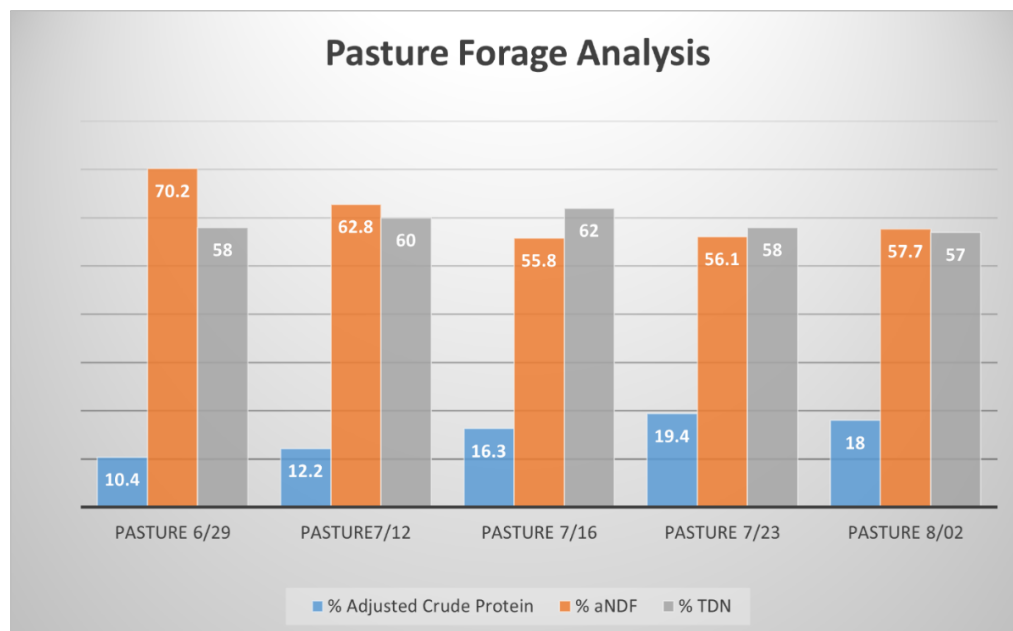


FIGURE 2. PASTURE FORAGE ANALYSIS; Comparing Summer Lamb Feeding Strategies: Barn-fed vs. Pasture-fed, NNYADP project, 2021.

Compensatory Gain

After the trial ended, the pasture lambs were weaned and all fed the same grain diet. They received approximately 1 pound of grain per head per day and all the hay they could eat. The hay was second-cut hay that needed to be fed out quickly because it was made during an equipment study and not as dry as we would have liked. We were curious about whether there was any compensatory gain among the pasture lambs so we weighed all the lambs in both groups one more time on September 8, 2021. The results showed that the average daily gains for the barn lambs was .58 lbs/day and the former pasture lambs was .92 lbs/day, up from .32 lbs at the end of the trial indicating compensatory gain.

Labor Observations

- Rotational grazing the way we applied it to this trial was time- and labor-intensive. We did not pick up electro-nets after the animals moved to the next pasture, which meant we had to pull them out of the grass later. There are more efficient ways to rotationally graze sheep, such as using a permanent perimeter fence with electro-net dividers. Easier methods of clearing under the fence or mowing a path are available as well as spraying the fenceline with pesticide to keep the green growth off the electric fence.
- If you have an efficient way to pasture your ewes already, having the lambs out there isn't really more work other than needing to keep vigilant about parasite management.
- There are pasturing techniques that can help reduce the parasite load.
- Predation, however, can also be an issue with lambs on pasture. We did not experience any predation problems, but we kept the lambs near the barn at all times.
- Lambs in the barn were very easy to feed. We essentially put the grain in the feeder and made sure it flowed properly, checked the lambs by observation, checked the automatic waterers, and added minerals as needed.
- Having the lambs in the barn makes them easier to weigh than pastured lambs. The barn environment also facilitates handling, e.g., tagging or addressing any needs, and facilitates marketing to perspective buyers.

Ewe Body Condition Observation

For farms practicing accelerated lambing (lambing more than once a year), having ewe lambs ready to breed sooner and ewes in better body condition are advantages. We did not officially measure ewe body condition but we handled all the ewes on sampling dates and did FAMACHA checks for parasites. Many ewes that were nursing lambs all summer were thinner than their lambs-weaned counterparts, especially towards the end of the trial. We did not track the ewes we treated for parasites for data on whether the ewes nursing lambs needed more de-worming during the pasture season.

CONCLUSIONS

- Considering the average daily gains over the course of this trial, it appears the ideal time to wean the lambs would be mid-July or about 70-75 days of age. This particularly makes sense if ewes' milk production drops off after 10 weeks.. The pasture and parasite management skills of

the farm manager must be evaluated for potential influence on the success. Less de-worming means less time and labor investment.

- To make the full-grain diet work, the ability and accessibility to purchase the correct kind of grain is needed. Several feed companies are capable of providing the correct grain. Plan ahead to request small ruminant product because processors gear up for dairy grain production and may not be available to create small quantities of sheep feed, particularly on short notice. Small, local, custom mills may be better equipped to provide the grain.
- Lambs on the all-grain diet were bigger and ready to breed or sell earlier. If the lambs are headed for the freezer or retail market, being bigger earlier could be an advantage for securing an appointment at the processor before deer season. If lambs are bigger sooner and marketed sooner that means potentially less labor for the farm.
- For farms practicing accelerated lambing (lambing more than once a year), having ewe lambs ready to breed sooner and ewes in better body condition are advantages. We did not officially measure ewe body condition but we handled all the ewes on sampling dates and did FAMACHA checks for parasites. Many ewes that were nursing lambs all summer were thinner than their lambs-weaned counterparts, especially towards the end of the trial. We did not track the ewes we treated for parasites for data on whether the ewes nursing lambs needed more de-worming during the pasture season.
- The decision whether to wean and feed lambs in the barn or leave lambs on pasture with their mother ewes will depend on lamb prices and grain prices. In 2021, the lambs made money over the price of the grain fed. However, that could change if grain prices are up and/or lamb prices are down.

OUTREACH

Project results were shared with sheep producers via the 2021 Ag Educators In-Service, and will be shared through Extension newsletters, Cornell Sheep listserv, and workshops in 2022.

FOR MORE INFORMATION:

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 APPENDIX
 Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed

Formulation Mix Report: SHEEP

Farm: *Cornell Coop Extension*

Wednesday, June 30, 2021

Ingredient Detail (Imperial)

		As-Fed Amount	Ingredient DM Percent	Dry Matter Amount	% of As-Fed	As-Fed (lbs/Ton)	\$/Ton
9905081	ade premix	✓ 1.0000	99.5000	0.9950	0.0500	0.9998	3000.00
05080	ovine tm salt	✓ 40.0000	99.5000	39.8000	1.9995	39.9900	1600.00
9905016	Calcium Sulfate Dihyd	✓ 20.0000	99.5000	19.9000	0.9998	19.9950	0.00
11021	Sel Plex 600	✓ 3.0000	89.8000	2.6940	0.1500	2.9993	1720.00
05001	Ammonium Chloride	✓ 14.0000	99.5000	13.9300	0.6998	13.9965	0.00
9905086	vit e 20k	✓ 10.0000	99.5000	9.9500	0.4999	9.9975	1520.00
01103	Soybean Hulls Ground	✓ 289.9999	91.0000	263.9000	14.4964	289.9276	256.00
01039	Corn Grain Ground Fine	✓ 799.9997	88.0000	703.9997	39.9900	799.7999	285.00
02027	Soybean Meal 47.5 Solvent	✓ 520.0000	90.0000	468.0000	25.9935	519.8702	392.00
05007	Calcium Carbonate	26.0000	99.5000	25.8700	1.2997	25.9935	175.00
11045			95.0000	0.4750	0.0250	0.4999	320.00
01079	Molasses Cane	✓ 66	73.0000	54.7500	3.7491	74.9813	0.00
01117	Wheat Shorts	✓ 199.9999	89.0000	177.9999	9.9975	199.9500	0.00
05087	deccox 6% <i>Decox .6</i>	✓ 10	93.0000	0.9300	0.0500	0.9998	0.00
		2000.5000		1783.1940	100.0000	2000.0000	

FIGURE 3. GRAIN MIX FOR LAMB FEEDING STUDY FROM WIGHT AND PATTERSON FEEDS; Comparing Summer Lamb Feeding Strategies: Barn-Fed vs. Pasture-Fed: NNYADP project, 2021.