



Sprouted Grain Fodder to Lactating Goats: Effects on Kids of Nursing Does

In a Nutshell:

- Milking does, whether in dairy production or feeding kids, are under high metabolic load.
- Adam Ledvina and Margaret Chamas conducted trials in which treatment does were fed sprouted grain as a supplemental fodder; all animals had access to the same base diet.
- Kid weights were measured at birth and at the end of a 30-day treatment period.

Key Findings:

- Chamas' herd of goats' does refused the sprouted grain.
- Ledvina's herd's treatment does' kids significantly underperformed the control kids after 30 days.

Cooperators

Adam Ledvina, Chelsea, IA

Margaret Chamas, Storm Dancer Farm,
Smithville, MO

Funding

The Builders Initiative

BACKGROUND

Lactation is a massively expensive and stressful metabolic task. A lactating doe needs to take in enough energy to support her kids and herself, as well as making available in her milk enough protein and other nutrients to fuel the kids' growth. Doe health and nutrition has a direct impact on kid health and growth, and on milk quantity and quality in dairy operations [1]. To boost the calories and nutrients available to them, lactating does are often fed concentrates. Grain is a popular concentrate for its higher energy and protein content, but the sugars and starches present in the seed pose a risk to ruminants, whose gastro-intestinal systems have evolved to extract less-accessible nutrients from the tough vegetative tissues of growing plants [2], [3]. Grain fermenting in the rumen through the slow process of rumination can acidify the stomach and skew the composition of the microbial community, which can damage the stomach and decrease feeding efficiency over time [3], [4]. One potential solution is to sprout the grain before feeding it to the goats. The sprouting plants use the energy and carbon stored in the seed to build new tissue. The structural cellulose is less available to monogastric animals but is digestible by ruminants. In addition to the physiological nutrition risks with grain, concentrates are expensive. Sprouting grain is perceived as a way of stretching the input, getting more nutrients out by increasing the fodder's digestibility [5], [6], [7].

Adam Ledvina raises Kiko meat goats in Chelsea, IA, and decided to investigate the possibilities of this feed with members of his herd, and the possible effects on his young kid goats. Margaret Chamas raises dairy goats at Storm Dancer farm in Smithville, MO. She wanted to investigate the effects of the feed on her milking does, their milk output, and the quality of their milk.



Ledvina's doe H7 with her male twins. She was in the control group. Photo taken Spring 2024.

METHODS

Design

Oats were used as the sprouted grain at both farms. Chamas set up a hydroponic system to sprout her oats. This can be seen in the photo below. Water from the reservoir was pumped to the top and trickled through the trays several times a day. Light for photosynthesis was provided by sun lamps mounted above the system. The feed for each day was taken from the top row, and the later days' trays were advanced on place.

Ledvina's oat-sprouting setup was somewhat less complex: each day, he soaked one-day's worth of oats in water and set them in black plastic tubs in the sun to germinate and grow for one week. Each day of feeding, the oldest tub's sprouts were fed to the does, and a new tub was prepared.

Chamas selected five pairs of does. Both does in each pair had kidded close together, were of similar age, and were the same breed, often closely related (half siblings or cousins). Which doe of the pair was treated and which served as a control was chosen by flipping a coin.

Ledvina selected six does who kidded twins close together for the trial. All of them were the same breed (Kiko), close to the same age (six years), and had had two kiddings; the three does for treatment were chosen randomly from the six. Both the control and trial mothers were fed grass/clover hay ad libitum. Ledvina hand fed each treatment mother a supplemental one pound of sprouted grain every day for the first 30 days they were nursing



Margaret Chamas' hydroponic grain sprouting setup. Photo taken Spring 2024.

their kids. The kids were weighed at birth and after 30 days; total weight gain and average daily gain were calculated from these two measurements.

Measurements

In Ledvina's trial, kid weights were taken at birth, and after thirty days of nursing from the does. We used these values to calculate gain and average daily gain (ADG). Kids make good experimental subjects because they show the effects of treatments more clearly than more resilient adult goats, in this experiment they served as a proxy measurement for milk quality.

Chamas was going to measure milk yield and milk quality – milk somatic cell count (SCC), fat percentage, protein percentage, and milk urea nitrogen (MUN). Because her goats refused the treatment fodder, the experiment stopped and she did not take these measurements.

Data analysis

Although the kids were the individuals being measured, the does were the experimental units. The weights of each doe's twin kids were averaged to give a single data point for each doe.

We used Fischer's LSD at a 90% confidence level to determine if there were significant differences between the does fed the sprouted grain and the control. For each metric, the difference between the means of the two treatments is compared with the LSD. A difference greater than or equal to the LSD indicates the presence of a statistically significant treatment effect, meaning one treatment outperformed the other and the farmer can expect the same results to occur 90 out of 100 times under the same conditions. A difference smaller than the LSD indicates the difference is not statistically significant and the treatment had no effect. We can perform this analysis because the experiment had a randomized and replicated design, with the does randomly assigned to treatments and three does having been included in each treatment (**Figure A1**).

RESULTS AND DISCUSSION

At Ledvina's, the sprouted grain treatment diet had a significant negative effect on the final weight, weight gain and average daily gain of the affected kids (**Table 1**).

It is not clear why the sprouted grain diet had such a negative effect on the kids. A couple of theories include the possibility that the sprouted grains were too nutritionally available, and "shot right through the goats" without being metabolized (from a conversation with Margaret Chamas). It could be that the process of capturing the does for hand-feeding each day introduced stress, or the hand feeding process reduced their access to the control food or their time to eat their respective fills.

It seems possible that some negative or antinutritional agent was introduced through the sprouting practice.

TABLE 1. Performance of kids raised by does fed two rations at Adam Ledvina's in 2024.

TREATMENT	BIRTH WEIGHT (lb)	FINAL WEIGHT (lb)	GAIN (lb)	AVERAGE DAILY GAIN (lb/day)
Control	6.9	19.0	12.2	0.40
Sprouted Grain	6.9	16.5	9.8	0.32
LSD (90%)	0.9	2.1	1.6	0.07
Difference	0.0	2.5	2.3	0.08
Significant?	No	Yes	Yes	Yes

Within a column, when the difference between the two averages is greater than or equal to the corresponding least significant difference (LSD), the yields are considered statistically different at the 90% confidence interval. When the difference is less than the LSD, there is no significant statistical difference.



Margaret Chamas' goats toy with the sprouted oat fodder. Their compatriots' rejection of the feed forced Chamas to abandon the trial. Photo taken June 2024.

CONCLUSIONS AND NEXT STEPS

Although the sprouted grain treatment led to negative results in Ledvina's trial, diet supplements remain an easy way to boost lactating does' intake of calories and nutrients

This trial has many possible variations to investigate different feedstuffs. Some that have been suggested as next step include black oil sunflower seeds, flaxseed meal, corn, or oats could be repeated with a different sprouting or feeding method.

Margaret Chamas attributed her goats' refusal of the fodder to their being "spoiled rotten" and "goats", and therefore unpredictable. For any future diet supplement trial Chamas remarked that she would make sure that her goats would eat the treatment diet before beginning the experiment. Further investigation on how to enhance the nutrition of lactating does will continue in 2025.

APPENDIX – TRIAL DESIGN AND WEATHER CONDITIONS

1	2	3	1	2	3
4	5		4	5	
Control group			Treatment group		

FIGURE A1. Experimental design used by Ledvina and Chamas.

Ledvina

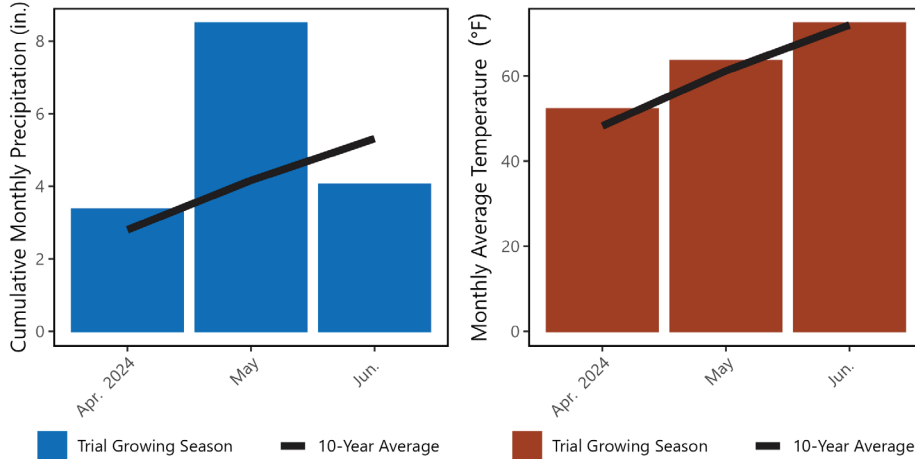


FIGURE A2. Monthly cumulative precipitation and average temperatures in Chelsea over the course of the experiment, April – June 2024 [8], [9].

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