Final Report

Kid Goat Feeding Trial
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with logistical support from

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and under contract and with financial support from

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Background

Wisconsin ranks first among the states in dairy goat numbers, the number of licensed dairy goat farms, and the amount of goat milk processed into cheese. By-products of goat milk production on these farms are male kids. On many farms, these male kids are assumed to have little or no economic value, and they are given away or sold soon after birth for very little money. No published research could be found in the scientific literature on the growth and feed efficiency of male dairy goat kids in the U.S.

The primary goal of this project was to gather data in a controlled setting on feed consumption, average daily gain, and feed efficiency of male dairy goat kids during the postweaning period to determine if they can be economically raised to market weights and contribute to the profit of dairy goat operations.

Since there are no goat herds and very little goat production research within the UW system or in the Wisconsin Technical College system, this study also allowed the State of Wisconsin to provide some assistance to the goat industry.

The study originated from an informal discussion among Larry Hedrich, Wisconsin dairy goat producer; David Johnson, Equity Cooperative Livestock Sales Association; and David Thomas, University of Wisconsin-Madison at the Focus on Goats Conference at the University of Wisconsin-Platteville in February 2014. The trial was greatly facilitated by a grant from the Wisconsin Department of Agriculture, Trade and Consumer Protection, organized by Norm Monsen, that covered the costs of student labor and maintenance of animals.

Materials and Methods

Weaned dairy buck kids were picked-up from three commercial farms in east central Wisconsin on May 12, 2014. The farms, number of kids from each farm and their average on-farm weight are given in Table 1.

Table 1. Origins of the buck kids and their average body weight at the farms on May 12, 2014.

Farm	No. of kids	Average weight at the farm, lb.
Afterglow Dairy Goat Farm Barry Midtling Port Washington, WI	44	31.0
LaClare Family Farms Larry & Clara Hedrich Chilton, WI	24	23.6
Adam Van Den Bosch Appleton, WI	8	20.6
Total/average	76	27.6

The kids were trucked to the UW-Madison campus on May 12, 2014. The 32 kids from the Hedrich and Van Den Bosch farms and 6 randomly selected kids from the Midtling farm were sorted off the trailer and entered the Livestock Laboratory (38 total kids). The remaining kids, all from the Midtling farm, went immediately to the Pioneer Farm, UW-Platteville. From the weigh sheets provided at the farms, we should have had 76 total kids. Thirty-eight kids were unloaded at Madison so 38 should have arrived at Platteville. However, a few days after arriving at Platteville, it was discovered that they had 40 kids. Due to some missing ear tags and difficult to read ear tattoos, it was not possible to determine which two kids had not been accounted for at the farm, but it is almost certain that the 2 extra kids came from the Midtling farm. The kids were purchased for $1.50 per pound using the farm weights.

The kids were adjusted to their new surroundings and feed for 10 days at UW-Madison and 21 days at UW-Platteville. During this time, they were fed a commercial starter pellet with 18.5% crude protein and a very small amount of hay. Kids were vaccinated for *Clostridium perfringens* (type C & D), tetanus, and sore mouth and given an injection of selenium and vitamin E. Feed consumption and gains were not recorded during this adjustment period.

During the feeding trial, the kids on the UW-Madison campus were housed in the Livestock Laboratory on slotted metal flooring in four pens in a temperature- and light-controlled room. A fifth pen in the same room was used to house 3 kids that were deemed to be too ill to compete with the other kids at the start of the trial. The remaining 35 kids were sorted into a heavy half (n = 17) and a light half (n = 18), and then each weight group was randomly allocated to two pens (8 to 9 kids per pen). Kids were fed their pelleted diet out of self-feeders with feed available at all times. Early in the trial, one kid in the light group was discovered to be a doeling, and she was removed from her trial pen. During the trial, one light kid died from urinary calculi, and another light kid foundered and was slaughtered at a light weight at the campus Meat Lab. Body weights and estimated feed intake for these three kids were deleted from the data set. The three kids in the "sick" pen recovered and were marketed with the other kids, and their body weights and feed consumption were included in the data set. On the day that the last group of kids went to market, there was a concern that one male kid might be showing signs of urinary calculi. This kid was kept back and observed by veterinary staff and then slaughtered at the campus Meat Lab a few days later. Since this kid completed the feeding trial, his feed consumption and growth data were included in the data set, and his market value was assumed to be the same as the kids in his contemporary marketing group. Of the 38 kids starting the trial at UW-Madison, 36 reached a market weight (35 buck and 1 doe kid), and 35 (34 buck and 1 doe kid) were marketed on two separate days (July 14 and August 25) at the Equity yards in Johnson Creek, Wisconsin.

The 40 kids at UW-Platteville were maintained at the Pioneer Farm in 4 pens of 10 kids each in bedded pens in a conventional barn. Kids were fed their pelleted diet in feed troughs that were refilled as feed disappeared so that feed was in front of the kids virtually all the time. All kids survived to market weight. The 40 kids were sold to a private buyer arranged by Equity in one lot on a single day (July 23) and were picked-up at the farm.

Results

During the growth trial, kids at both locations were fed the same commercial grower pellet

with 16% crude protein and a very small amount of hay. The grower pellet cost $420/ton delivered. Individual kid weights were recorded at least weekly at UW-Madison and every 2 weeks at UW-Platteville. At the time of weighing, pen feed consumption for the previous period was determined, and feed efficiency (lb. of feed per lb. of gain) was calculated. Presented in Table 2 are the raw performance data of each pen of kids at each location and the market price received.

Table 2. Average performance of kids in each pen at each location.

Pen	n	Start wt., lb.	End wt., lb.	Days on trial	Average daily gain, lb./kid	Average daily feed consumption, lb./kid	Feed/gain	Sale price/lb. live wt., $
UW-Madison								
1 - heavy	8	35.1	59.0	53	0.45	2.18	4.84	2.10
2 - heavy	9	35.6	57.0	53	0.41	2.10	5.12	2.10
3 - light	8	24.4	64.6	95	0.42	2.10	5.01	1.50
4 - light	7	24.0	64.9	95	0.43	2.04	4.74	1.50
5 - sick	3	21.2	60.7	95	0.42	2.86	6.82	1.50
UW-Platteville								
1	10	37.2	52.6	51	0.30	1.47	4.90	2.00
2	10	36.2	52.5	51	0.32	1.47	4.59	2.00
3	10	38.7	53.3	51	0.29	1.48	5.10	2.00
4	10	38.3	56.0	51	0.35	1.49	4.25	2.00

Examination of the raw means in Table 2 indicates that the kids at UW-Madison had higher daily gains and greater feed consumption than the kids at UW-Platteville. The UW-Madison kids were fed in an environmentally-controlled facility, and the UW-Platteville kids were fed in a barn exposed to ambient summer temperatures. The “cooler” environment at UW-Madison is the most likely reason for the greater feed consumption and greater average daily gains at this location. Other than the poorer feed efficiency of the “sick” pen at UW-Madison, feed efficiencies were similar at the two locations, but slightly better (lower) at UW-Platteville.

The prices received for the three groups of marketings varied greatly from a high of $2.10/lb. to a low of $1.50/lb. The two heavy groups at UW-Madison and all of the UW-Platteville kids were marketed during the Muslim religious holiday of Ramadan (June 28 – July 27, 2014), with fasting during the day and a large family meal after dusk to break the fast. Goats and sheep are very common meats eaten during Ramadan and probably is the main reason for the high prices obtained for the kids sold during this time. Pens 3, 4, and 5 were sold on August 25 after Ramadan when there was less demand for goat meat for religious purposes. These pens also had heavier slaughter weights than the pens sold earlier, which also may be partially responsible for their lower price of $1.50/lb.

Data Analyses

Traits analyzed were individual kid start weight, end weight, and average daily gain and pen feed efficiency (lb. feed fed / lb. of kid gain) and estimated returns above grower pellet feed costs per kid by pen (profit). The statistical model for the individual traits included the effect of location and pen within location, and the statistical model for pen feed efficiency and profit included only the effect of location.

The formula for profit was: Average profit per kid by pen = (average end wt.)(market price/lb.) – (average start wt.)($1.50) – (average end wt. – average start wt.)(pen feed/gain)($0.21).

The results of the statistical analysis are presented in Table 3. As expected from the raw means in Table 2, the kids at UW-Madison were significantly ($P < 0.05$) lighter at the start of the trial, heavier at the end of the trial, and had greater average daily gains during the trial than did kids at UW-Platteville. Feed efficiency was poorer at UW-Madison than at UW-Platteville, largely due to the exceptionally poor feed efficiency of the "sick" pen at UW-Madison. Profit (estimated returns over grower pellet feed costs) was approximately $7.00/head higher at UW-Platteville than at UW-Madison. This was due to both a slightly better feed efficiency and a much better average end price for kids at UW-Platteville than at UW-Madison. However, the feed efficiency and profit differences between locations were not statistically significant, due primarily to the low number of observations (n = 9 pens).

Table 3. Least squares means for growth performance and profit over pellet costs at the two locations.

Location	No. of kids	Start wt., lb.	End wt., lb.	Average daily gain, lb.	Feed/gain	Profit, $
UW-Madison	35	27.9[a]	61.2[a]	0.43[a]	5.33	27.31
UW-Platteville	40	37.6[b]	53.6[b]	0.31[b]	4.72	34.25
Average		33.7	57.1	0.37	5.06	30.39

Means with a different superscript are different ($P < 0.05$).

The average performance of the kids across both locations may be the best estimate available from this study of the postweaning growth performance that producers can expect from buck dairy kids, i.e., approximately 0.40 lb. of gain per day with 5.0 lb. of complete feed required per lb. of gain when grown from 34 to 57 lb. of body weight. With the purchase prices and sale prices in effect during the time of this trial, these performance levels resulted in approximately $30/kid return above the cost of the complete feed and the purchase price of the kids. Total profit would be less than $30/kid because daily yardage costs, health costs, labor costs, etc. have not been considered. However, those additional costs would be expected to be far less than $30/kid, so we can say with some degree of certainty that the feeding of these dairy buck kids was profitable in 2014.

The returns from feeding these kids to a heavier finished slaughter weight is very dependent on the cost of feed, the purchase price/value of the kids at the start of the feeding period, and the final price received for the market-weight kids. Table 4 presents the expected returns above the cost of the purchased kid and the cost of the amount of complete grower pellet consumed for various combinations of pellet costs, kid costs, and market prices received. The additional costs not accounted for in our analysis such as transportation, marketing, daily yardage, bedding, supplies, health, death loss, etc. would likely be $10.00 or less per kid. The highlighted portions of Table 4 indicate the combination of factors for which at least a $10.00 return per kid above feed costs and the purchase price can be expected, and are the combinations of factors that are most likely to give a producer a true positive net profit from feeding dairy goat male kids during the postweaning period.

If the cost of the grower pellet is between $360 and $440 per ton and a 35 lb. male feeder kid costs $52.50 ($1.50/lb.), a feeder would need to receive at least $1.50 per pound for a finished 60 lb. kid to have some assurance of a positive net profit. If the male feeder kid cost $70.00 ($2.00/lb.), the finished kid would need to bring at least $1.80 per pound for a positive net profit at the same range in grower pellet costs. While market prices are largely out of the control of the feeder, there are some ways to increase the probability of a good market price. Goat meat is not a "mainstream" meat found in the local supermarket, but instead a specialty meat more commonly eaten by minority populations with greater consumption during specific religious holidays. For example, the higher prices received for the kids in our study were during the Muslim religious holiday of Ramadan. A listing of Muslim, Jewish, and Christian religious holidays when goat is most likely to be consumed can be found at http://www.sheepgoatmarketing.info/calendar.php. Producers of slaughter kids would be well advised to market kids during these periods.

Feed is the most expensive input in feeding kids, and every effort should be made to reduce feed costs without significantly reducing growth performance and feed efficiency. A $0.01/lb. decrease in feed costs increased returns/kid by $1.25. In comparison, a $0.01/lb. increase in market price increased returns/kid by $0.60, and a $0.01/lb. decrease in the purchase price of the feeder kid increased returns/kid by $0.35.

Other Issues

Even with these young buck kids, there was lots of fighting and sexual activity among the buck kids that may have negatively affected their growth performance. Common thought is that the ethnic market wants an unblemished animal (e.g., sexually intact with horns) for some of the religious holidays like Ramadan. If wethers would bring the same market price as intact males in the market place, wethers may be preferable to raise. Dehorned kids would be easier to manage than animals with horns.

Pens need to be higher than for sheep in order to contain the kids. Sides of the pens need to be solid or with small enough openings to avoid kids from sticking their heads through because kids with horns will get their heads stuck.

When feeding wethers or bucklings, the calcium to phosphorous ratio needs to be at least 2:1 to prevent urinary calculi. Some resources recommend a calcium to phosphorous ratio of 1:1, which from our experience is not high enough. In addition to the 2:1 calcium to phosphorous ratio, ammonium chloride should be added to the complete diet at the rate of 0.5% to 1.0% in order to acidify the urine to lessen the precipitation of urinary stones, and a supply of fresh and clean water must be available at all times.

When purchasing kids born indoors in the winter and spring, there may be a high rate of respiratory disease. Be ready with a veterinary recommended treatment regime for pneumonia.

Conclusions

This study, conducted at two locations in different facilities with buck kids from three farms, found good postweaing performance (approximate gain of 0.40 lb./day and feed efficiency of 5.0 lb. feed/lb. gain) for dairy buck kids. With the market prices in the summer of 2014, returns above the purchase price of the feeder kids and the cost of the grower pellet were approximately $30/kid. When roughly estimating other costs, the kids would have had a net return of approximately $20/kid or more. Therefore, buck kids have the potential to increase the herd profit of the dairy goat producer if taken to a finished market weight of 55 to 60 pounds. If the herd owner does not want to finish these male kids, they should be able to command a price after weaning and started on feed of at least $1.50/lb. and still provide a profit for the feeder. Keeping feed costs low, minimizing mortalities, and marketing during ethnic holidays are crucial points for maximizing returns from the feeding of male kids beyond weaning.

Future research is needed on reducing costs and mazimizing returns on kids raised from birth to weaning.

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Table 4. Effect of estimated returns per kid above the initial purchase price of the kid and the cost of the commercial complete grower pellet consumed by the kid with different pellet costs, different values of kids at the start of the feeding period, and different market prices of finished kids.

			Final market value of kids, $/lb.[b]															
Grower pellet cost, $/lb.	Kid starting value, $/lb.[a]		**1.00**	**1.10**	**1.20**	**1.30**	**1.40**	**1.50**	**1.60**	**1.70**	**1.80**	**1.90**	**2.00**	**2.10**	**2.20**	**2.30**	**2.40**	**2.50**
0.10	**1.50**		-5.00	1.00	7.00	13.00	19.00	25.00	31.00	37.00	43.00	49.00	55.00	61.00	67.00	73.00	79.00	85.00
0.10	**2.00**		-22.50	-16.50	-10.50	-4.50	1.50	7.50	13.50	19.50	25.50	31.50	37.50	43.50	49.50	55.50	61.50	67.50
0.14	**1.50**		-10.00	-4.00	2.00	8.00	14.00	20.00	26.00	32.00	38.00	44.00	50.00	56.00	62.00	68.00	74.00	80.00
0.14	**2.00**		-27.50	-21.50	-15.50	-9.50	-3.50	2.50	8.50	14.50	20.50	26.50	32.50	38.50	44.50	50.50	56.50	62.50
0.18	**1.50**		-15.00	-9.00	-3.00	3.00	9.00	15.00	21.00	27.00	33.00	39.00	45.00	51.00	57.00	63.00	69.00	75.00
0.18	**2.00**		-32.50	-26.50	-20.50	-14.50	-8.50	-2.50	3.50	9.50	15.50	21.50	27.50	33.50	39.50	45.50	51.50	57.50
0.22	**1.50**		-20.00	-14.00	-8.00	-2.00	4.00	10.00	16.00	22.00	28.00	34.00	40.00	46.00	52.00	58.00	64.00	70.00
0.22	**2.00**		-37.50	-31.50	-25.50	-19.50	-13.50	-7.50	-1.50	4.50	10.50	16.50	22.50	28.50	34.50	40.50	46.50	52.50
0.26	**1.50**		-25.00	-19.00	-13.00	-7.00	-1.00	5.00	11.00	17.00	23.00	29.00	35.00	41.00	47.00	53.00	59.00	65.00
0.26	**2.00**		-42.50	-36.50	-30.50	-24.50	-18.50	-12.50	-6.50	-0.50	5.50	11.50	17.50	23.50	29.50	35.50	41.50	47.50
0.30	**1.50**		-30.00	-24.00	-18.00	-12.00	-6.00	0.00	6.00	12.00	18.00	24.00	30.00	36.00	42.00	48.00	54.00	60.00
0.30	**2.00**		-47.50	-41.50	-35.50	-29.50	-23.50	-17.50	-11.50	-5.50	0.50	6.50	12.50	18.50	24.50	30.50	36.50	42.50

[a] Kids were assumed to start the post-weaning feeding period weighing 35 lb. Therefore, the kids could be purchased for or were valued at $52.50/kid ($1.50/lb.) or $70.00/kid ($2.00/lb.) at the start of the post-weaning period.

[b] Kids were assumed to be marketed at 60 lb. after gaining 25 lb. during the post-weaning feeding period and requiring 5 lb. of feed for each lb. of gain (125 lb. of feed consumed per kid).