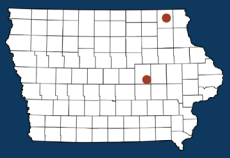
PRACTICAL FARMERS OF IOWA
COOPERATORS' PROGRAM Farmer-Led Research

EXPERIMENT



2023

Castration Timing in Goats and Sheep

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In a Nutshell:

- Lamb and kid castration timing may affect animal health and wellbeing, final hanging weights, and labor timing and costs.
- Adam Ledvina and Bailey Lutz tested whether castrating goat kids at 4 weeks vs. 8 weeks affected goat weight. Ledvina also included an uncastrated kid treatment. Emily Fagan and Hannah Breckbill assessed whether castrating lambs at 1-4 weeks old vs. 6-8 weeks old affected final hanging weights.

Key Findings:

- Kid and lamb age at castration did not affect kid average daily gains (Ledvina and Lutz) or lamb final weight (Fagan & Breckbill). All the animals were healthy throughout the trial.

Cooperators

Emily Fagan and Hannah Breckbill, Humble Hands Harvest– Decorah, IA

Adam Ledvina, Iowa Kiko Goats – Chelsea, IA

Bailey Lutz, Hollyhock Land & Livestock – Decorah, IA

Funding

Walton Foundation

BACKGROUND

Castration of goat kids and lambs is a common practice but there are no set regulations on this procedure in the US. Farmers commonly perform castration on animals anywhere from one or two days old to several months old. Castration affects the animal's hormones and therefore growth rate, meat fattiness, and some physical development factors such as urethra size. Cooperators Emily Fagan & Hannah Breckbill, Adam Ledvina and Bailey Lutz wondered if the timing of kid or lamb castration would affect the final hanging weights of their animals or the general health in their herds. Ledvina and Lutz assessed average daily gain (ADG) and health differences in kids castrated at four weeks or eight weeks old (Ledvina) and eight or twelve weeks old (Lutz), while Fagan & Breckbill assessed differences in lambs castrated at 1-4 or 6-8 weeks old. Lutz commented that "This trial will influence financial viability by determining the impact of castration on the growth and thus the financial yield of each goat. Additionally, I can see it influencing labor

Goats crowding up to a pasture fence at Adam Ledvina's. Photo taken by Ledvina in 2023.

(which also impacts financial viability) by helping to determine how important the timing of castration is." Fagan & Breckbill also hoped to "learn a lot about how boy sheep grow and gain weight, which will help us on the way to being more profitable with our sheep production."

One common reason for delaying castration until animals are several months old is that castration when the animals are young leads to them having narrower urethras later in life [1], [2]. This has been associated with increased rates of urinary calculi, mineral deposits that block the urethra and prevent animals from peeing. However, animal welfare and veterinary sources agree that castration while animals are very young is safe as long as the animals are consuming feed or forage that has proper ratios of calcium to potassium [3]. Feed marketed for goats and sheep and most forage sources meet these criteria. Ledvina noted that "this trial may help show whether kidney stones could be a problem or not with timing of castration."

METHODS

Design

Trial management factors including species, castration method, feed type unique to each farm are shown in **Table 1**. Cooperators used different castration treatment ages based on their existing castration practices and preferences. Kids and lambs were born on-farm and assigned to castration timing treatments at the time of the first treatment (**Table 1, Figure A1**). Fagan & Breckbill and Lutz intentionally split twin boys into different castration treatments and otherwise randomly divided animals into castration groups. Ledvina randomly divided kids into treatments. All cooperators kept track of individual animals with numbered ear tags. Apart from the castration treatments, all goats were managed similarly: raised on pasture and receiving equal access to feed and water.

TABLE 1. Trial management for each farm in 2023.

	FAGAN & BRECKBILL	LEDVINA	LUTZ
Species	Sheep	Goat	Goat
Breed	Katahdin / Dorper cross	Kiko	Kiko
Animals per treatment group	10	5-7	5-6
Castration method	Burdizzo (Treatment A) Banded (Treatment B)	Banded	Banded
Treatment A	Castrate at 1-4 weeks old	Not Castrated	Castrate at about 8 weeks old
Treatment B	Castrate at 6-8 weeks old	Castrate at 4 weeks old	Castrate at about 12 weeks old
Treatment C	--	Castrate at 8 weeks old	--
Kidding dates	May 5 to May 19, 2023	Apr. 1, 2023	Mar. 7 to Apr. 15, 2023
Final Weighing date	Nov. 7, 2023 (slaughter, hanging weights)	July 1, 2023	Oct. 21, 2023
Pasture Description	Cool season pasture, mostly orchard grass and some legumes	Brush	April through May cool season pasture and grass/alfalfa hay. Late May into June grazing woodland and grassy pasture.

TABLE 2. Final hanging weights in Fagan & Breckbill's trial

	Hanging weight (lb)
Castrated at 1-4 weeks old	31
Castrated at 6-8 weeks old	28
Difference	3
Significantly different?	No

Measurements

All cooperators tracked goat or lamb day of birth and slaughter dates. Ledvina and Lutz recorded the weight of each individual goat from each of the two groups at about 4, 8, and 12 weeks old. Lutz also weighed the animals at birth. Average daily gains (ADG) were calculated from weights and animal ages. Fagan & Breckbill reported final hanging weights provided by processor. Cooperators also noted any illnesses in animals.

Data analysis

We used Fischer's LSD at a 90% confidence level to determine if there were significant differences in average daily gain or final hanging weight by castration treatment. For each metric, the difference between any 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 cooperators had completely randomized and replicated experimental designs (**Figure A1**).

RESULTS AND DISCUSSION

None of the cooperators found that castration affected lamb final hanging weight (Fagan & Breckbill)(**Table 2**) or goat ADG (Ledvina and Lutz)(**Tables 3 and 4**). Lutz weighed their kids on four dates (at birth, at 8 week castration treatment, at 12 week castration treatment, at time of sale) and found no differences in ADG of castration treatment groups within any of these time periods. ADG between 8-week castration treatment to time of sale is shown in **Table 4** for comparability with Ledvina's data. No one observed differences in animal health or health issues related to castration between the treatments, either. Fagan reports that the cooperators "learned that different castration timing doesn't matter as much as I thought it might."

Ledvina was especially interested to find that his uncastrated treatment group had no differences in ADG compared to the two castration treatments (**Table 3**). "Many assume leaving bucks intact results in higher growth rates, but this test proved overwise," he said. Recent academic literature has similarly found that castration timing [5] and castration vs. leaving intact [4] does not affect goat growth rate though these studies castrated much older goats (3-6 months) than the cooperators in this trial did.

TABLE 3: Kid weights and Average Daily Gain (ADG) for Ledvina's trial.

	4-week weight (lb)	12-week weight (lb)	Average gain (lb), 4 weeks to 12 weeks	ADG (lb/day), 4 weeks to 12 weeks
Not Castrated	18	49	31	0.51
Castrated at 4 weeks old	22	55	33	0.54
Castrated at 8 weeks old	18	47	30	0.47
Significantly Different?	--	--	No	No

TABLE 4: Kid weights and ADG for Lutz's trial.

	8-week weight (lb)	Weight at time of sale (lb)	Gain (lb), 8 weeks to time of sale	ADG (lb/day), 8 weeks to time of sale
Castrated at about 8 weeks old	19	63	44	0.29
Castrated at about 12 weeks old	17	52	35	0.23
Difference	2	11	9	0.06
Significantly different?	--	--	No	No

CONCLUSIONS AND NEXT STEPS

No farms found any differences in animal yield metrics or animal health by castration timing. Ledvina and Fagan agreed that they will now probably stick with an early castration date – Ledvina to "prevent any accidental breeding," and Fagan because "it's easier to handle the lambs, and to do the castration itself [at an earlier date]." Lutz still wants to experiment further with what castration timing will work best on their operations. All three cooperators were happy to have answered some questions through this trial and were eager to continue experimenting with their livestock methods. Ledvina calls for "more farms to participate in these sorts of trials!"

APPENDIX – TRIAL DESIGN AND WEATHER CONDITIONS

5-10 goats	5-10 goats
4 weeks	**8 weeks**

10 lambs	10 lambs
Castrated	**Intact**

FIGURE A1. Experimental design used by Ledvina and Lutz (top) and Breckbill & Fagan (bottom).

REFERENCES

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[3] A. Bassett, "Urinary Calculi in Goats." A Greener World, 2009. Accessed: Sep. 29, 2023. [Online]. Available: https://agreenerworld.org/wp-content/uploads/2018/05/TAFS-3-Urinary-Calculi-in-Goats-v1.pdf

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