



Livestock Integration

UPDATE MARCH 2024



Why Livestock are Integrated at Dakota Lakes

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Period covered: 28-Sep-2023 to 28-Mar-2024

The following report was produced as a part of the Cooperative Agreement Between NRCS and Dakota Lakes Research Farm Corporation, Award Number NR226740XXXXC004.

Livestock play a vital role in harvesting cover crops and perennial forages used in crop rotations. Livestock grazing generates short-term economic returns while forages provide long-term soil benefits. Grazing crops in the field, rather than removing grain and hay, ensures that organic matter and mineral nutrients remain in place and are returned to the soil.

Perennials offer additional advantages. Their deep root systems stay active deeper in the soil and for a longer portion of the growing

season compared to annuals. These roots transport nutrients from deeper layers back to the surface, making them accessible to subsequent crops. In areas with high water tables, perennials also help reduce salinity by drawing down excess water and mitigating saline seeps. When cattle graze cropland and consume supplemental feed such as soybean meal and grain, most of the nutrients and organic matter from those inputs remain on the land, contributing to soil fertility.



Sept. 27, 2023. Steers grazing a standing cover crop on heavy clay soils at the “North Unit” of Dakota Lakes Research Farm.

March 2024

On October 4, 2023, Dakota Lakes received 67 steers from a local rancher, integrating them with an existing group of 12 steers. For the following three-and-a-half weeks, the herd grazed both a standing cover crop—primarily composed of cool-season grasses—and milo residue at the North Unit. These fields, characterized by dryland conditions and clay soils, supported initial grazing activities.

In November, the steers were moved to the main farm, where grazing continued on corn residue and cover crop swaths in irrigated fields. During this phase, a mobile feed bunk train was first deployed. This system comprised four commercially manufactured feed bunks, each modified with skids and connected in a series. The lead bunk was attached to an irrigator, enabling the entire train to move daily with the irrigation system. This approach allowed the feeding site for grain and hay to shift regularly across the field, thereby distributing animal impact more evenly compared to conventional stationary bunk systems.

Oct 17, 2023. This mineral feeder was placed on a field of sorghum residue. When ~two inches of rain was received, excessive disturbance occurred in its vicinity.





Oct 18, 2023. Pugging is visible in this sorghum field after a two-inch rainfall. However, the damage is much less than around the mineral feeder.

Grazing on cover crops concluded on December 6. This timeline was selected to avoid the challenges encountered the previous winter, when grazing was required beneath an icy snow crust. Between December 6 and 22, processed alfalfa hay was fed on an unirrigated alfalfa field (Field 3-1) using the mobile bunk system. Without irrigation to assist in movement, the feed bunks were relocated every three days using a tractor. High volume hoof impact near the feedbunk introduced some disturbance to the surrounding soil and may have caused damage to alfalfa crowns; the full extent of the impact will become clear once regrowth begins in 2024 (refer to the next six-month report for results). The amount of alfalfa impacted by excessive residue was much less than

the previous year, when processed hay was fed directly on the ground.

From December 22 through February 5, the feed bunk train was used on an irrigated corn field (Field 2-3), where alfalfa-orchardgrass hay was provided. The bunks were moved only once during this period. On January 5, the 67 steers provided by the rancher were sold at auction in Herreid, South Dakota. These steers entered Dakota Lakes weighing 848 lb (823 lb with a 3% shrink) and stayed for 92 days. At the time of sale, they averaged 1,024 lb, resulting in an average daily gain of 2.18 lb. Compensation was \$1.25 per pound of gain, translating to \$2.73 per head per day, or \$251 per head for the entire period.



Commercial feedbunks were fitted with skids and chained together to form a feed bunk “train.”

A basic economic analysis (see p. 6) indicated an expense of \$2.48 per head per day, not including labor or tractor costs. The most significant expenses were hay and cover crops. Future costs could be reduced by using lower-quality hay more efficiently and simplifying the cover crop seed mix by removing higher-cost species such as millet. It is also worth noting that this analysis excluded potential revenue from government programs designed to incentivize cover crop planting.

A “train” of feedbunks is chained to an irrigator. The irrigator is moved daily, which slowly pulls the bunks across the field. This results in greater distribution of urine, feces, and the animal disturbance to soil.



On February 7, the remaining 12 Dakota Lakes steers were transported to a processor in Dakota City, Nebraska. Excluding three animals affected by footrot, the average final weight for the group was 1,150 lb. Between May 30 and October 30, average daily gain was 1.37 lb, but this increased to 2.21 lb per day during the subsequent winter period (October 30 to February 5). This improvement is attributed to mild winter weather, enhanced forage quality, and increased grain supplementation. By the end of the feeding period, each steer was consuming an average of 16.5 lb of corn grain and 1.7 lb of flaxseed meal daily.



Feeding hay processed with a bale-processor on an alfalfa field resulted in a small band of residue stretching across the field. The hay was processed into feedbunks that were moved every ~three days.

Expenses for 67 stocker steers from Oct. 5 to Jan. 4.

	Quantity	Unit price	Total
Corn, lb.	36,834	\$0.08	\$3,091
Flaxseed meal, lb.	7,005	\$0.20	\$1,401
Hay bales, lb.	70,604	\$0.07	\$4,766
Swaths, ac.	27		\$2,101
Water			\$472
Bunks, \$	\$2,714		\$543
Mineral, bags	5	\$29.00	\$148
Peas, lb.	560	\$0.16	\$91
Sunflower screenings, lb.	2,290		
Standing cover crop, ac	43		\$2,670
Fencing supplies			
Total expense			\$15,282
Expense/head/day			\$2.48

*Rock Valley, IA hay prices on Jan 5: fair/good alfalfa/grass \$165/ton. Grass utility \$85-\$100/ton.

*Cover crop expenses include seed and fertilizer applications only.

*Bunk expenses are pro-rated over five years.



Hay was processed directly onto the ground in this field of corn residue.

Carcass grading revealed seven Select and two Standard steers—lower than anticipated based on ultrasound projections from previous years. The reduced grading was likely due to a shortened finishing period, as the steers were processed in early February (~17 months old) rather than in late March or April (~18–19 months). While the winter gain rate of 2.21 lb/day was acceptable, extending the finishing period by one to two months may have improved carcass quality to industry standards of High Select or Choice. Alternatively, a higher grain ration could have been provided in the final stage. The concentrate portion of the diet reached approximately 50% by the end, compared to more than 80% in many commercial feedlot operations.

Carcass data from nine Dakota Lakes steers butchered on Feb. 7, 2024

Hot carcass weight	Calculated yield grade	Stamped yield grade	Rib eye area	Marbling	Fat thickness	Kidney, pelvic, heart fat
644	2.67	2.4	10.5	336	0.3	1.74



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