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Forage-Based Beef Production Research at the Armstrong Outlying Research Farm

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Abstract
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Summary

Fifty-five yearling crossbred steers and 3C cow-calf pairs were used in a forage-based beef production system demonstration project at the Armstrong Outlying Research Farm. From May 11 to June 13, steers rotationally grazed a 41-acre grass pasture that was divided into eight paddocks. From June 13 to August 24, steers were placed in a drylot and fed berseem clover/oat soilage from a strip-intercropping system. Beginning June 5, 36 cow-calf pairs were allowed to rotationally graze the 41-acre pasture until September 18. Calf weight gains for the 110 days were 1.57 pounds per day, and total production from the pasture was 151 pounds per acre. No cow weight change or condition score change was measured. Total steer production was 29 and 580 pounds per acre or average daily gains were .67 and 2.23 pounds while grazing pasture and being fed in a drylot.

Introduction

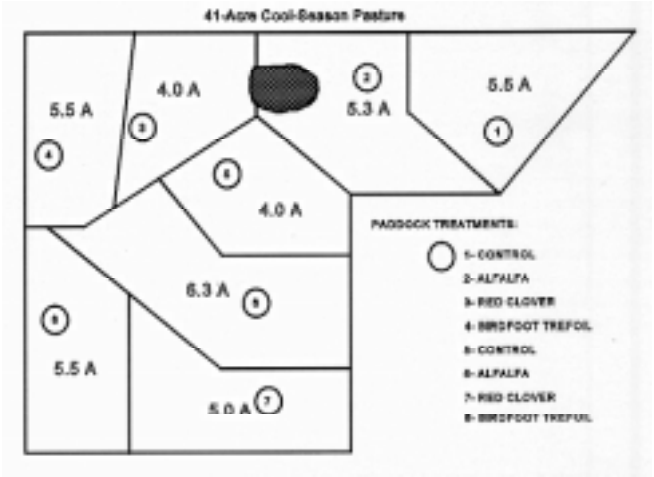
In order for moderate-sized, family-based farming operations to remain competitive, value-added livestock enterprises must be integrated with existing cropping enterprises. One such value-added enterprise would be the addition of a beef cow herd with retained ownership opportunities for the calves. Using a more diverse cropping system such as strip intercropping to produce forages for the livestock enterprise would create a more sustainable, less environmentally harmful farming system. Furthermore, integrating livestock and crop production will spread the financial risk over several enterprises. One difficulty associated with raising beef cattle is how best to manage abundant spring growth of perennial forage species, as well as how to accommodate the midsummer forage shortages commonly encountered when grazing cool-season grasses. The objective of this project is to demonstrate a beef production system optimizing forage utilization by lead-grazing spring pasture and feeding soilage from dhe small grain-legume strips of a strip intercropping system. Incorporating this enterprise into a total farming operation will more efficiency utilize available land, labor, and management resources.

Materials and Methods

Pasture Mamagement

In 1995, a 41-acre tall fescue pasture was divided into eight paddocks and interseeded wid=th legumes to rotationally graze for 105 days (Figure 1).

Figure 1. Armstrong grass pasture layout and interseeding treatments within paddocks.



On May 11, 55 yearling crossbred steers (average weight of 566 pounds) previously implanted with Ralgro2 were placed on the pastures to graze for 32 days. Steers were rotated among paddocks daily from May 11 to May 31 and every two to four days thereafter. Thirty-six cow-calf pairs were brought into the rotational grazing system on June 5 to follow the steers. Steers were removed from pasture June 13, placed in a drylot, and fed berseem clover/oat soilage (green chop). Cows were rotated among paddocks on dhe basis of available forage. This was calculated by measuring sward height with a falling plane meter (8.8 pounds per square yard) before animals entered a new paddock as well as when animals were removed from that paddock.

Days of grazing per paddock were calculated by assuming:

- 100 pounds of dry matter (DM) per acre for each centimeter of sward height.
- Cow feed intake was 3 % of body weight.
- 50% removal rate of the forage.

A = Available forage per paddock (lbs) = Sward height x 100 lbs DM per acre x paddock size x removal rate.

R = Required forage DM per day (lbs) = Total weight of cow (lbs) x 3 % Dry Matter Intake (DMI).

Days per paddock = A . R

Example:
Sward height = 15 cm
8 acre paddock
25 came (each 900 lbs) ~ Total weight = 22,500 (lbs)
A = 15 cm x 100 (lbs)/acre/cm x 8 acre x 0.5 = 6,000 (lbs)
R = 22,500 (lbs) x %3 = 675 (lbs)

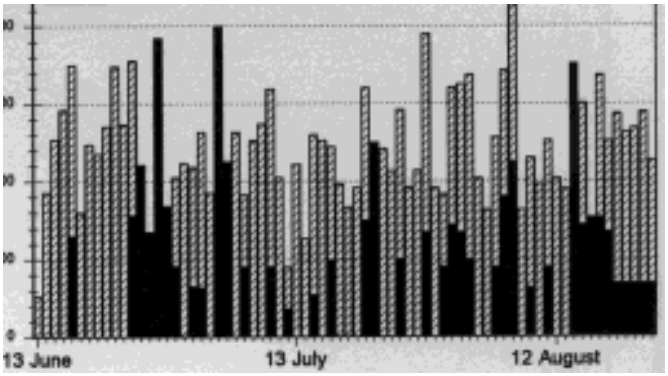
Days in Paddock = 6,000 . 675 = 9 days

To reduce the incidence of pinkeye, the pasture was clipped the third week of June to remove seedheads. Water was available in each paddock for animals. Cows were implanted with SynchroMate2 on June 1. The implant was removed June 10, and cows were bred by artificial insemination June 12. One bull was turned in with the cows from June 21 until August 1.

Soilage Feeding

A strip-intercropping system was established on 30 acres in the spring of 1994. A 20-foot strip of corn, soybeans, or oats with berseem clover was planted at two different strip orientations following contour line direction. This cropping system takes advantage of border effects on crop yields and the fixed nitrogen from the legume. Wide strips allow easy access of forage harvesting equipment throughout growing season. Because berseem clover is a true annual legume, it offers advantages in such an annual rotation. In 1995, 120 pounds per acre for oats and 16 pounds per acre for berseem clover were planted on May 6. Additionally, a bulk field (approximately 3 acres) of sloe-seeded berseem clover at 18 pounds per acre seed rate was planted as a reserve source of forage. Above-normal early spring rainfall and wet field conditions resulted in elimination of corn planting; soybeans were drilled (170,000 seeds per acre) in both strips designated for corn and soybeans. Beginning on June 13, fresh forage was chopped as soilage with a John Deere flail chopper (Model 16 A) from the 8 acres of oat-berseem clover strips. Forage was to be harvested daily or every other day as necessary to feed forage *ad libitum.* Because berseem clover stops growing after flowering begins, hay harvest was anticipated. On days when green-chopping strips was prevented due to bad weather or equipment breakdown, previously harvested hay was fed (Figure 2). Each load of soilage and hay was weighed and sub-sampled for dry matter concentration. The soilage averaged 29.5 % DM.

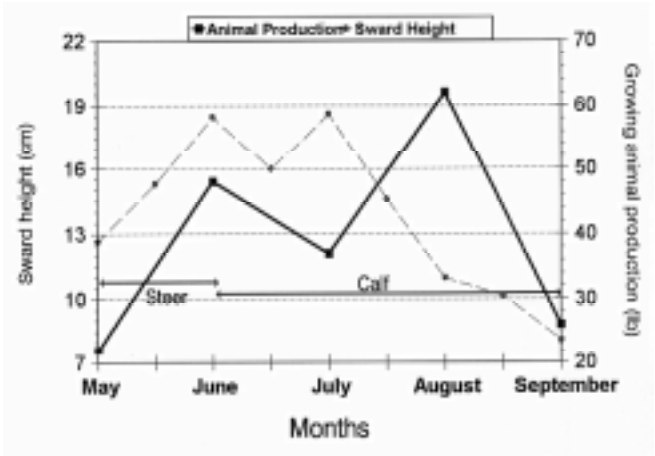
Figure 2. Daily soilage consumption by 55 steers in drylot.



Measurements

Steers were weighed unshrunk on May 11 before going onto pasture, June 14 when they were removed from pasture, and at 14-day intervals while they were in the drylot until August 24. Cows and calves were weighed monthly until termination of grazing on September 18. Total dry-matter yields of the pasture were calculated by hand-clipping a .25 square-meter area at 24 locations on May 5, July 17, and September 18. Sward heights were measured in 10 locations as animals were placed onto or taken off a paddock. Each load of harvested soilage and previously harvested hay was weighed and sub-sampled for dry matter concentration. Soybean yields were measured at the end of the growing season. Soybean yields were 37 bushels per acre.

Figure 3. Sward heights and animal production during grazing of grass pasture.



Results and Discussion

Pasture Performance

During 33 days of grazing, average daily gain of steers was .67, resulting in 29.5 pounds of steer production per acre. Over 110 days that cows and calves grazed, average cow weights increased 41 pounds. Cows' body condition score was 4.4 at the initiation of grazing and did not change over the grazing season. Calf average daily gain and weaning weights were 1.57 and 368 pounds, respectively. This system resulted in 152 pounds of calf production per acre (Table 1).

Table 1. Weight gain of steers, cows, and calves rotationally grazing tall fescue-based pasture interseeded with legumes.

Animal type	Initial weight	Daily gain	Total (lb/acre)
Steer[a]	556	0.7	29.5
Cow[b]	978	0.4	36.0
Calf	195	1.6	151.0
Total growing	-----	-----	180.5
Total animal[d]	-----	-----	216.5

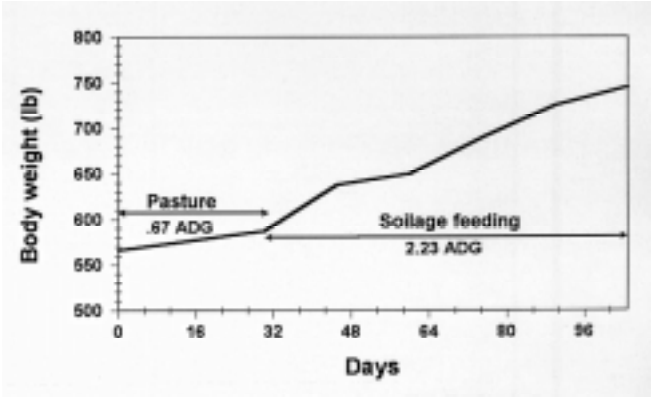
[a]Grazed at 1.34 steers/acre from May 11 to June 14.
[b]Grazed at 0.88 cow-calf pairs/acre from June 5 to Sept. 18.
[c]Calf plus steers.
[d]Calf plus steers plus cow.

Sward heights and forage yields were 12.7 cm and 1,823 pounds dry matter per acre at initiation of grazing on May 5; 15 cm and 2,002 pounds DM per acre on July 17; and 5 cm and 1,350 pounds DM per acre at termination of grazing September 18. Early in the grazing season, pounds of growing animals produced per acre tended to increase with increasing grass growth (Figure 3). A decrease in production occurred in July, probably due to high environmental temperature. As the forage growth began slow down in July, animal production showed an increase in August. This could be explained by the calves grazing in addition to receiving milk from the cow, increasing their weight gains and also contributing to the grazing pressure. The combination of increased grazing pressure and slowed forage growth led to decreasing sward heights. As available forage became a limiting factor in August and September, calf production decreased.

Feedlot Performance

Forage production as soilage harvested from the oat/berseem strips was 3.05 tons per acre of dry matter. An additional 7.6 tons of berseem clover dry matter were harvested from a bulk field. Furthermore, 13.6 tons of alfalfa hay were fed *ad libitum* on days when berseem regrowth was inadequate, or when rain prevented soilage harvest. Steer ADG for the 71 days of soilage feeding was 2.2 pounds with no grain supplementation (Figure 4).

Figure 4. Steer production from pasture grazing and soilage feeding.



Implications

For farming operations with a diverse mix of available pasture and crop ground, the inclusion of a cow herd into the operation could greatly increase the efficient use of resources: land, labor, and management. Practices such as rotational grazing and strip intercropping allow highly erodible land to be more productive without increasing erosion risk.

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