ZEA MAYS GRAZING IN CATTLE PRODUCTION SYSTEMS

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ABSTRACT
Nebraska producers have used silage maize (*Zea mays* L.) hybrids as a grazed forage in dairy and beef production systems. In an on-farm case study, farmers and researchers collaborated to gather information on production practices, grazing management, and plant characteristics of grazing maize within three forage-based dairy and beef systems. Production practices were generally similar to conventional grain corn production, except that in one system maize was seeded directly into a suppressed grass sod. Milk production from grazing maize was 23 kg/day/animal, compared to 24 kg/day/animal before using maize and 22 kg/day/animal after using maize. Average gain of stockers on maize was 1.0 kg/day over a 90 to 125 day period. Cows grazing maize interseeded into a mixed grass-legume sod gained 0.3 points condition score. Grazing maize complemented other forages within these grazing systems.

KEYWORDS
Beef, corn, dairy, grazing, on-farm case study, *Zea mays*

INTRODUCTION
In 1995, several Nebraska farmers used Baldridge Temperate Grazing Maize, a blend of silage maize hybrids selected for high whole-plant crude protein, as a grazed forage in beef and dairy systems. In the 1995 season, stocker gains on grazing maize ranged from 0.9 to 1.3 kg/day. Milk production from grazing maize increased 1.5 kg/day over production from cool-season pasture. High attendance at summer field tours and a winter grazing maize conference demonstrated that Nebraska farmers had sufficient interest in grazing maize to warrant more formal investigation.

The objective of this paper was to study production practices, grazing management and animal performance, and plant characteristics of grazing maize as a component of forage-based production systems for dairy cows and growing and finishing cattle.

METHODS
Two beef producers and one dairy producer who first used grazing maize in 1995 participated in this study. Because grazing maize was used within a total production system, preliminary interviews were held with the farmers to determine the intended contribution of grazing maize to each farm system. Farmers described their crop rotations, production practices and philosophy, and animal and non-animal enterprises (Murray et al., 1994).

Farmers recorded planting and tillage operations, chemical and fertilizer use, and water used for grazing maize. Animal units per ha, frequency of moving animals to fresh maize, amount of new forage given at each move, supplemental nutrition, and time required to manage grazing were recorded during the maize grazing period.

Initial and final weights of growing beef cattle were obtained during the maize grazing period. Milk production was measured during the maize grazing period for dairy cows, and for 12 days before and after the maize grazing period. Initial and final body condition scores for the maize grazing period were obtained for beef cows.

Researchers obtained whole-plant samples for biomass. These samples were separated into leaf, top and bottom half of stem, and ear fractions for crude protein analysis because animals preferentially grazed different plant parts. Sampling began on each farm before or when grazing began and continued throughout the grazing season.

During follow-up interviews, farmers described the actual contributions of grazing maize to their production systems.

CASE STUDY RESULTS
Dairy. Forty-nine lactating Holstein dairy cows, two Jersey bulls, and 12 dry cows grazed maize in a leader-follower system from 24 July to 4 August 1996. Grazing began when maize was fully tasseled. The stand was weed-free and had no disease or nutrient-deficiency symptoms. Stand population was 60,000 plants/ha.

Bulls and lactating cows received 0.12 ha fresh maize and 0.28 ha newly-established orchardgrass (*Cynodon dactylon*)-alfalfa (*Medicago sativa*) daily, alternating forages following each milking. Residue indicated that they grazed primarily leaves, ears, and the top 1/3 of the maize stems. Dry cows that followed grazed fallen leaves and the middle 1/3 of maize stems.

Previous to maize, lactating cows grazed orchardgrass-alfalfa pastures. After maize, cows grazed smooth bromegrass (*Bromus inermis*)-alfalfa pastures. Cows were supplemented with 5.5 kg/hd/day corn grain plus mineral at all times. During grazing, maize leaves, tops, and ears averaged 10.9% crude protein and maize forage mass averaged 8800 kg/ha.

Cows calved in March, 1996. Milk production during the 12 days before and after the maize grazing period averaged 24 and 22 kg/hd/day, respectively. During the grazing maize period, production averaged 23 kg/hd/day. The dairy farmer was satisfied with milk production while the cows grazed maize, and by using grazing maize, he was able to extend the rest period for his cool-season pastures during hot summer weather.

Beef - northeast Nebraska. On 25 June 1996, grazing maize was no-till drilled into 2.6 ha of a diverse cool-season grass/legume sod. Immediately afterwards, 45.5 l/ha of a 28% N solution was applied to suppress the sod. Seeding problems, compacted soil, and competition from the vigorously-recovering sod stunted much of the maize, although some patches were healthy. Peak maize forage mass during the grazing period was 1198 kg/ha.

The farmer's original intention was to graze this forage mix with growing steers. Since maize was poor and the grass-legume sward became too mature to support rapid gains, 20 cow-calf pairs and 1 bull were allowed to graze instead, from 13 September to 16 October 1996. Animals were forced to graze nearly all available forage with no supplements.

During grazing, whole-plant maize crude protein averaged 6.1% although leaves and ears averaged 8.4% crude protein. Cows gained 0.3 points in condition score over the 33-day grazing period. The farmer was disappointed with growth from the maize but pleased with cow performance. He intends to test sod-seeded maize again in

1997 in a pasture he believes will provide more favorable growing conditions.

Beef - south central Nebraska. On 20 May 1996, 37.5 kg/ha of grain saved from an October 1995 harvest of Baldridge Hi-Oil corn was drilled in 18 cm rows on two fields, 7.5 and 4.0 ha. Each field was fertilized with 130 kg N/ha.

On 4 July 1996, 49 Angus crossbred steers weighing 370 kg began grazing maize that was 98 cm tall at growth stage V10 in the 7.5 ha field. Previous to maize, steers grazed smooth bromegrass pasture. Animals received about 0.08 ha fresh maize daily and had free access to 24 ha smooth bromegrass that never exceeded 7 cm height during maize grazing. Mature alfalfa hay was provided ad lib from 23 August until grazing ended on 1 October 1996 with average hay disappearance of 3.3 kg/hd/day. Average daily gain was 0.93 kg.

On 5 July 1996, 12 Angus crossbred steers weighing 388 kg began grazing similar maize in the 4.0 ha field. Steers were supplemented with an average of 3.0 kg corn grain/hd/day and from 23 August to 7 October received a 20% crude protein supplement at 0.45 kg/hd/day. Steer weights averaged 405, 474, and 510 on 25 July, 10 September, and 5 November, respectively.

Maize plants did not appear thrifty in either field, had moderate leaf diseases, and lodged considerably near the end of grazing. Many cattle had slight footrot problems and 9 needed medical treatment in the 7.5 ha field. Upper leaves and stem tops were consumed until ears began to form. Cattle readily grazed ears. Stem bottoms rarely were eaten.

Gains were somewhat disappointing, but animal and plant health may have reduced animal performance. Also, dietary protein may have been inadequate, especially after mid-September. Nonetheless, this farmer considered the lack of yardage fees and reduced feed and manure handling to be major advantages. He plans to continue to use grazed maize for growing cattle.

CONCLUSIONS

The farmers reported that grazing maize was effective because it provided a necessary component in their forage-livestock systems. Maize may provide high-quality grazing when other high-quality forages are unavailable and may be used best by livestock requiring high nutrient intake. Grazing must be controlled carefully to avoid wasting forage while permitting adequate selection of the more nutritious plant parts.

Using corn as a grazed forage rather than a harvested feed was attractive to these farmers as a way to reduce harvest and feeding costs. Grazing maize might be most beneficial to farmers with small to mid-sized diverse operations with limited feeding facilities.

REFERENCES

Murray, H., D. Green-McGrath, L.S. Lev, and A.M. Morrow. 1994. Whole farm case studies: a how-to guide. Oregon State University Extension Manual 8558.

Figure 1
Dry matter yields of maize plant parts from south central Nebraska. Average of two fields in 1996.

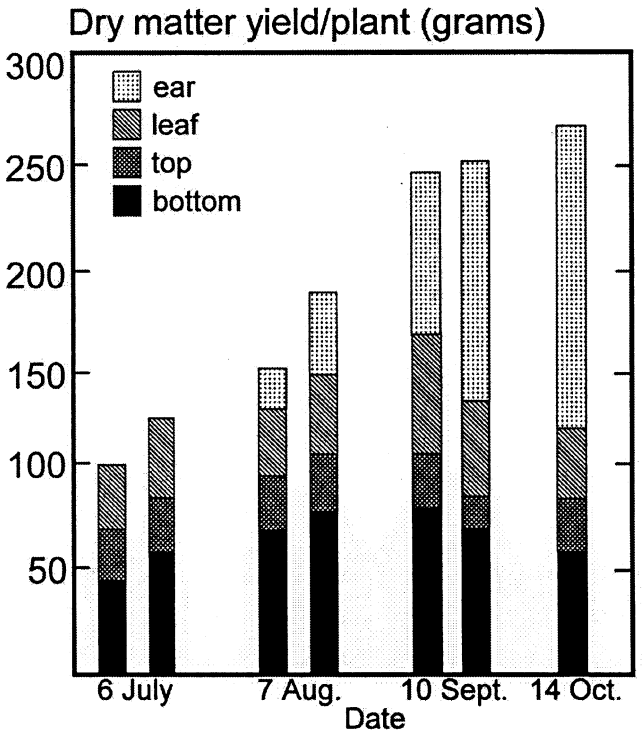

Figure 2
Crude protein of maize plant parts from south central Nebraska. Average of two fields in 1996.