# Supplemental Winter Feeding of Spring Calving Beef Cows on Bermudagrass Pasture

*J. E. McCroskey, Frank Bates, Robert Renbarger and W. C. Elder*

Over the past ten years bermudagrass has received considerable attention as a pasture forage for beef cattle. Acreage has increased in some areas of the state to the point that it is now considered a major forage and is being used as a year-round pasture. Research in Oklahoma and surrounding states has been rather extensive on such matters as variety, level of fertilization, stocking rates and forage yield per acre. Most of the work has been concerned with production during the growing season and very little data are available on cattle performance or supplemental feed requirements during the winter months.

Since Oklahoma is primarily a "cow-calf" state most of the bermudagrass pastures in the state are used by cows rather than steers. It has been established that cows grazing native grass pastures during the winter months need additional protein and sometimes a supplemental energy source. The amounts needed vary with location, quality and amount of grass and condition of cattle. It is reasonable to assume that cattle grazing bermudagrass during the dormant season also need some type of supplemental feed. A pilot trial was conducted at Heavener and Perkins in cooperation with the Agronomy Department comparing milo grain with cottonseed meal as a winter supplement for spring-calving cows. Results of the two-year study indicated a definite advantage for cottonseed meal. Chemical analyses of the grass and digestibility studies also indicate a need for a high-protein supplement during the winter months.

The current study was initiated in the fall of 1965 at the Ft. Reno Experiment Station to determine the level of protein supplement needed during the winter months by spring-calving beef cows grazing Midland Bermudagrass year-long. A comparison was also made to determine the need for supplemental phosphorus during the winter.

## Procedure

Sixty-four grade Hereford cows, ranging in age from three to four years, were selected from the Experiment Station herd and divided into four lots of sixteen on the basis of age, weight and previous treatment. All cows were bred to calve during the months of January through April. Three of the lots (1, 2 and 3) grazed a 140 acre pasture of Midland Bermudagrass while one lot (4) was used as a control and grazed an adjacent 140 acre native grass pasture. Lots 1, 2 and 3 received one, two and three pounds of cottonseed meal (41 percent C.P.) per head daily, respectively. Lot 4 cows were fed two pounds of cottonseed meal (41 percent C.P.) per head daily. This is the level which has been shown to be adequate for spring-calving cows on native grass pastures at Ft. Reno.

Work done in cooperation with ARS USDA.

One-half of the cows in lots 1, 2 and 3 were fed additional phosphorus in the form of monosodium phosphate (36 gm./head/day) in the cottonseed meal supplement. All cows on bermudagrass were fed salt free-choice. Lot 4 was fed a mineral mixture of salt and bonemeal (2:1) free-choice.

All lots on bermudagrass grazed a common pasture and were fed their supplements in individual stalls once daily, while cows on native grass (lot 4) were group-fed. All cows were injected with 1,000,000 I.U. of vitamin A early in January, 1966.

The bermudagrass pasture was cross-fenced into four equal pastures to facilitate rotational grazing. Cows were allowed to graze each pasture for approximately a week then were moved to another. It was necessary to mow the pastures occasionally to prevent spot grazing and to use a drag to scatter manure piles. Two hundred pounds of nitrogen was applied per acre in three equal applications during the growing season.

Data were collected on cow weight changes (bi-weekly), calf birth weights, intermediate calf gains, weaning weights and milk production. Blood samples were taken from one-half of the cows in each treatment group at the start (December 3, 1965) and at the end of the winter (April 15, 1966) to study the changes in plasma phosphorus content.

Milk production was estimated by weighing the calf prior to and after nursing following a 12-hour period away from the cow. The sum of two successive 12-hour periods was used to estimate 24-hour milk production. Milk production data were obtained six times during the nursing period.

## Results and Discussion

The effects of level of winter protein supplement (cottonseed meal) on cow and calf performance are shown in Table 1. Postcalving weight losses of cows grazing bermudagrass diminished with each one-pound increase in winter supplement. Cows on native grass receiving two pounds of cottonseed meal had similar postcalving loss in weight to those grazing bermudagrass and consuming three pounds of supplement. When postcalving weight loss is expressed as a percent of the initial winter weight it can be seen that the cows receiving the least amount of winter supplement on bermudagrass lost a higher percent of body weight (lots 1, 2 and 3). The percentage weight loss of cows grazing native grass was similar to lot 3. All are within the "safety zone" of winter weight loss which has been established in previous wintering studies on native grass at Ft. Reno. At weaning all lots were similar in body weight and were heavier than at the start of the previous winter, indicating that winter weight losses were not excessive and that grass was adequate during the growing season to allow for restoration of body tissues.

Average 24-hour milk production of cows grazing bermudagrass was greater with each increment of cottonseed meal. Cows grazing

**Table 1. Effect of Level of Protein Supplement on Cow and Calf Performance**

| Pasture | Bermuda | Bermuda | Bermuda | Native |
|---|---|---|---|---|
| Lot No. | 1 | 2 | 3 | 4 |
| Level of C.S.M. (lb.) | 1 | 2 | 3 | 2 |
| No. of Cows | 16 | 16 | 16 | 16 |
| **Cow Data:** | | | | |
| Initial wt. (lb.) | 1088 | 1090 | 1105 | 1066 |
| Wt. change from initial (lb.) | | | | |
| to post calving | —130 | —118 | —100 | —101 |
| to weaning | + 25 | + 30 | + 88 | + 39 |
| Postcalving wt. loss (% of initial) | 12.0 | 10.9 | 9.0 | 9.4 |
| Ave. 24-hr. milk (lb.) | 12.5 | 13.0 | 14.1 | 13.7 |
| **Calf Data:** | | | | |
| Ave. birth wt. (lb.) | 74 | 85 | 79 | 73 |
| Ave. weaning wt. (lb.)[1] | 476 | 487 | 489 | 444 |

[1] Weaning weights adjusted to 205-day steer equivalents.

native grass (lot 4) were intermediate in milk production between lots 2 and 3 on bermudagrass. Figure 1 shows the pattern of milk production for all four lots during the nursing period. It is interesting to note that the cows grazing bermudagrass (lots 1, 2 and 3) ranked in the same order at each milk sampling date. Lot 4 cows were more variable in milk production than the other three lots but had a higher average production than both lots 1 and 2. It is surprising that the differences in milk production between treatment groups on bermudagrass are rather small when we consider the relative differences in amounts of supplement fed. If we use lot 4 as a control it appears that between two and three pounds of cottonseed meal are needed for cows grazing bermudagrass to equal the milk production obtained on native grass with two pounds of supplement.

Level of cottonseed meal fed during the winter had no consistent effect upon calf birth weight but weaning weights increased slightly with level of supplement (Table 1). Although cows fed one pound of cottonseed meal (lot 1) weaned lighter calves than the other lots on bermudagrass, they still weaned heavier calves than those on native grass fed two pounds of supplement (lot 4). This is not consistent with the milk production data obtained if we assume calf gains are directly correlated with milk produced. However, it has been shown that calf gains and milk production of the dam are highly correlated only through the first four months of lactation. Therefore, a major portion of the nutrient intake by the calves probably came from grass during the last three months. A possible explanation for the low weaning weights of calves from cows grazing native grass lies in the fact that they had no shade during the summer months, while those on bermudagrass did.

Phosphorus supplementation results are shown in Table 2. The data indicate that additional phosphorus was beneficial at both the one

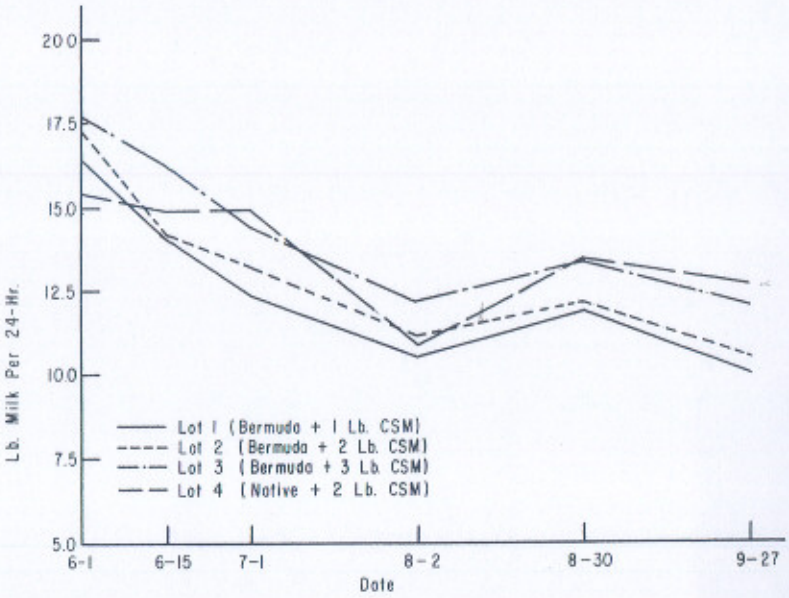


**Figure 1. Effect of level of protein supplement on milk production.**

and two pound levels (lots 1 and 2) of cottonseed meal but not at the three pound level (lot 3). Cows in lots 1 and 2 receiving supplemental phosphorus lost less weight through calving and were heavier at weaning than cows on the same level of supplemental protein without additional phosphorus. Milk production and calf birth weights were not improved by additional phosphorus but there was a slight increase in calf weaning weight as a result of phosphorus supplementation in lots 1 and 2. As would be expected, the greatest effect of phosphorus supplementation was observed with cows fed only one pound of cottonseed meal (lot 1).

Table 3 shows the plasma phosphorus content of cows grazing bermudagrass at the start and end of the wintering period. Apparently, three pounds of cottonseed meal along with the pasture provides adequate phosphorus to meet the requirements of the cow during gestation. Although the phosphorus levels are quite variable there is an indication that plasma level of phosphorus was improved on the low level of cottonseed meal by feeding additional phosphorus. It should be pointed out that some workers feel that a level of 4.0 mg. phosphorus per 100 ml. blood plasma is adequate. Therefore, it would appear that even the lowest level of cottonseed meal did not result in abnormally low plasma levels of phosphorus. It must be recognized, however, that calcium and phosphorus are mobilized from the skelton during periods of inadequate dietary intake. Thus, it is quite likely that the cows on the lowest level of intake were drawing on their reserves in order to maintain a normal level in the blood.

**Table 2. Effect of Supplemental Phosphorus on the Performance of Cows and Calves Grazing Midland Bermudagrass**

| Lot No. | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|
| Phosphorus supplement | 0 | + | 0 | + | 0 | + |
| No. of Cows | 8 | 8 | 8 | 8 | 8 | 8 |
| **Cow Data:** | | | | | | |
| Initial wt. (lb.) | 1102 | 1073 | 1084 | 1096 | 1093 | 1117 |
| Wt. chg. from initial (lb.) | | | | | | |
| to postcalving | —137 | —123 | —129 | —107 | — 99 | —101 |
| to weaning | — 6 | + 43 | + 35 | + 25 | + 89 | + 86 |
| Postcalving wt. loss (% of initial) | 12.4 | 11.5 | 11.9 | 9.8 | 9.1 | 9.0 |
| Ave. 24-hr. milk (lb.) | 12.0 | 12.3 | 15.1 | 13.0 | 13.8 | 13.5 |
| **Calf Data:** | | | | | | |
| Ave. birth wt. (lb.) | 75.6 | 73.0 | 80.1 | 89.1 | 83.1 | 75.4 |
| Ave. weaning wt. (lb.)[1] | 471 | 481 | 483 | 490 | 500 | 478 |

[1] Weaning weights adjusted to 205-day steer equivalents.

Although these data indicate only a slight advantage to phosphorus supplementation, it is a good practice to provide a mineral mixture containing phosphorus at all times, especially during the winter months.

## Summary

Sixty-four mature grade Hereford cows were allotted into four equal groups to determine the level of winter protein supplement required by spring-calving cows grazing Midland Bermudagrass year-round. One group (lot 4) was used as a control and grazed an adjacent native grass pasture and was fed according to established requirements for cows grazing native grass pasture at Ft. Reno during the winter (2 lb. C.S.M./hd./day). One-half of each lot of cows grazing bermudagrass was fed additional phosphorus (36 gm. monosodium phosphate/hd./day) to study the need for supplemental phosphorus by cows grazing Midland Bermudagrass.

The data show that cow weight changes, milk production and calf weaning weights were improved with each one-pound increase in cottonseed meal up to three pounds. It appears that between two and three pounds of cottonseed meal may be needed by cows grazing bermudagrass to accomplish the same cow weight changes and milk production obtained on native grass under recommended feeding conditions. However, calf weaning weights were higher for cows wintered on bermudagrass and one pound of cottonseed meal than for those on native grass and two pounds of supplement. Low weaning weights on native grass may have been due to the extremely hot summer and the lack of shade.

Supplemental phosphorus appeared to improve cow and calf performance for the lots fed one and two pounds of cottonseed meal per

**Table 3. Effect of Supplemental Phosphorus on Plasma Phosphorus of Cows Grazing Midland Bermudagrass**

| Lot No. | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|
| Phosphorus supplement[1] | 0 | + | 0 | + | 0 | + |
| No. of Cows | 4 | 4 | 4 | 4 | 4 | 4 |
| Plasma Phosphorus (mg./100 ml.) | | | | | | |
| 12-3-65 | 5.9 | 5.5 | 4.7 | 5.6 | 5.3 | 6.0 |
| 4-15-66 | 4.1 | 6.5 | 5.3 | 5.9 | 4.0 | 4.5 |
| Ave. change | —1.8 | +1.0 | +0.6 | +0.3 | —1.3 | —1.5 |

[1] One-half of each lot received no supplemental phosphorus, while the other half received 36 gm. monosodium phosphate (7.2 gm. phosphorus) per head daily during the winter.

head daily but had no apparent beneficial effect on the lot fed three pounds of supplement. Although blood phosphorus levels were quite variable, it appeared that there was an improvement in phosphorus level of the plasma of cows fed one pound of cottonseed meal when additional phosphorus was provided.

Results of this one-year study suggest that two pounds of cottonseed meal as a winter supplement is adequate for satisfactory performance of mature spring-calving beef cows grazing Midland Bermudagrass year-round. The data also suggest the need for supplemental phosphorus during the winter months, especially if low levels of protein supplement are fed.