# Effect of field pea based creep feed on intake and digestibility of nursing beef calves grazing native range in western North Dakota

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## Impact

Supplemental creep feed increased total feed intake of nursing calves, without affecting forage or milk intake. Grazed diets of nursing calves declined in crude protein and digestibility with advancing season.

## Summary

Effects of pea-based creep feed on intake of nursing calves grazing native range in western North Dakota was investigated using eight ruminally cannulated Angus x Hereford nursing steer calves (320 ± 96 lb initial BW). A completely randomized design was used with two treatments: 1) no creep feed control and 2) supplemented. Supplemented calves received 0.45% BW (DM basis) creep feed daily of the field pea-based creep feed (20% CP, 0.6% Ca, 0.4% P). Total feed intake was higher ($P = 0.09$) for the supplemented compared with the control calves. No differences were observed in forage ($P = 0.40$) or milk intake ($P = 0.90$). Supplemented calves tended to consume forage higher ($P = 0.07$) in CP compared with controls. Data indicate that supplementation of nursing calves with a pea based creep increases total intake without altering forage or milk consumption.

## Introduction

Supplemental creep feed can increase weaning weights of nursing calves (Faulkner et al., 1994, Lardy et al., 2001, Loy et al., 2002). Lardy et al. (2001) found metabolizable protein to be the first limiting nutrient for nursing calves, while Loy et al. (2002) found energy to be the first limiting nutrient. This could be due to different forage quality available to the calves. Forage diet samples from Lardy et al. (2001) averaged 12.5% CP and 54.8% in vitro organic matter digestibility (IVOMD). Loy et al. (2002) had forage that averaged 10.2% CP and 53% IVOMD.

Potential value of creep feed in a cow/calf operation is dependant upon increased weaning weight, ability to stretch tight forage supplies, and improved feed intakes at weaning. Research by Lardy et al. (2001) shows that forage intake as a percent of BW tended ($P = 0.09$) to be higher in the non-supplemented calves than calves receiving supplemental undegraded intake protein (UIP) in the form of sulfite liquor-treated soybean meal and feather meal. However, Loy et al. (2002) found no differences in forage intake between supplemented and non-supplemented calves. Milk intake did not differ between supplemented and non-supplemented calves in either study. Krysl et al. (1989) found that small amounts of soybean meal and steam-flaked sorghum grain had little effect on forage intake, but both increased total tract OM digestion in steers. However, increased starch intakes may lead to depressions in forage digestibility when starch-based creep feeds are fed at high levels. Our objectives were to determine the effects of pea-based creep feed on forage intake, supplement intake and ruminal fermentation of nursing calves grazing native range.

## Procedure

Research was conducted at North Dakota State University Dickinson Research Extension Center and used eight ruminally cannulated Angus x Hereford nursing steer calves (320 ± 96 lb initial BW). Calves were allotted randomly to two treatment groups: 1) no creep feed control and 2) supplemented . Supplemented calves received 0.45% BW of a 20% CP (DM basis) field pea-based creep feed (Table 1). Previous research conducted at Dickinson Research and Extension Center shows that this creep feed formulation is optimum for calf performance.

All calves grazed native pasture with their dams from July 1 to November 5. Salt and mineral was available on a continuous basis. Measures of calf responses to treatment were taken July, August, September, and October and included BW, fecal output, milk consumption, diet composition, and digestion. Grazed forage quality was analyzed for organic matter (OM), neutral detergent fiber (NDF), acid detergent fiber (ADF), crude protein (CP), in vitro organic matter digestibility (IVOMD), and acid detergent insoluble nitrogen (ADIN).

## Results

Supplementation did not alter grazed forage NDF, but tended to decrease ADF ($P = 0.09$) and tended to increase CP ($P = 0.07$; Table 2). Grazed forage ADIN and IVOMD were not altered by supplementation. There were no seasonal effects for grazed forage NDF or ADF ($P > 0.10$; Table 2). Crude protein and ADIN decreased linearly with advancing season ($P \# 0.03$). In vitro organic matter digestibility decreased ($P < 0.01$)

from July (58.5%) to October (41.3%). Calf weight was similar ($P$ = 0.51) between treatments at the beginning of the trial (control = 310 lb; supplemented = 331 lb); however in October supplemented calves were heavier ($P$ = 0.05; control = 497 lb; supplemented = 569 lb).

Forage intake was not different ($P$ = 0.89) between treatments, but increased linearly with advancing season ($P$ = 0.025; Table 3). Milk intake was similar ($P$ = 0.55) between control and supplemented calves, but decreased linearly ($P$ = 0.001) over time when expressed as a percentage of calf BW. Supplement intake (lb/d) increased linearly ($P$ = 0.002) over time. This was due to the research protocol. Calves were fed at a % of BW consequently creep intake (lb/d) increased as calves grew. Supplemented calves had greater total intake (forage + milk + creep; $P$ = 0.05) than control calves.

Organic matter and CP digestibilities of the grazed forage were higher ($P$ = 0.004; Table 4) for the supplemented calves than the control calves. With advancing season, NDF, ADF, and OM digestibilities decreased linearly ($P$ < 0.01; Table 4).

## Discussion

Forage intake did not differ between the two treatment groups, which is similar to the findings of Lardy et al. (2001) and Loy et al. (2002), but contradictory to the findings of Faulkner et al. (1994). Milk intake was not different between the two treatment groups, and, as a percentage BW, decreased over time. Lardy et al. (2001) and Loy et al. (2002) reported similar findings. Total intake of the supplemented calves was higher than the total intake of control calves, which also agrees with data from Lardy et al. (2001) showing that nursing calves receiving supplement had greater total intakes than control calves.

There was no treatment effect on total tract digestibility of NDF and ADF of the forage, but treatment effects were present for OM and CP digestibilities, which were similar findings as Krysl et al. (1989).

Calves that received supplement had similar forage intake compared to control calves, with total intake being higher, resulting in greater weight gains and weaning weights for the supplemented calves. Supplemented calves had higher total tract digestibilities of OM and CP compared to control calves.

## Implications

Forage quality declines with advancing season in western North Dakota. A field pea based creep feed may be used to increase total energy intake and improve nutrient status in nursing calves. More research is necessary to define optimum creep feed level and economics under southwestern North Dakota conditions.

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**Table 1.** Supplement composition (dry matter basis).

| Ingredient | % |
|---|---|
| Field peas | 62.10 |
| Wheat middlings | 31.05 |
| Molasses | 5.00 |
| Limestone | 1.80 |
| Trace mineral & vitamin premix | 0.05 |
| **Laboratory Analysis** | |
| CP | 19.11 |
| IVOMD | 88.10 |

**Table 2.** Effects of season on grazed forage diet quality (OM basis).

| | Treatment | | | | Season | | | | | Contrast | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **CON** | **SUP** | **SEM[a]** | ***P*** | **July** | **Aug** | **Sept** | **Oct** | **SEM[a]** | **L[b]** | **Q[c]** | **C[d]** |
| OM | 84.8 | 86.2 | 1.38 | 0.49 | 88.4 | 81.4 | 87.5 | 84.6 | 1.96 | 0.84 | 0.32 | 0.02 |
| | ----------%, OM basis---------- | | | | | | | | | | | |
| NDF | 67.9 | 66.4 | 0.96 | 0.32 | 68.6 | 66.6 | 68.6 | 64.9 | 1.41 | 0.24 | 0.55 | 0.10 |
| ADF | 40.8 | 39.2 | 0.57 | 0.09 | 40.0 | 40.2 | 41.1 | 38.7 | 0.92 | 0.56 | 0.17 | 0.27 |
| CP | 8.6 | 9.8 | 0.36 | 0.07 | 9.7 | 10.3 | 8.1 | 8.6 | 0.57 | 0.03 | 0.92 | 0.08 |
| ADIN | 0.23 | 0.25 | 0.015 | 0.54 | 0.25 | 0.29 | 0.21 | 0.21 | 0.020 | 0.02 | 0.30 | 0.08 |
| IVOMD | 52.7 | 53.4 | 1.51 | 0.76 | 58.5 | 57.1 | 55.3 | 41.3 | 1.28 | <0.001 | <0.001 | 0.003 |

[a]SEM=standard error of the mean
[b]L=linear contrast
[c]Q=quadratic contrast
[d]C=cubic contrast

**Table 3.** Effect of treatment and period on intakes of nursing calves (DM Basis).

| | Treatment | | | | Season | | | | | Contrast | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CON | SUP | SEM[a] | *P* | July | Aug | Sept | Oct | SEM[a] | L[b] | Q[c] | C[d] |
| **Intake, lb, DM/day** | | | | | | | | | | | | |
| **Milk** | 2.23 | 2.29 | 0.32 | 0.90 | 2.60 | 2.26 | 2.11 | 2.07 | 0.31 | 0.23 | 0.62 | 0.83 |
| **Forage** | 5.10 | 5.99 | 0.68 | 0.40 | 3.69 | 4.18 | 6.86 | 7.44 | 0.48 | <0.001 | 0.93 | 0.30 |
| **Total** | 7.33 | 10.26 | 1.03 | 0.09 | 7.02 | 7.32 | 10.05 | 10.78 | 0.57 | <0.001 | 0.71 | 0.36 |
| **Intake, % BW** | | | | | | | | | | | | |
| **Milk** | 0.58 | 0.54 | 0.04 | 0.55 | 0.81 | 0.58 | 0.50 | 0.39 | 0.075 | <0.001 | 0.31 | 0.45 |
| **Forage** | 1.28 | 1.31 | 0.127 | 0.89 | 1.18 | 1.08 | 1.50 | 1.42 | 0.117 | 0.025 | 0.94 | 0.12 |
| **Total** | 1.86 | 2.29 | 0.125 | 0.05 | 2.21 | 1.88 | 2.18 | 2.02 | 0.139 | 0.88 | 0.54 | 0.09 |

[a]SEM=standard error of the mean
[b]L=linear contrast
[c]Q=quadratic contrast
[d]C=cubic contrast

**Table 4.** Total tract digestibilites (% OM basis) of nursing calves grazing native range.

| | Treatment | | | | Season | | | | | Contrast | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Item** | **CON** | **SUP** | **SEM[a]** | ***P*** | **July** | **Aug** | **Sept** | **Oct** | **SEM[a]** | **L[b]** | **Q[c]** | **C[d]** |
| **NDF** | **46.0** | **45.6** | **1.82** | **0.88** | **53.0** | **53.1** | **41.0** | **36.0** | **2.85** | **< 0.001** | **0.31** | **0.37** |
| **ADF** | **44.3** | **41.7** | **1.92** | **0.35** | **49.0** | **51.7** | **38.6** | **32.7** | **3.01** | **< 0.001** | **0.10** | **0.25** |
| **OM** | **45.4** | **57.7** | **2.07** | **0.004** | **58.2** | **56.4** | **46.0** | **45.5** | **2.96** | **< 0.001** | **0.80** | **0.34** |
| **CP** | **25.1** | **48.3** | **4.40** | **0.004** | **36.2** | **44.2** | **27.2** | **39.2** | **4.98** | **0.42** | **0.65** | **0.03** |

**[a]SEM=standard error of the mean**
**[b]L=linear contrast**
**[c]Q=quadratic contrast**
**[d]C=cubic contrast**