Does limiting winter rations of beef cows affect

▲ COW WEIGHT GAINS?
▲ CALF PRODUCTION?
▲ PERFORMANCE OF CALVES?

A DICKINSON EXPERIMENT STATION REPORT

By Larkin Langford, Raymond Douglas and M. L. Buchanan

In November, 1950, a beef cow wintering experiment was initiated at the Dickinson Experiment Station. The experiment was designed to study the effects of below-maintenance winter rations upon beef cows and upon their offspring. Rations used were either corn silage and native prairie hay or corn silage and mixed crested wheatgrass and bromegrass hay. Soybean oilmeal was added as protein supplement in some lots. Crushed rock salt and steamed bonemeal were made available in a 2 to 1 mixture at all times.

All cows were divided as equally as possible into two groups, on the basis of age, body weight and past performance. Each group was subdivided into 2 lots, then expanded to 3 lots after 1 year for wintering on the various rations. Rations were set up at 2 nutritional levels, called a "normal" and "low"; the low being 75 percent of the normal and containing the same ingredients.

The recommendations of the National Research Council for wintering a 1,100 pound cow were .8 pound of digestible protein and 9.0 pound of total digestible nutrients per day. Using average estimated analyses of available feeds, the "normal" ration consisting of 30 pounds corn silage and 10 pounds tame grass hays met or slightly exceeded these recommended levels. The "normal" ration of 30 pounds corn silage and 10 pounds native hay fell short of the recommended protein level. However, feed samples analyzed from time to time have been found to contain more protein than the estimated analyses, leading to the conclusion that the "normal" rations contained enough nutrients to meet the recommendations of the National Research Council.

The low, or 75 percent rations probably also contained adequate amounts of digestible protein at times, depending upon the quality of the silage and hay

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being used. These low rations did not supply the recommended minimum amount of T. D. N. However, as mentioned above, soybean oilmeal was added in 2 of the lots. To the normal ration of silage and native grass hay, 8 pounds of soybean oilmeal were added and 1 pound of hay was removed in order to keep the T. D. N. about constant. To the low ration of silage and native grass hay, .6 pound of soybean oilmeal was added and .75 pound of hay was removed.

Calves were dropped beginning Apr. 1 each year and winter feeding in dry lot was continued until about May 1 each year. During the period from calving until the close of the winter feeding period, cows on the normal level rations were fed 7 pounds daily of ground barley and oats mixed 1 to 1. Cows on the low level rations were allowed 5.25 pounds or 75 percent as much grain during this period.

All cows and calves were grazed together each summer, on crested wheatgrass pasture in May and early June, and on native grass pasture after mid-June. Calves were weaned about Oct. 31 each year, and the cows were returned to the same lots to which they were originally assigned. Necessary replacements and additions to the cow herd always consisted of bred yearling heifers from the herd. Individual weights of all animals were taken at monthly intervals. Winter feed was weighed and fed to each lot once daily.

The 6 rations used during the 6-year experiment were as follows:

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Corn silage, lb./day	30	30	22.5	22.5	30	22.5
Crested wheatgrass and bromegrass hay	10		7.5			
Native prairie grass hay		10		7.5	9	6.75
Soybean oilmeal					.8	.6

BODY WEIGHT OF COWS

The most readily observed difference among cows on the normal and low rations was the change in body weight over winter. The better fed cows usually gained weight while the poorly fed cows lost weight. The spring weights were taken after the majority of the cows had calved. The mean amount of weight gained over winter by the cows on normal rations in lots 1, 2 and 5 were 26, 3 and 31 pounds. The mean amount of weight lost over winter by cows on low rations in lots 3, 4 and 6 were 41, 66 and 55 pounds. The spread in weight was, therefore, 67 pounds on crested wheat hay, 69 pounds on native hay, and 86 pounds on the soymeal supplemented rations. These weight differences were highly significant in each of the 3 pairs of rations ($P<.01$).

In spite of the great spread in spring weights, it was not easy to distinguish between lots when the cows came off pasture in the fall. The light weight cows gained more on pasture while nursing calves than the cows that had been fed better the preceding winter.

Good summer gains narrowed the spread between well-wintered and poorly wintered cows but seldom closed the gap entirely. The question of whether there was a difference in total yearly gain between the normal winter ration and low winter ration cows was submitted to statistical analysis. There was no significant difference between rations in yearly

weight gains for the first 3 years. However, when the same group of cows was compared for 4 or more successive years, the difference in yearly gain between normal and low level cows was significant. ($P<.05$).

Inspection of the yearly gains data of the normal and low winter rations lots suggests two reasons for the lack of significant difference in the first 3 years. First, the growth depressing effect of the low winter rations may be to some extent cumulative; and second, the difference in growth rate was so small that 4 or more years data were required to level out the effect of normal cow-to-cow variability within lots.

There was some indication that mixed crested wheatgrass and bromegrass hay held up cow weights better than native prairie hay as fed in these rations. No significant difference appeared in the weights of cows that received soybean oilmeal and those that did not. In computing the average gain per cow for each ration, it was necessary to adjust for the varying ages of the cows. In a 4-year study, using cows which averaged 4 years of age at the start, it was found that for each year younger in age the cows gained an additional 75 pounds. The total 4-year adjusted gain per head on the 6 rations was as follows:

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Adjusted gain	259	182	171	126	196	123

BIRTH WEIGHTS AND WEANING WEIGHTS

Birth weights and weaning weights of calves produced by the cows on the various rations also reflected the differences in level of feed intake. A simple average of birth weights and weaning weights of the 350 calves produced by 6 lots of cows in 6 years will give some idea as to comparative performance on the various winter rations. These weights were not adjusted for age or dam or for calf age at weaning.

Although the better fed cows consistently produced calves heavier at birth than the calves from the low-fed cows, the difference was often too small to be of statistical significance. In considering birth weights year by year; it was found that in only 2 calf crops, the second and sixth, was there a great enough spread in birth weight between the two

AVERAGE BIRTH WEIGHTS AND WEANING WEIGHTS OF 350 CALVES OVER 6 YEAR PERIOD.

	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6
Birth wt.	70.75	73.13*	68.07	68.26	72.78*	68.45
Weaning wt.	374**	376**	333	350	369**	342

*Heavier than Lot 3, 4, or 6 at 5% level.
**Heavier than Lot 3 at 1% level; heavier than Lot 6 at 5% level; Lot 2 heavier than 4 at 5% level.

Over the entire 6-year period of the experiment, cows fed a normal winter ration (lots 1, 2, 5) produced calves about 4 pounds heavier at birth and 32 pounds heavier at weaning than cows fed a 75 percent of normal winter ration (lots 3, 4 and 6.)

cow-ration levels to be significant, statistically. We could not say that this difference in birth weight got larger as the normal vs. low winter cow rations were continued.

There also was no definite trend toward a widening of the spread in weaning weights between the two ration groups as the experiment progressed. The year to year difference in weaning weight between calves from the normal and low wintered cows ranged from 21 pounds to 40 pounds, but there was not a definite trend toward widening of this difference from year to year. This difference in weaning weight of the two groups of calves was statistically significant at the 10 percent level in the first and second years at the 1 percent level in the third year, and at the 5 percent level in the last 3 years. When weaning weights were adjusted for age of dams, the difference in weaning weights between calves from normal and low ration cows was 33 pounds, only 1 pound more than the uncorrected 6-year average difference stated above.

STEERS FINISHED AS 2-YR. OLDS

When steer calves from the normal and low winter cow lots were handled alike from birth to market as finished 2-year olds, the steers from the better wintered cows gained slightly faster than steers from the low cow rations. The average difference between 2 groups of 34 steers each, over a 5-year period, was 23 pounds at weaning and 28 pounds at market time. The 5 pound greater weight spread at market time than at weaning was not statistically significant.

OUR INTERPRETATION OF RESULTS

1 Cows wintered on a ration of corn silage and grass hay at 75 percent of the usual standard level lost 41 to 66 pounds over winter, but tended to make up the lost weight on summer grass. The total yearly gain per cow was not greatly affected until the low winter ration was continued for 4 or more years. There was no real difference between tame grass hay, (crested wheatgrass and bromegrass) and native prairie hay when fed with corn silage. Supplemental protein did not improve these rations noticeably.

2 Cows on the low winter rations produced slightly lighter calves at birth than the better fed cows. The mean difference in birth weights between the normal and low cow rations was 4 pounds. This difference did not become greater from year to year, but remained about constant. There was no real difference between rations in number of dry cows.

3 Weaning weights were higher from the better wintered cows. The mean difference of about 33 pounds per calf was not enough to offset the saving in winter cow feed, however. The spread in weaning weights of calves from the 2 cow ration levels varied but showed no definite trend toward widening of the spread during the 6-year experiment. The better wintered cows weaned about 2 percent more calves in 6 years than did the low-wintered cows.

4 Steers fattened for slaughter as 2-year-olds were a little heavier from the

well-wintered cows than from the low-wintered cows. The larger steers at weaning gained about 5 pounds more between weaning and slaughter than did the lighter weaned steers.

When home raised feed is available, we recommend wintering cows on a full maintenance ration of about 30 pounds of corn silage and 10 pounds of hay, or the equivalent in other combinations. However, if feed is scarce and abnormally high in price, we believe a stockman can safely winter his cows on 75 percent of the above daily rations for at least 3 winters without serious ill effects in the herd.

A WILLISTON EXPERIMENT STATION REPORT ON –

Potato Irrigation

• By Howard Olson and R. H. Johansen

Since 1941, potato variety trials have been grown under irrigation and dryland conditions at the Williston experiment stations. The irrigation station, established in 1939, is situated on the Lewis and Clark Irrigation project and the dryland station is 5 miles west of Williston on typical upland Williams soils. The dryland data were obtained from two different locations, as before 1955 the station was adjacent to Williston.

Precipitation is the main factor limiting crop yields in this area with a mean of 9.86 inches during the period of April to August.

The irrigated trials were conducted on soils of the Havre series ranging in texture from silty clay loam to silt loam typical of the Missouri river bottom. These soils are not particularly suitable for good potato production due to poor internal drainage, and poor physical condition when wet or dry. They do possess a high water holding capacity and tend to remain wet for considerable periods following irrigation or rainfall. This is an advantage in reducing the need for frequent water applications but it makes weed control difficult and discourages late season irrigation, for the soil remains too sticky for efficient operation of potato harvesting machinery.

Two types of irrigation studies with potatoes are reported here. One has been a continuous evaluation of potato varieties and selections from the Horticulture Department, North Dakota Agricultural Experiment Station at Fargo, when grown under irrigation and under dryland conditions. The other was an irrigation water requirement study carried out over a 6-year period (1948-1953) to determine when and how much to irrigate potatoes on Missouri river bottom soils.

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Performance of Potato Varieties Under Irrigation

The amount and distribution of rain-