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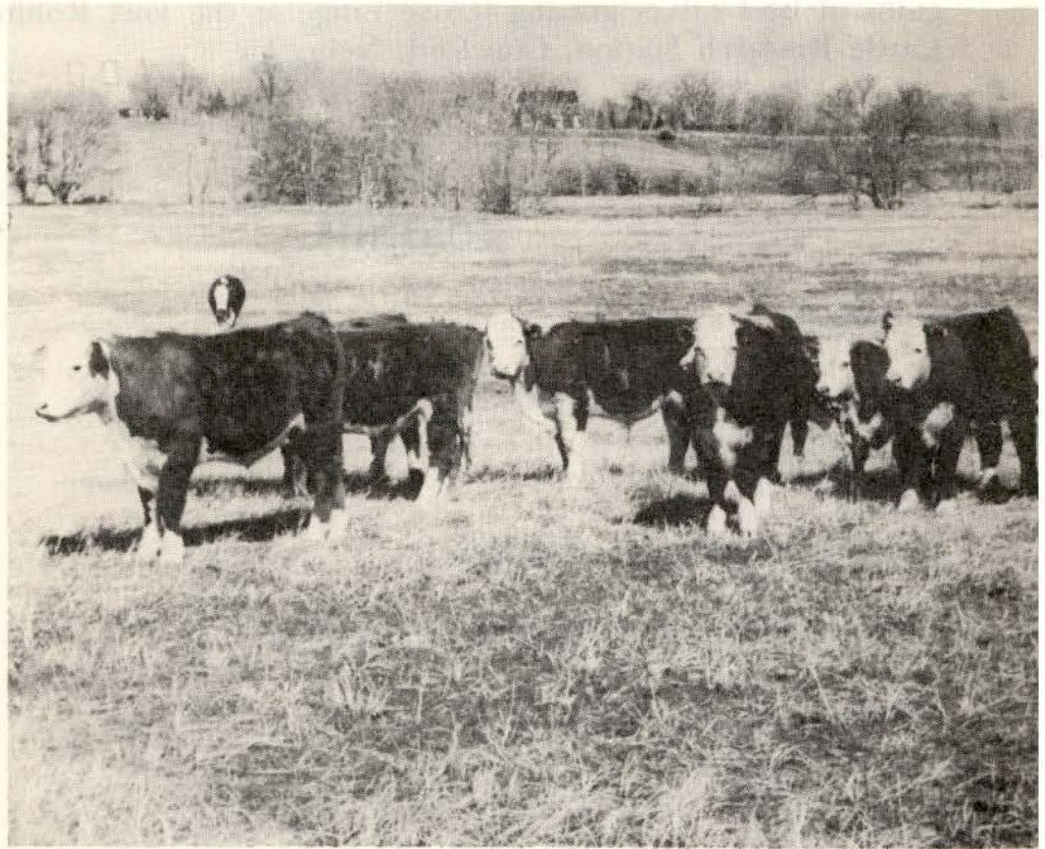
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Protein Supplements for Beef Calves on Winter Range



University of Nebraska College of Agriculture

The Agricultural Experiment Station

E. F. Frolik, Dean; A. W. Epp, Acting Director

FOREWORD

Large numbers of beef calves are wintered on native range in Nebraska and other Great Plains states. Many of these calves then are grazed on native range during the summer and sold as feeders in the fall. In general, winter range throughout this area is low in protein and phosphorous.

Ranchers are interested in the supplement that will give the most economical total gains (winter and summer).

These trials were to compare the effect of different sources and levels of supplemental protein on the winter and subsequent summer gains of beef calves grazing native range at the Fort Robinson Beef Cattle Research Station, Crawford, Nebraska.

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The cover picture is of steer calves
on winter range at Fort Robinson.

PROTEIN SUPPLEMENTS FOR BEEF CALVES ON WINTER RANGE

W. W. Rowden, J. E. Ingalls, K. E. Gregory
and R. M. Koch¹

Summary and Conclusions

1. The protein supplied by 1 pound per head daily of a 20% protein supplement does not meet the supplemental protein needs of calves on winter range in northwest Nebraska.
2. Two pounds of a 20% protein supplement, 1 pound of a 40% protein supplement, and 4 pounds of alfalfa hay per head daily were of approximately equal value in producing the total gains (winter and summer) of cattle on range of the type used in these studies. The results indicate, however, that supplementing this type of winter range with 2 pounds of a 40% protein supplement is not profitable.
3. A full feed of alfalfa hay either on range or in the dry lot did not increase total gains enough (winter and summer) over either 4 pounds of alfalfa hay per head daily or 1 pound of a 40% protein supplement per head daily to repay the additional cost. This was not an economical way to winter calves that were to be grazed the following summer.
4. Cost per unit of protein actually supplied is the major factor in selecting a protein supplement for calves on winter range of the type used in these trials.
5. Relatively large winter gains were followed by somewhat reduced summer gains. Thus, it is desirable to consider total gains (winter and summer) in selecting the most economical method of wintering calves that are to be grazed the following summer.

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The Trials

The calves used in these trials were bought in October and the experiment started in either November or December. The years involved were 1956-57, 1957-58, and 1958-59 (three trials).

All cattle had free access to salt, salt mixed with steamed bone meal, and water throughout the winter and summer. It is assumed that the steamed bone meal provided adequate phosphorous.

Enough dry grass was available during the winter. The calves were fed alfalfa hay at the rate of approximately 4 pounds per head daily whenever there was extensive snow cover. The winter phase of the trials ended during the latter part of April.

All groups of animals grazed the same native range for approximately five months during the following summer. Summer grazing ended in late September. The winter pastures ranged in size from 200 to 300 acres, the summer pastures from 2,000 to 3,000 acres.

The primary grasses in all pastures were blue grama (*Bouteloua gracilis*), needle and thread (*Stipa comata*), western wheatgrass (*Agropyron smithii*) and threadleaf sedge (*Carex filifolia*). The summer pastures also contained a considerable amount of prairie sandreed (*Calamovilfa longifolia*).

The alfalfa hay used was second-cutting hay of good quality.

All animals were individually weighed at the beginning and end of the winter period and at the end of the summer.

Levels of Supplemental Protein

In 1956, 240 Hereford steer calves were divided into four groups to compare the effects of different amounts of 20% and 40% protein supplements on weight gains made during the winter and the following summer. These two supplements were fed at the rate of 1 and 2 pounds per head daily during the 165-day winter period. The average initial weight of the steers was 416 pounds. The results are given in Table 1.

Two pounds of 20% protein supplement per head daily and 1 pound of 40% protein supplement per head daily resulted in approximately equal total weight gains during the winter and summer. Both provided the same level of supplemental protein.

The results indicate that 1 pound of 20% protein supplement per head daily was not enough under these conditions. Even though the summer gains were higher for the group fed 1 pound of a 20% protein supplement, they were not high enough to make up for the lower winter gain.

The group receiving 2 pounds of 40% protein supplement made slightly more winter and total gain than the group receiving 1 pound



Heifers fed one pound of 40% protein concentrate per day in winter of 1957-58.

of 40% protein supplement. This difference was so slight, however, that for all practical purposes, 1 pound of 40% protein supplement seems adequate and more economical.

Sources and Levels of Supplemental Protein

In the fall of 1957, 384 heifer calves were divided into six groups for winter trials. Of these, 144 were Angus, 134 Shorthorn, and 106 Hereford. The heifers were assigned to treatment group at random within breed and source of purchase. The average initial weight was 359 pounds.

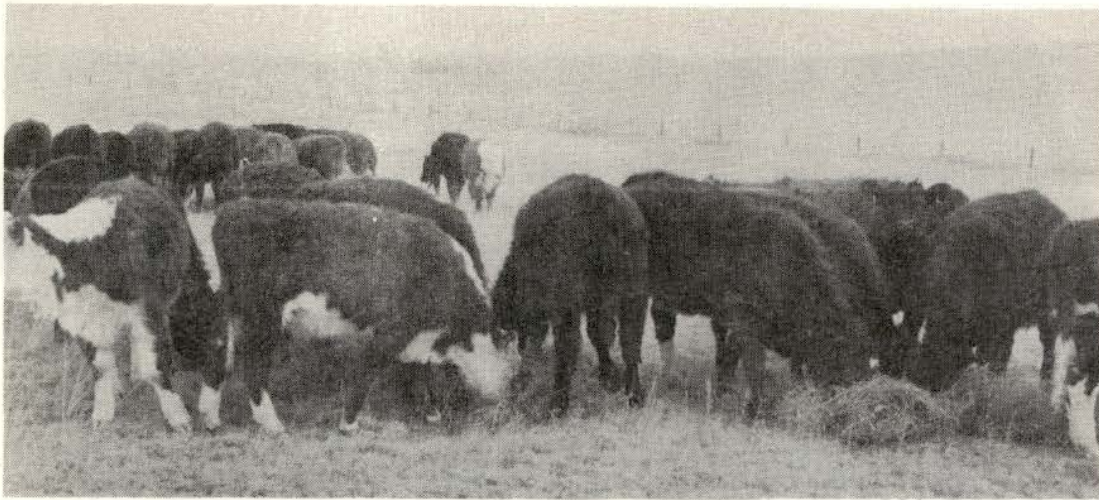
Four of these groups of heifers were grazed on native range plus a protein supplement during the winter. The remaining two groups were wintered in dry lot.

The supplements fed to the four groups on native range were 1 pound of 40% protein supplement per head daily, 2 pounds of 20% protein supplement per head daily, 4 pounds of alfalfa hay per head daily, and a full feed of alfalfa hay. The two dry-lot groups were full-fed alfalfa hay, one group for 112 days or until April 1, and the other for 140 days. The group that was wintered in the dry lot for only 112 days was full-fed alfalfa hay on native range for the last 28 days of the trial.

The heifers full-fed hay on pasture ate approximately 8 pounds per head daily, and the heifers full-fed hay in dry lot ate approximately 12 pounds per head daily.

The results of this trial are given in Table 2.

On the basis of two years' results, it can be said that 2 pounds of 20% protein supplement and 1 pound of 40% protein supplement



Heifers fed four pounds of alfalfa hay per day in winter of 1957-58.

are of approximately equal value as a winter supplement to calves grazing native range in northwest Nebraska.

The winter gains made by the group fed 4 pounds of alfalfa hay per head daily were somewhat less than the other lots. However, most of this was regained during the summer. Hence, there was little difference in total gain between the group receiving 4 pounds of alfalfa hay per head daily and the other groups.

If adequate winter range is available, it is not economical to winter calves on full feed of alfalfa hay either on the range or in the dry lot.

While the group receiving a full feed of alfalfa hay (12 pounds per day) in the dry lot made greater winter gains, their summer gains were so reduced that they had only a slight advantage in total gains.

A third trial was conducted during the year 1958-59. Forty-two Hereford heifer calves were started on the experiment in early December. One group (21 head) was fed 1 pound of 40% protein supplement per head daily. The other group (21 head) received 4 pounds of alfalfa hay per head daily. The heifers averaged 400 pounds at the start of the experiment. The results are presented in Table 3.

While the group receiving 1 pound of 40% protein supplement per head daily made greater winter gains, their summer gains were less. The total gains made by the two groups did not differ greatly. This agrees with the results of the previous year.

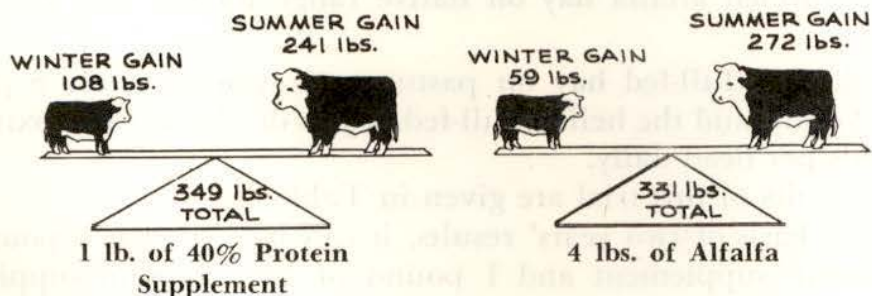


Table 1. Effects of Different Levels of Supplemental Protein on Winter and Subsequent Summer Weight Gains of Beef Steers on Native Range in Northwest Nebraska, November 1956–September, 1957.

Winter Treatment	165-day Winter Gain Lbs.	155-day Summer Gain Lbs.	320-day Total Gain Lbs.	No. Steers
1 lb. 20% protein supplement per head daily	16	316	332	62
2 lb. 20% protein supplement per head daily	49	298	347	61
1 lb. 40% protein supplement per head daily	60	293	353	60
2 lb. 40% protein supplement per head daily	77	288	365	61

Average Initial Weight of All Calves—416 pounds.

Table 2. Effects of Source and Level of Supplemental Protein on Winter and Subsequent Summer Weight Gains of Beef Heifers on Native Range and in Dry Lot in Northwest Nebraska, December, 1957–September, 1958.

Winter Treatment	140-day Winter Gain Lbs.	146-day Summer Gain Lbs.	286-day Total Gain Lbs.	No. Heifers
1 lb. 40% protein supplement per head daily	83	226	309	57
2 lb. 20% protein supplement per head daily	90	218	308	66
4 lb. Alfalfa hay per head daily	67	231	298	63
Alfalfa hay full fed on pasture (8 lb. per head daily)	87	221	308	67
Alfalfa hay full fed in dry lot 112 days—on native range with full feed of hay for the last 28 days (12 lb. per head daily)	104	202	306	66
Alfalfa hay full fed in dry lot 140 days (12 lb. per head daily)	136	183	319	65

Average Initial Weight of All Heifers—359 pounds.

Table 3. Effects of Source of Supplemental Protein on Winter and Subsequent Summer Weight Gains of Beef Heifers on Native Range in Northwest Nebraska, December, 1958–September, 1959.

Winter Treatment	141-day Winter Gain Lbs.	154-day Summer Gain Lbs.	295-day Total Gain Lbs.	No. Heifers
1 lb. 40% protein supplement per head daily	108	241	349	21
4 lb. Alfalfa hay per head daily	59	272	331	21

Average Initial Weight of All Heifers—400 pounds.

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