Beef Cattle Research

Warren F. Brannon, Animal Husbandman
Robert W. Wheeler, Assistant Animal Husbandman

Beef cattle research at the Squaw Butte Experiment Station is both basic and practical.

The station has a cow herd which is grazed on sagebrush bunchgrass range during the summer, on wild flood meadows during the fall, and carried through the winter on hay from these meadows. This type of operation is very similar to operations of ranchers in Harney county as well as other ranchers in the western grazing country.

Possibilities of Vitamin A Efficiency in the Cow Herd

Purpose of the experiment

In the range country, many calves die at birth or soon thereafter. The causes of many of these losses are unknown. It is possible that they may be due to one or more nutritional deficiencies. During the severe winter of 1952 a high percentage of baby calves was lost from the experiment station herd. At that time the experiment station reported indications of vitamin A deficiency symptoms.

It is a common practice to keep hay stored in stacks for more than one year. During the storage period carotene is lost at varying rates depending upon the existing conditions. Carotene in feed is converted to vitamin A in the body of the cow. It is possible that 1- or 2-year-old hay may contain insufficient amounts of carotene to carry the animal through the winter without detrimental deficiency.

This experiment was designed with the following objectives in mind:

1. What carotene level is necessary in a winter ration to protect the cow herd from vitamin A deficiency?

2. Will meadow hay that has been in the stack for longer than 1 year meet the winter's carotene needs of pregnant beef cows?

3. Under what forage conditions or years should supplement be given?

4. When and in what form should vitamin A supplement be used?

Experimental plan

During each of the last three successive winters, 16 pregnant Hereford cows have been fed individually on well-bleached chopped meadow hay. The hay has been as nearly full-fed as the conditions permit and in addition each cow has received 3 pounds of barley daily. These cows were randomly separated into 4 groups of 4 animals each and were supplemented with the following amounts of carotene:

Group 1 - No supplement.
Group 2 - 5 mgm. carotene per 100 lbs. live weight.
Group 3 - 15 mgm. carotene per 100 lbs. live weight.
Group 4 - 25 mgm. carotene per 100 lbs. live weight.

These animals grazed the sagebrush-bunchgrass range during the summer.

Native hay used in this work was from meadows of the rush-sedge-grass type with over 80 per cent of the forage consisting of rush and sedge. Grasses and forbs make up the rest of the forage feed. The carotene content was approximately 1.5 p.p.m.

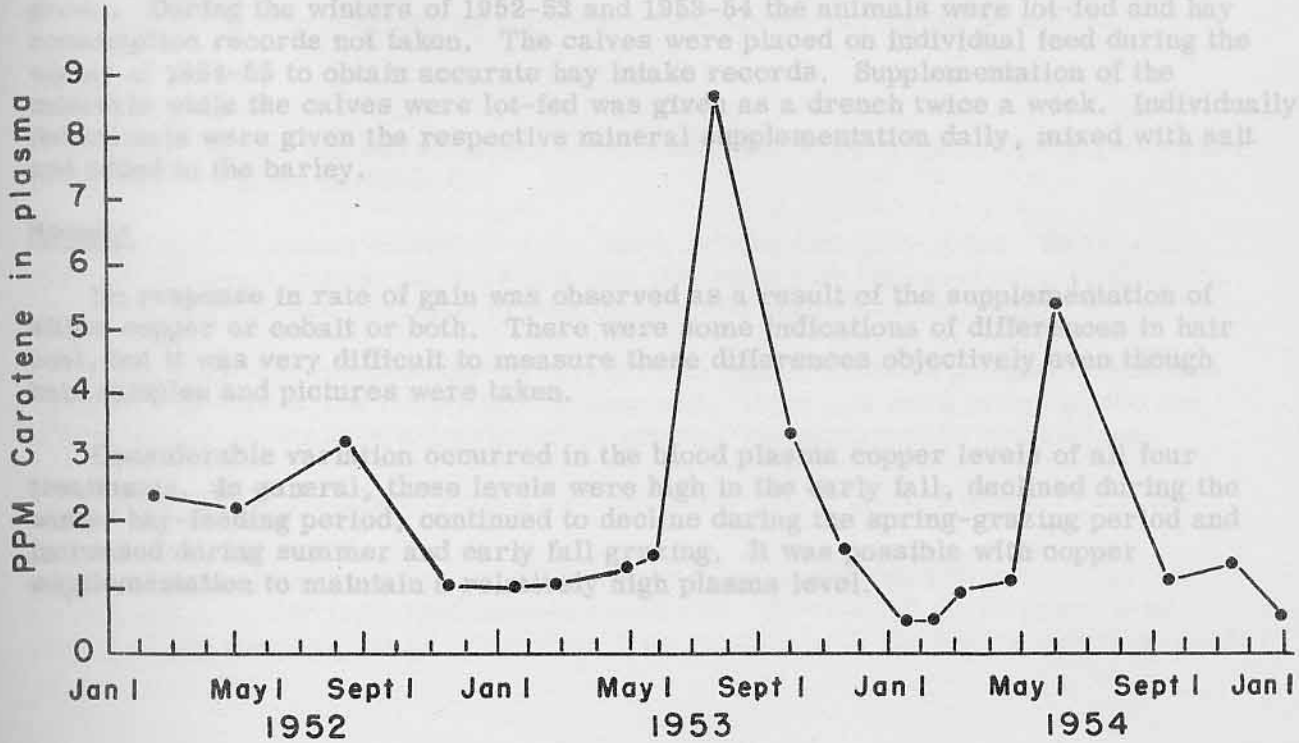
Barley is very low in carotene, containing about .4 p.p.m.

Results

Contrary to expectations there have been no well-defined symptoms of vitamin A deficiency occur during the 3-year period. There are some striking differences of the carotene content of the blood plasma as shown in Figure 3. Keep in mind that the graph is an indication only of the carotene consumption and does not give us any indication of storage in the liver. This year liver biopsys have been taken to study this problem. It is possible liver stores are adequate under our grazing conditions to carry the animal through the winter.

Live weight gains of these cows and their calves were not greatly different. It is possible that costly supplements containing vitamin A are not needed.

Figure 3. Carotene Content in Cow Plasma
(Average of all treatments)



Copper and/or Cobalt Needs for Hereford Weaner Calves

Purpose of the experiment

A number of hay samples obtained from the station and vicinity have been analyzed for copper and cobalt. Analyses revealed that the copper and cobalt content was low to marginal as compared to standards established by research elsewhere. Also, during the winters of 1951 and 1952, blood plasma copper values of cows appeared to be in the marginal range. This experiment was initiated, therefore, to obtain information on the following problems:

1. Is copper and/or cobalt limiting the growth rate on weaner calves?

2. Should stockmen be feeding these trace minerals?

Experimental plan

During each of three successive years, 24 Hereford weaner calves have been assigned to this experiment. On each of the years these calves were randomly separated into 4 groups of 6 each. The animals were full-fed meadow hay and 3 pounds of barley daily. In addition they were supplemented in the following manner:

Group 1 - No trace minerals.
Group 2 - Copper supplementation.
Group 3 - Cobalt supplementation.
Group 4 - Copper and cobalt supplementation.

The animals were bled periodically to determine the effect of supplementation on blood plasma copper content.

Hay used in this work was the mixed rush-sedge-grass type. Barley was locally grown. During the winters of 1952-53 and 1953-54 the animals were lot-fed and hay consumption records not taken. The calves were placed on individual feed during the winter of 1954-55 to obtain accurate hay intake records. Supplementation of the minerals while the calves were lot-fed was given as a drench twice a week. Individually-fed animals were given the respective mineral supplementation daily, mixed with salt and added to the barley.

Results

No response in rate of gain was observed as a result of the supplementation of either copper or cobalt or both. There were some indications of differences in hair coat, but it was very difficult to measure these differences objectively even though hair samples and pictures were taken.

Considerable variation occurred in the blood plasma copper levels of all four treatments. In general, these levels were high in the early fall, declined during the winter hay-feeding period, continued to decline during the spring-grazing period and increased during summer and early fall grazing. It was possible with copper supplementation to maintain a relatively high plasma level.

Data obtained from this experiment do not indicate a need for copper or cobalt supplementation in this area, even though we have obtained some marginal forage and blood plasma levels. Stores of these elements appear to relieve seasonal deficiencies.

Rate and Efficiency of Gain by Weaner Calves Fed on High and Low Plane Rations

It is the goal of this work to investigate practical possibilities for most rapid improvement of quality beef production.

Most investigations conducted in the United States to determine the rate and efficiency of gains in cattle have been conducted with fattening rations. Under practical conditions, it seems unwise for commercial cattle producers to place their animals on a high plane of nutrition for the only purpose of selectivity.

Purpose of experiment

1. To determine if rate and efficiency of gain in heifer calves can be effectively selected on a winter growing ration.

2. To determine if rate of gain of such weaner heifers can be effectively used in the selection of brood cow replacements.

Experimental plan

Twenty-eight Hereford heifers were individually-fed during the winter period for the last three consecutive years. Fourteen head were full-fed each year a ration of native meadow hay and a small quantity of grain so good growth could be obtained (approximately 1 pound per day). The other 14 heifers were full-fed a fattening ration consisting of much grain and a limited amount of hay (Table 5).

Animals grazed together on sagebrush-bunchgrass during the summer.

Results

Actual rations fed and examples of rate and efficiency of gains on the two planes of feeding are given in Table 6.

Differences among calves upon the same rations are quite great. In general, the most efficient gaining animals are also the ones with the most rapid daily gain. These differences are observed in both the low and high plane rations.

This study will of necessity be carried into future years so production records of these individuals now tested may be obtained. Until this work is completed the effectiveness of selecting animals on the growing ration cannot be determined.

Studies of Nutritive Value of Native Hay and Range Forage

Beef cattle production in the sagebrush-bunchgrass country is not as high per animal unit as under improved pasture conditions, the tall- or short-grass-type ranges of the midwest, or on the timber-type range land of the higher mountain areas.

TABLE 5. Rations Fed (pounds) -- 1954-55.

Treatment	M. hay	Alfalfa	Barley	CSM
Low	9.2	2.8	1.2	0.5
High	3.4	3.2	8.7	0.5

TABLE 6. Example of Rate and Efficiency of Gain on High and Low Plane Rations--1954-55.

Treatment	Chain calf no.	Daily gain lbs.	TDN/100 lb. gain lbs.
Low plane			
	77	1.37	629
	72	1.33	635
	146	1.30	645
	67	1.19	760
	158	0.93	797
	142	0.99	869
High plane			
	110	2.04	428
	6	2.11	483
	53	2.05	489
	113	1.89	552
	59	1.98	564
	111	1.75	576

Management, breeding, disease, and nutrition may work singly or in any combination to result in lower or less profitable production. Deficiencies of calcium, phosphorus, copper, cobalt, vitamin A, protein, and energy have been considered to be among the major nutritional deficiencies which may seriously reduce the calf crop and calf-weaning weight. Because of these possibilities many stockmen feed protein supplements, bone meal, trace mineral salt, range cubes, molasses, urea supplements, etc. These attempts to relieve nutritional deficiencies are many times made without knowing positively that a deficiency exists or to what degree the deficiency results in less profitable production.

It is the goal of the beef cattle research work on this station to determine the various factors limiting beef production and to develop sound economic remedies for them.

The following studies of nutritive value of native hay and native range are being initiated on this station as a means of more accurately determining forage requirements and the presence or absence of deficiencies. As facts are obtained, existing forages may be supplemented or improved to profitably balance the animals' diet.

Nutritive Value of Wild Flood Meadow Hay (Phase 1)

Purpose of experiment

1. To determine if wild flood meadow hay can be nutritionally improved by adding protein.

2. To determine the effect upon digestibility of adding increments of protein, such as found in cottonseed meal, to the hay.

Experimental plan

Eight Hereford steers were fed individually and allotted in pairs to the following four rations:

Ration 1 - 11 pounds of hay.
Ration 2 - 10.76 pounds of hay plus .24 pounds alpha protein.
Ration 3 - 10.52 pounds of hay plus .48 pounds alpha protein.
Ration 4 - 10.28 pounds of hay plus .72 pounds alpha protein.

These steers averaged 550 lbs. in live weight and maintained it throughout the experimental period of 6 weeks. The hay contained approximately 7 per cent crude protein.

Results

The average digestion coefficient of the eight steers was 62.5. Translated to TDN this would be about 65 per cent. Analyses yet to be made will give an accurate estimation of this figure.

The average coefficients of the four pairs of steers appeared not to be different. Therefore, the addition of pure protein to this hay probably did not increase its nutritive value.

Herbage Consumption of Grazing Animals (Phase 2)

Six steers are being used in a study to develop methods which can be used to measure pasture intake. After methods for determining intake have been developed the nutritional value of this consumed herbage will be studied with respect to proper supplementation for correcting deficiencies.

Publications

1. Hitchcock, Glen H., W. A. Sawyer, Ralph Bogart, and Lyle Calvin. 1955. Rate and efficiency of gains in beef cattle. Oregon Agr. Exp. Sta. Tech. Bul. 34.

2. Hubbert, Farris, Jr., P. H. Weswig, J. R. Hagg, and W. A. Sawyer, 1953. Influence of age of meadow hay in beef cows' winter rations following summer grazing on sagebrush-bunchgrass range. Proceedings Western Section Soc. An. Prod. July 1953.

3. Hubbert, Farris, Jr., 1955. A comparison of trucking and trailing beef cows and calves to and from summer range. Jour. of An. Sci. 14: 279.

4. Hubbert, Farris, Jr., Niel Hoffman, W. A. Sawyer, Ralph Bogart, and A. W. Oliver. A comparison of Brahman-Hereford crossbreds with Herefords. Oregon Agricultural Experiment Station Bulletin 549. 1955.

5. Sawyer, W. A., Ralph Bogart, and Mohammed M. Oloufa. 1948. Weaning weight of calves as related to age of dam, sex, and color. Unpublished data. Squaw Butte Experiment Station.

6. Sawyer, W. A., J. C. R. Li, and Ralph Bogart. 1948. The relative influence of age of dam, birth weight, and size of dam on weaning weight of calves. Unpublished data. Squaw Butte Experiment Station.

7. Sawyer, W. A. and Farris Hubbert, Jr. 1951. The influence of winter nutrition on range beef cattle production in eastern Oregon. Proceedings Western Section Soc. An. Prod. July 1951.