THE EFFECT OF WINTER SUPPLEMENTATION ON SUBSEQUENT GAINS OF BEEF STEERS ON GRASS AND IN THE FATTENING LOT

W. E. CONNELL, S. S. WHEELER AND R. C. TOM
Colorado Agricultural Experimental Station

Introduction

The high plains area of eastern Colorado lends itself to the production of grain sorghum, barley, wheat and some corn for concentrate feeds, to sorghum fodder and silage for roughage feeds, and to short grass pasture associations such as grama and buffalo grasses for grazing. This gives opportunity to feed cattle under a flexible program that can include wintering, grazing and fattening. The utilization of those home-grown feeds and the practicability of protein supplementation of rough winter rations for steers were considered in feeding experiments conducted by the Colorado Agricultural Experiment Station with the cooperation of the U. S. Dryland Experiment Station at Akron, Colorado.¹

Experimental work at other stations indicates that the rate of winter gains is in inverse ratio to subsequent gains on grass. Weber et al. (1947) at the Kansas station found that steers which made the largest winter gains tended to make the smallest pasture gains and as a consequence, differences in total gains (wintering plus grazing) were of doubtful significance. Experimental results at the Oklahoma station by Ross et al. (1946-47) indicate that calves winter on grass and cottonseed meal, to gain $\frac{1}{2}$ to $\frac{3}{4}$ of a pound a day, will produce desirable feeder yearlings at a greater profit than those gaining 1 to $1\frac{1}{2}$ pounds per head daily on a more concentrated ration.

Plan of Experiment

Five replications were made over a period of three years testing the value of adding a protein supplement to a wintering ration for steer calves and observing the carry-over effect during the subsequent grazing and fattening periods. The basal wintering ration was composed of chopped forage sorghum (cane) fodder and silage fed according to appetite, salt free choice and a mineral mixture of two parts ground limestone, 2 parts steamed bone meal and one part salt fed free choice. In May the steers were grazed together on native short-grass pasture. In November the steers were returned to the Akron feed lots where they were fattened for market.

¹ Grateful acknowledgment is made of the cooperation given by Sup't. J. F. Brandon of the U. S. Dryland Experiment Station, Akron, Colorado.
Winter Feeding and Later Gains in Steers

Results

The results of winter supplementation on subsequent gains are shown in Table 1. Adding one pound of over 40 per cent protein supplement (both cottonseed meal and soybean meal were fed) to the wintering ration apparently stimulated the appetite of the steers, thus increasing the total consumption of feed. Mineral consumption, however, was reduced in the protein fed lot. The steers fed the supplemented ration gained 85.3 pounds more per head at an additional feed cost of $6.67 or 7.8 cents per pound added gain. By the end of the grazing period this spread in gains was narrowed to 36.8 pounds, which increased the cost per pound of added gain to 18.1 cents. By the end of the fattening period the spread in gains was further narrowed to 29.8 pounds which further increased the cost to 22.3 cents per pound of extra gain.

The feed cost per cwt. of gain for the protein supplemented steers during the winter was $8.27 less than for those receiving no protein. During the following grazing and fattening periods, however, this cost was greater for the winter supplemented steers and over the entire three-phase period resulted in a 21 cent greater feed cost per cwt. of gain for these steers. Livestock market men evaluated the steers at the end of each period. With but one exception, no differences were made in their price estimates. This exception gave a 50-cent per cwt. advantage to the non-supplemented steers at the end of one of the three wintering periods due to a greater demand for light weight feeders at that time.

Using Morrison's (1944) energy tables, the following average energy values were calculated for the feeds used in these trials:

- Grain: 1,540 therms per ton
- Protein supplement: 1,540 therms per ton
- Cane silage: 280 therms per ton
- Cane fodder: 600 therms per ton.

Based on the above values, using the therms of energy required to produce 100 pounds of gain, the protein supplement when added to the wintering ration showed the following energy replacement values through the three feeding periods:

- By the end of wintering: 10,714 therms per ton
- By the end of grazing: minus 125 therms per ton
- By the end of fattening: minus 84 therms per ton.

Thus, the energy replacement value of the protein supplement during the wintering period was over seven times that of its calculated value, but this
TABLE 1. EFFECT OF ADDING PROTEIN SUPPLEMENT TO THE WINTERING RATIONS OF STEERS FED IN A WINTERING, GRAZING, FATTENING PROGRAM

<table>
<thead>
<tr>
<th>Lot treatment</th>
<th>Avg. No. days</th>
<th>Avg. initial wt.</th>
<th>Avg. final wt.</th>
<th>Avg. daily gain</th>
<th>Average daily feed per steer</th>
<th>Feed consumed per CWT gain</th>
<th>Feed cost per CWT gain</th>
<th>Total feed cost per steer</th>
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</thead>
<tbody>
<tr>
<td>Wintering</td>
<td>113</td>
<td>458.6</td>
<td>578.5</td>
<td>1.24</td>
<td>.99</td>
<td>10.09</td>
<td>10.00</td>
<td>.05</td>
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<tr>
<td>Grazing</td>
<td>184</td>
<td>578.5</td>
<td>746.2</td>
<td>.94</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sub-total</td>
<td>397</td>
<td>458.6</td>
<td>746.2</td>
<td>1.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fattening</td>
<td>183</td>
<td>746.2</td>
<td>1103.1</td>
<td>1.95</td>
<td>16.36</td>
<td>1.06</td>
<td>13.87</td>
<td>.05</td>
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<tr>
<td>Total</td>
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<td>458.6</td>
<td>1103.1</td>
<td>1.38</td>
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<td>Protein supplement—47 steers</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wintering</td>
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<td>444.4</td>
<td>490.0</td>
<td>.49</td>
<td>9.17</td>
<td>8.19</td>
<td>.10</td>
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<td>711.3</td>
<td>1.18</td>
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<td></td>
<td></td>
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<tr>
<td>Sub-total</td>
<td>397</td>
<td>444.4</td>
<td>711.3</td>
<td>.93</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fattening</td>
<td>183</td>
<td>711.3</td>
<td>1079.1</td>
<td>3.00</td>
<td>16.36</td>
<td>1.06</td>
<td>13.87</td>
<td>.05</td>
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<tr>
<td>Total</td>
<td>479</td>
<td>444.4</td>
<td>1079.1</td>
<td>1.35</td>
<td></td>
<td></td>
<td></td>
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<td>No protein supplement—49 steers</td>
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increased value was lost by the end of the following grazing and fattening periods.

In terms of total feed replacement, when one pound of protein supplement was added to the wintering ration, one ton of protein supplement valued at $90.00 was equivalent to:

- By the end of wintering: 15 tons cane silage + 11 tons cane fodder + 600 pounds mineral = $300.48.
- By the end of grazing: 1 ton cane silage + 3 tons cane fodder + 140 pounds mineral = $21.47.
- By the end of fattening: 1 ton grain + 1 1/4 tons cane silage + 1 1/2 tons cane fodder + 120 pounds mineral = $106.97.

The feed prices used were as follows:

- Grain — $60.00 per ton
- Protein supplement — $90.00 per ton
- Cane silage — $8.00 per ton
- Cane fodder — $15.00 per ton
- Mineral mixture — $45.00 per ton
- Salt — $20.00 per ton
- Pasture — 4.50 per head

From a practical feeding standpoint, it would pay under High Plains conditions to add one pound of over 40% protein supplement (cottonseed meal or soybean meal) to a steer calf wintering ration of sorghum silage and sorghum fodder if the steers are sold at the end of the wintering period. If they are carried on through the grazing and fattening periods it is questionable whether winter protein supplementation would pay.

**Literature Cited**

