Bulletin No. 30 - Stock Feeding Experiments at Lander

University of Wyoming Agricultural Experiment Station
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Agricultural College Department.

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STOCK FEEDING EXPERIMENTS AT LANDER.

BY THE AGRICULTURIST.

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Wyoming Agricultural Experiment Station.

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STOCK FEEDING EXPERIMENTS.

B. C. BUFFUM.

The experiments here reported were carried on upon the Lander Experiment Farm during the winter of 1895-'96, under the direct charge of the superintendent, Mr. J. S. Meyer, and his assistant, Mr. H. S. Kendall. The results here presented are computed from the notes furnished by them.

The following is a letter from Mr. Meyer in regard to the general objects of the feeding tests:

"What seems to me to be the object of feeding stock in Wyoming, is to ascertain the cost of having fat stock for the spring months when we cannot depend on the range to furnish us with a good quality of meat. There has been a time when good meat could be killed off the range in any month of the year, but that day has passed. We must now begin to feed our stock for at least the latter part of the winter and the early spring months, to supply our home market. Where shipping facilities are convenient, there should be no reason why Wyoming cannot feed stock profitably for the eastern markets, if by experiments we find we can produce good meats with our grain, hay, and root crops so as to be able to compete with our neighbor corn-growing states. And, while too few of our farmers are figuring on making a profit out of feeding their crops to stock, the time is now
at hand when they should figure on feeding their crops and marketing them in stock, instead of selling to government posts, freighters, etc., as this market is too uncertain and too limited to depend on. If, however, we depended on feeding our crops, it would not be any longer a question of how much we are going to find a market for. The question would be then, how much can we raise of such crops as can be profitably fed or consumed by stock.

"Carrying on feeding experiments in our state with our various crops, so as to ascertain the best and cheapest way of fattening our stock, will certainly be of great value to the citizens of Wyoming as well as to other states raising the same crops as we do, or who are similarly situated.

"If the Experiment Station carries on these feeding experiments it will be only a short time until the best methods of feeding will be understood and our citizens can begin at once marketing their crops in stock. If the farmers have to make these experiments alone, it will take years to accomplish the same end."

It should be stated that the direct object of this test is not to add to the scientific principles upon which stock feeding is based, but merely to show what can be done in feeding with the materials at hand. The results are published for the benefit of our farmers and ranchmen who are seeking such information.

It will readily be seen that the rations are not well balanced. However, with the materials at hand it would be difficult to feed correct rations. For example, in the sheep feeding test, during the last period, when the combination of foods gives the nearest balanced ration, the nutritive ratio is $1:5.8$, which is too wide. In order
to narrow it down to the standard it would be necessary to add oil cake or some other concentrated food, which would have been hardly justifiable in this case. No doubt the rations could be improved and we hope to show in future experiments the advantage of balancing them so far as may be and use our own products. Farmers that feed are recommended to follow as nearly as possible the general rules on stock feeding given in Bulletin 13 of this Station.

**FEEDING STEERS.**

Six steers were purchased. They were from the open range, but had been put in the fields and winter fed. On this account they were in fair condition for beef with the exception of steer No. 6, which was only in fairly good order; in consequence of this he made a greater gain than any of the others. All were coming three years old and had been dehorned a year or more.

Nos. 1 and 2 were grade shorthorn. No. 1 was wild and did not become tame during the whole experiment. No. 2 was a good feeder, though a little nervous. Nos. 3 and 4 were grade polled Angus, took kindly to feeding, were always lively, and had good appetites. Nos. 5 and 6 were ordinary range steers. No. 5 was a fair feeder, but a little nervous. They were fed second cutting alfalfa hay and had access to running water at all times except for three hours before weighing. On April 1st No. 5 became sick and took no grain till the 9th. From that time till the 20th he was fed the same ration as during the intermediate period.

The first feeding period began on January 19th. All were fed alfalfa hay up to March 1st, a total of
41 days. During this time they were given 6,549 pounds of hay, of which they consumed 5,529 pounds, or an average consumption of 22.48 pounds per day for each steer.

At this point in the experiment the steers were divided into two lots of three each. Lot No. 1, consisting of steers Nos. 1, 3, and 6, were fed on alfalfa hay and sugar beets. Lot No. 2, consisting of Nos. 2, 4, and 5, were fed on alfalfa hay, chopped oats, and cracked wheat. Beginning on March 1st and continuing for 11 days the two lots were fed respectively on an increasing daily ration of sugar beets and grain until they reached the amount to be fed during the last period, which was 14 pounds of sugar beets apiece to those in lot No. 1, and 7 pounds of chopped oats and 9 pounds of cracked wheat apiece to those in lot No. 2. The average amount of beets fed daily to each steer for this period was 9 pounds. The average amount of grain was 4 pounds of oats and 5 pounds of wheat. During this intermediate period the steers were fed 4,914 pounds of hay, of which they consumed 4,061 pounds, or an average daily consumption for each of 23.34 pounds.

On March 12th the last period was begun, which lasted 40 days, ending April 20th. During this time the steers were fed 7821.5 pounds of hay, of which they consumed 6,505.5 pounds, or an average daily consumption for each of 26.03 pounds, the amounts of hay eaten by the two lots not being kept separate. As stated above, lot No. 1 was fed 14 pounds of sugar beets with the hay, lot No. 2 being fed 7 pounds of chopped oats and 9 pounds of cracked wheat with the hay.

The following shows the gain for each steer during the different periods. The minus sign signifies a loss.
Gain.

<table>
<thead>
<tr>
<th>Steer No.</th>
<th>Weight (lbs.)</th>
<th>Gain for 1st period (lbs.)</th>
<th>Gain for intermediate period (lbs.)</th>
<th>Gain for last period (lbs.)</th>
<th>Total gain for entire experiment (lbs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-grade shorthorn</td>
<td>1024</td>
<td>34</td>
<td>2</td>
<td>7</td>
<td>43</td>
</tr>
<tr>
<td>2-grade shorthorn</td>
<td>962</td>
<td>78</td>
<td>6</td>
<td>43</td>
<td>127</td>
</tr>
<tr>
<td>3-grade polled Angus</td>
<td>932</td>
<td>128</td>
<td>-34</td>
<td>67</td>
<td>161</td>
</tr>
<tr>
<td>4-grade polled Angus</td>
<td>902</td>
<td>103</td>
<td>-5</td>
<td>41.5</td>
<td>139.5</td>
</tr>
<tr>
<td>Range</td>
<td>756</td>
<td>109</td>
<td>-15</td>
<td>53</td>
<td>147</td>
</tr>
</tbody>
</table>

COST AND PROFIT—STEERS.

The two grade shorthorn steers cost $30 each, the two polled Angus $25 each, and the two range $25 each.† The steers were sold at the close of the feeding period for $3.35 per hundred pounds live weight.

Prices allowed for feed are, alfalfa hay $4 per ton, sugar beets $3.50 per ton, and wheat and oats $1 per hundred pounds. No account is taken of the cost of preparing the food of, feeding and caring for the cattle, the interest on the money invested in the stock, or the hay which was wasted.

The following are the results from a financial standpoint, based on the above quotations. The six steers are taken together.

- Average selling price of each: $35.72
- Average cost price of each: $26.66
- Average gross profit on each: $9.06
- Average cost of feed for each: $8.47
- Average net profit on each: $0.59

To estimate the exact cost of the gain obtained from the sugar beet or grain rations, it can readily be seen that

*This steer was sick during April.

†“The price paid for 'feeders' this year was higher than usual, and caused many farmers to feed at a loss.”—J. S. Meyer.
it is necessary to find the average cost per pound of the six steers so that the actual cost price, according to weight, of each lot of steers may be determined. The average price per pound paid for the six steers was 2.81 cents.

The two lots, one being fed during the last period on alfalfa and sugar beets, the other on alfalfa and grain, are here compared.

<table>
<thead>
<tr>
<th>Average initial weight</th>
<th>Average price according to weight</th>
<th>Average final weight</th>
<th>Average selling price</th>
<th>Average gross profit</th>
<th>Average cost of feed</th>
<th>Average net profit</th>
<th>Average net loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot fed on hay and sugar beets</td>
<td>984</td>
<td>$27.65</td>
<td>1101.3</td>
<td>$36.88</td>
<td>$9.23</td>
<td>$5.78</td>
<td>$3.45</td>
</tr>
<tr>
<td>Lot fed on hay and grain</td>
<td>913.3</td>
<td>$25.66</td>
<td>1031.8</td>
<td>$34.56</td>
<td>$8.90</td>
<td>$11.28</td>
<td></td>
</tr>
</tbody>
</table>

A comparison of the results obtained from the grade shorthorn, grade polled Angus, and range steers is here given. As has been noted there were two of each kind, one of which was fed on alfalfa and sugar beets, the other on alfalfa and grain, during the last period.

<table>
<thead>
<tr>
<th>Cost price</th>
<th>Selling price</th>
<th>Gross Profit</th>
<th>Cost of Feed</th>
<th>Average net profit on each</th>
<th>Average net loss on each</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorthorn</td>
<td>$60</td>
<td>$72.23</td>
<td>$12.23</td>
<td>$17.80</td>
<td>$1.85</td>
</tr>
<tr>
<td>Polled Angus</td>
<td>$50</td>
<td>$71.51</td>
<td>$21.51</td>
<td>$17.80</td>
<td>$2.55</td>
</tr>
<tr>
<td>Range</td>
<td>$50</td>
<td>$70.61</td>
<td>$20.62</td>
<td>$15.52</td>
<td>$2.38</td>
</tr>
</tbody>
</table>

From the above table it would appear at first thought that grade shorthorns were poor cattle to feed. This is doubtless misleading, for in this particular case a much higher price per pound was paid for the shorthorns than for the other kinds.

**SUMMARY FOR STEERS.**

Average gain per head for six steers while on feed, 92 days, 117.5 pounds or 1.28 pounds per day.

Average gain of three steers fed alfalfa and sugar beets, 117 pounds or 1.27 pounds per day.
Average gain of three steers fed alfalfa and grain 118.2 pounds or 1.284 pounds per day.
The grade shorthorns gained 85 pounds each.
The grade polled Angus gained 149.7 pounds each.
The range steers gained 118 pounds each.
Lot No. 1 made an average gain in first period on hay of 2.2 pounds per day. In last period on hay and beets they made an average gain of 1.06 pounds per day.
Lot No. 2 in first period on hay made an average gain of 2.36 pounds per day. In last period on hay and grain, they made an average gain of 1.14 pounds per day.
The lot fed on alfalfa and sugar beets returned a net profit, above a fair price for feed given, of $3.45 apiece, and the lot fed on alfalfa and grain a loss of $2.38 apiece.
Net profit on the six steers was $.59 each. This would be sufficient to pay for feeding where large numbers were handled.

SHEEP FEEDING.
The sheep used for this experiment were purchased from the only range bunch accessible at the time. Three ewes four or five years old and three spring lambs of 1895 were purchased. The price paid for the sheep upon the range was $2.50 apiece for the ewes, and $2 apiece for the lambs. The six sheep actually cost the station an average of $3 apiece, but the extra amount was paid for delivering them and is not taken into account in the results given below; as sheep when purchased in large numbers for feeding would not be subject to great expense for delivery.
All the sheep were mutton fat at the beginning of the experiment on December 1st, and consequently were not as good for the test as could be desired.
Throughout the experiment they were fed at 8 a. m. and 6 p. m. each day; and were weighed at 10 a. m. every
third day during the first and second periods, and once a
week during the last period. They had a small corral in
which to exercise and had access to fresh water at all times.
They did not become quiet under handling, but fretted al-
most as much at the last weighing as at the first. The hay
fed was second cutting alfalfa, and the grain and roots
were grown on the Station farm. The value of the hay is
placed at $4 per ton in the stack, the sugar beets at $3.50
per ton, which is sufficient to more than pay the cost of
raising them, and the grain at $1 per hundred pounds.

The food was weighed to the sheep night and morn-
ing and the orts or waste weighed back in the morning.

The experiment was carried through three feeding
periods. During the first period, from December 1st to
February 1st, the ewes were separated from the lambs and
both lots were fed hay. At the end of the first period they
were divided into three lots of two each, each lot being
composed of one lamb and one ewe. During the second
period, from February 2nd to March 2nd, lot No. 1 was
fed hay alone, lot No. 2 hay and sugar beets, and
lot No. 3 hay and cracked wheat. During the third
and last period all were put together and fed hay, sugar
beets, and cracked wheat to “top them off” for market.

Gains.

<table>
<thead>
<tr>
<th></th>
<th>Weight on December 1st.</th>
<th>First period, 63 days.</th>
<th>Second period, 30 days.</th>
<th>Third period, 28 days.</th>
<th>Total gain.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ewe No. 1</td>
<td>94 lbs.</td>
<td>4 lbs.</td>
<td>1.5 lbs.</td>
<td>5 lbs.</td>
<td>13 lbs.</td>
</tr>
<tr>
<td>Ewe No. 2</td>
<td>105 lbs.</td>
<td>4.25 lbs.</td>
<td>1.25 lbs.</td>
<td>5 lbs.</td>
<td>10 lbs.</td>
</tr>
<tr>
<td>Ewe No. 3</td>
<td>100 lbs.</td>
<td>5 lbs.</td>
<td>1.5 lbs.</td>
<td>10 lbs.</td>
<td>15 lbs.</td>
</tr>
<tr>
<td>Lamb No. 1</td>
<td>66 lbs.</td>
<td>1.25 lbs.</td>
<td>3.75 lbs.</td>
<td>10 lbs.</td>
<td>15 lbs.</td>
</tr>
<tr>
<td>Lamb No. 2</td>
<td>60 lbs.</td>
<td>4 lbs.</td>
<td>8.5 lbs.</td>
<td>7 lbs.</td>
<td>20 lbs.</td>
</tr>
<tr>
<td>Lamb No. 3</td>
<td>64 lbs.</td>
<td>7 lbs.</td>
<td>3.75 lbs.</td>
<td>8.25 lbs.</td>
<td>19 lbs.</td>
</tr>
</tbody>
</table>
Stock Feeding Experiments.

Food Consumed.

<table>
<thead>
<tr>
<th>Lot Number</th>
<th>First period.</th>
<th>Second period.</th>
<th>Third period.</th>
<th>Total</th>
<th>Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1, ewe and lamb</td>
<td>302</td>
<td>177</td>
<td>66</td>
<td>18.25</td>
<td>120</td>
<td>140</td>
</tr>
<tr>
<td>No. 2, ewe and lamb</td>
<td>302</td>
<td>122</td>
<td>52</td>
<td>18.25</td>
<td>120</td>
<td>140</td>
</tr>
<tr>
<td>No. 3, ewe and lamb</td>
<td>302</td>
<td>102</td>
<td>52</td>
<td>18.25</td>
<td>120</td>
<td>140</td>
</tr>
</tbody>
</table>

The total food consumed was 2,409.5 pounds, and the total gain was 93 pounds, giving one pound of gain for each 25.9 pounds of food eaten.

COST AND PROFIT.

At the close of the feeding test the sheep and lambs were sold for six cents a pound net. The weights, dressed, were, ewes, No. 1, 54 pounds; No. 2, 60 pounds; No. 3, 57 pounds; lambs, No. 1, 38 pounds; No. 2, 35 pounds, and No. 3, 38.5 pounds. The mutton produced in percent of the live weight was 49.3 percent for the ewes, and 45.7 percent for the lambs, or an average of 47.8 percent.* The pelts of the ewes brought 80 cents each and of the lambs, 60 cents each.

With the values of alfalfa, beets and grain given above we have the following table of results:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>$4.50</td>
<td>$2.00</td>
<td>$6.50</td>
<td>$5.50</td>
<td>$1.40</td>
<td>$6.92</td>
<td>$0.42</td>
<td>Hay.</td>
</tr>
<tr>
<td>No. 2</td>
<td>4.50</td>
<td>2.10</td>
<td>6.60</td>
<td>5.70</td>
<td>1.40</td>
<td>7.10</td>
<td>0.50</td>
<td>Beets.</td>
</tr>
<tr>
<td>No. 3</td>
<td>4.50</td>
<td>2.22</td>
<td>6.72</td>
<td>5.73</td>
<td>1.40</td>
<td>7.13</td>
<td>0.41</td>
<td>Grain</td>
</tr>
</tbody>
</table>

*This seems to be low, as results in other states show from 5 to 9 percent more mutton.
The following comparison of cost and profit with the ewes and lambs may be of interest:

<table>
<thead>
<tr>
<th></th>
<th>Lambs</th>
<th></th>
<th>Ewes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>Value</td>
<td>Loss</td>
</tr>
<tr>
<td>No. 1</td>
<td>$2.97</td>
<td>$2.88</td>
<td>$.09</td>
</tr>
<tr>
<td>No. 2</td>
<td>3.01</td>
<td>2.70</td>
<td>.31</td>
</tr>
<tr>
<td>No. 3</td>
<td>3.08</td>
<td>2.91</td>
<td>.17</td>
</tr>
</tbody>
</table>

The total value at 6 cents per pound net gives $3.44 per hundred pounds live weight for the lambs, and $3.65 per hundred pounds live weight for the ewes.

During the experiment 1,507.5 pounds of hay were weighed back as orts or waste. This would have a value of $3.01 and where wasted would add to the cost, but in feeding sheep nearly all this waste may be saved by feeding it to cattle or other stock. The larger part of the waste hay left by one kind of stock will be eaten by another. This should always be taken advantage of in feeding mixed stock.

**SUMMARY FOR SHEEP.**

The lot fed hay and sugar beets during the second period gave better returns than those fed hay alone or those fed hay and grain.

The ewes gave better gains and greater profit than did the lambs.

The average results of the six sheep show a fair return for the feed given, with enough profit to meet all expense of feeding where larger numbers are handled.

The rations fed were not properly balanced and give a ratio which is too wide. The best balanced ration gave the best returns in each case.