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UNIVERSITY OF WYOMING
Agricultural College Department.

Wyoming Experiment Station
LARAMIE, WYOMING.

BULLETIN NO. 85
MAY, 1910

Feeding Experiments, 1909-10
A. D. FAVILLE.

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Wyoming Agricultural Experiment Station

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Feeding Experiments, 1909-10

INTRODUCTION.

Feeding experiments for 1909-10 have been largely along lines begun a year ago. It was felt at that time that positive results could only be obtained from tests covering a series of years. With this in mind, Wyoming grains, barley and emmer, were again compared with corn as a fattening ration for lambs. Alfalfa was also fed against native hay. For convenience the work may be considered under three heads:

EXPERIMENT I. A comparison of corn, barley, and emmer for lamb feeding.

EXPERIMENT II. A comparison of alfalfa and native hay for lamb feeding.

EXPERIMENT III. A comparison of corn and barley for growing cattle.

We are indebted to Mr. Hepner for analyses of the feeds used and to Shepherd McLay for the careful carrying out of the experiments.
OUTLINE OF EXPERIMENTS I AND II.

The lambs used were far from uniform in breeding, size, and type, but an effort was made to divide them as carefully as possible. Twenty-seven of the lambs in each lot were brought in from a ranch near Laramie. They were from range ewes sired by Cotswold and Shropshire rams. The balance of the lots were lambs bred at the Station farm and represented crosses of thirteen different breeds.

The feeding period covered 91 days. Table A shows the divisions made, the feeds used and the average weight of each lot at the beginning of the experiment:

Table A.
Divisions Made and Feeds Used.

<table>
<thead>
<tr>
<th>Lot</th>
<th>No. in Lot</th>
<th>Av. Wt. per Head lbs.</th>
<th>FEEDS USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>I...</td>
<td>41</td>
<td>63.9</td>
<td>Alfalfa</td>
</tr>
<tr>
<td>II...</td>
<td>41</td>
<td>64.5</td>
<td>Alfalfa</td>
</tr>
<tr>
<td>III...</td>
<td>41</td>
<td>62.7</td>
<td>Alfalfa</td>
</tr>
<tr>
<td>IV...</td>
<td>41</td>
<td>64.1</td>
<td>Native hay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roughage</th>
<th>Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>Corn</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>Barley</td>
</tr>
<tr>
<td>Emmer</td>
<td></td>
</tr>
<tr>
<td>Native hay</td>
<td>Corn</td>
</tr>
</tbody>
</table>

The alfalfa used was purchased at Wheatland and while not choice, it was much better than that used the previous year. The native hay came from the Laramie Plains and was of excellent quality. Professor Nelson, the station botanist, reported on it as follows: "Typical irrigated meadow hay. It was difficult to determine all the species represented in the hay, but the following were detected and are named in the order of their predominance: 1, Baltic Rush (Juncus balticus); 2, Spike Rush (Eleocharis palustris); 3, Long styled Rush (Juncus longistylis); 4, Tufted Hair-grass (Deschampsia caespitosa); 5, Nebraska Sedge (Carex nebraskensis). Several other species of grasses, sedges and weeds
were present in small amounts.” The barley (Scotch) and emmer were both grown on the Laramie Plains while the corn came from Nebraska. The following table gives the analyses of feeds used:

**Chemical Composition of Feeds Used.**

<table>
<thead>
<tr>
<th>Feed</th>
<th>Water</th>
<th>Ash</th>
<th>Protein</th>
<th>Crude Fiber</th>
<th>Nitrogen-free extract</th>
<th>Ether extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>10.51</td>
<td>1.41</td>
<td>8.80</td>
<td>2.25</td>
<td>73.11</td>
<td>3.92</td>
</tr>
<tr>
<td>Barley</td>
<td>10.94</td>
<td>2.43</td>
<td>9.40</td>
<td>5.10</td>
<td>70.12</td>
<td>2.01</td>
</tr>
<tr>
<td>Emmer</td>
<td>8.19</td>
<td>3.69</td>
<td>9.26</td>
<td>10.12</td>
<td>65.91</td>
<td>2.83</td>
</tr>
<tr>
<td>Native Hay</td>
<td>5.58</td>
<td>6.60</td>
<td>7.71</td>
<td>30.82</td>
<td>47.16</td>
<td>2.13</td>
</tr>
<tr>
<td>Alfalfa</td>
<td>6.39</td>
<td>8.05</td>
<td>11.16</td>
<td>38.95</td>
<td>34.17</td>
<td>1.28</td>
</tr>
</tbody>
</table>

Each lot of lambs was provided with good shelter and a yard large enough to furnish needed exercise. Fresh water and salt were always accessible. Grain was fed whole.

Similar preliminary feeding was given all lambs, the grain ration consisting of a mixture of the three concentrates to be used. During the feeding period each lot received the same amount of grain and all the hay it would eat. Racks were kept clean and hay removed was weighed and deducted from the total.

**RESULTS.**

In discussing the results obtained, the lot fed corn and native hay will be included in each table, and compared with the corn and alfalfa lot. Weights and gains of the various lots were as follows:
TABLE B.
Average Weights and Gains of Lambs.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. {Corn . . . .} {Alfalfa . . .}</td>
<td>63.9</td>
<td>96.1</td>
<td>32.2</td>
<td>.35</td>
</tr>
<tr>
<td>II. {Barley . . .} {Alfalfa . . .}</td>
<td>64.5</td>
<td>90.1</td>
<td>25.6</td>
<td>.28</td>
</tr>
<tr>
<td>III. {Emmer . . .} {Alfalfa . . .}</td>
<td>62.7</td>
<td>88.8</td>
<td>26.1</td>
<td>.29</td>
</tr>
<tr>
<td>IV. {Corn . . . .} {Native hay}</td>
<td>64.1</td>
<td>86.6</td>
<td>22.5</td>
<td>.25</td>
</tr>
</tbody>
</table>

Corn gave decidedly better returns than either barley or emmer, the two latter being very nearly equal considered only from the standpoint of gains. The test with barley was hardly a fair one, as four of the lambs in this bunch did very poorly. This was through no fault of the grain. Lot IV, fed native hay, made much poorer gain than did lot I, given the same grain with alfalfa.

Table C deals with the total feed given to each lamb during the experiment and presents some interesting figures. In the case of the hay, it seemed impossible to avoid a certain amount of waste and the totals represent all that was used exclusive of the small amount that was weighed back.
Table C.

Average Feed Consumed per Lamb.
(91 days)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I..</td>
<td>8</td>
<td>176</td>
<td></td>
<td>80.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>II..</td>
<td>7</td>
<td>195</td>
<td></td>
<td></td>
<td>80.9</td>
<td></td>
</tr>
<tr>
<td>III.</td>
<td>5</td>
<td>224</td>
<td></td>
<td>153</td>
<td>80.9</td>
<td></td>
</tr>
<tr>
<td>IV..</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

With an equal grain allowance we find an extreme variation of 71 pounds in the hay consumption. In all cases, the amount of hay weighed back was small. The lots fed alfalfa appeared to waste much more than did the lambs fed native hay.

Table C gives the following average daily ration for the lambs in each lot:

Lot I—Alfalfa, 2.02 lbs.; corn, .89 lb.
Lot II—Alfalfa, 2.22 lbs.; barley, .89 lb.
Lot III—Alfalfa, 2.52 lbs.; emmer, .89 lb.
Lot IV—Native hay, 1.70 lbs.; corn, .89 lb.

The grain allowance was increased from a minimum of half a pound to one pound per head per day, and held there during the greater part of the experiment. One and one-half pounds was more than the lambs would clean up, and was discontinued after a short trial.
Comparing first the three lots fed alfalfa, we find corn gave much the best returns, with emmer and barley running very nearly equal. It is well to remember in this connection what was said earlier regarding four of the barley fed lambs. It required 215 pounds, or 28%, less alfalfa, and 65 pounds, or 21%, less grain for 100 pounds of gain when corn replaced barley in the ration.

Lots I and IV furnish a comparison of alfalfa and native hay. As was stated elsewhere, the native hay was choice, while the alfalfa was not above the average, having lost many of its leaves in baling and handling. Analysis shows it below the average in protein. 133 pounds, or 20%, less hay, and 109 pounds, or 30%, less grain was required for 100 pounds gain where alfalfa replaced native hay.

This test adds another link to the strong chain of arguments already advanced in favor of alfalfa for mutton production. Better results would undoubtedly have been obtained with the native hay had linseed or cotton seed cake been used as part of the allowance of concentrates. The object of the experiment was, however, to approach as closely as possible to average Wyoming feeding conditions.

The bulk of the lambs were marketed at Denver, and while not fat, they were in good killing condition. The shrinkage on the car was exceptionally heavy:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>547</td>
<td></td>
<td>251</td>
<td>316</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>762</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>858</td>
<td>680</td>
<td>360</td>
<td></td>
<td>310</td>
</tr>
</tbody>
</table>

*Table D.*

*Feed for 100 Pounds Gain.*
Average weight of lambs at Laramie... 89.1 lbs.
Average weight of lambs at Denver... 80.8 lbs.

Shrinkage... 8.3 lbs.

This large loss can only be accounted for on the supposition that the lambs were not properly cared for on their arrival in Denver.

OUTLINE OF EXPERIMENT III.

This test had for its object the comparing of corn and barley as concentrates for growing young stock. Six yearling Hereford heifers used in the trial were divided as carefully as possible into two lots of three each. The feeding period, 77 days, was of necessity short, due to the sale of four of the animals.

Analyses of the hay and grain used have already been given. All grain was ground before feeding. Hay was supplied "ad libitum."

Good shelter was provided and yards were large enough for needed exercise.
As will be noted in the following table, the animals were small, though they were all thrifty.

**Table E.**
Divisions Made and Feeds Used.

<table>
<thead>
<tr>
<th>Lot</th>
<th>No. in Lot</th>
<th>Av. Wt. per Head lbs.</th>
<th>FEEDS USED.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Roughage</td>
</tr>
<tr>
<td>I...</td>
<td>3</td>
<td>450</td>
<td>Native hay.</td>
</tr>
<tr>
<td>II...</td>
<td>3</td>
<td>442</td>
<td>Barley</td>
</tr>
</tbody>
</table>

**RESULTS.**

Table F gives the average weights and gains of the heifers during the time they were on feed.

**Table F.**
Average Weight and Gain of Heifers.

<table>
<thead>
<tr>
<th>Lot</th>
<th>Wt. at beginning, lbs.</th>
<th>Wt. at close, lbs.</th>
<th>Gain, lbs.</th>
<th>Daily gain, lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I Corn</td>
<td>450</td>
<td>583</td>
<td>133</td>
<td>1.73</td>
</tr>
<tr>
<td>II Barley</td>
<td>442</td>
<td>580</td>
<td>138</td>
<td>1.79</td>
</tr>
</tbody>
</table>

A fair gain was made in both cases, with the barley lot slightly in the lead. The condition of the animals when put on experiment was such as to make them respond readily to a grain ration.

The average feed consumed per head was as follows:
The grain ration was gradually increased from a minimum of four pounds to eight pounds and hay was always before them. The above table shows that the barley lot ate slightly more hay. Still the difference is too small to be considered seriously.

Working out the next step, the average daily ration of each lot, we have:
Lot I—Native hay, 8.8 lbs.; corn, 6.7 lbs.
Lot II—Native hay, 9.0 lbs.; barley, 6.7 lbs.

It will be seen that the two lots checked up practically the same on feed consumed. Roughage constituted the larger part of the ration at all times.

A showing such as the above would not justify one in making claims of superiority for either grain. The gains in
both cases were very good. Barley is a grain readily grown throughout Wyoming, and the results of its use in this case should do much to popularize it with stock feeders.

CONCLUSIONS.

RESULTS OF LAMB FEEDING.

Emmer and barley gave practically the same gains; 858 pounds of alfalfa and 310 pounds of grain were required by the emmer lot and 762 pounds of alfalfa and 316 pounds of grain by the barley lot for 100 pounds of gain. This year's test with barley was hardly a fair one and the figures do not do it justice.

It required 215 pounds, or 28%, less alfalfa, and 65 pounds, or 21%, less grain for 100 pounds of gain when corn replaced barley in the ration.

133 pounds, or 20%, less hay, and 109 pounds, or 30%, less grain was required for 100 pounds gain when alfalfa replaced native hay. Native hay and corn undoubtedly gave too wide a ration and better results would have been obtained by substituting cotton seed or linseed cake for part of the grain allowance.

RESULTS OF CATTLE FEEDING.

Barley and corn, when fed with native hay, proved to be of equal value as concentrates for growing heifers. In this case, also, better results would probably have been obtained with a narrower ration.