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Bulletin No. 106 - I. Cottonseed Cake vs. Cold Pressed Cottonseed Cake for Beef Cows. II. Mixed Grains vs. Cottonseed Cake for Growing Beef Cattle

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I. Cottonseed Cake vs. Cold Pressed Cottonseed Cake for Beef Cows.

II. Mixed Grains vs. Cottonseed Cake for Growing Beef Cattle.

By A. D. FAVILLE.
UNIVERSITY OF WYOMING

Agricultural Experiment Station

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PART I. COTTONSEED CAKE VS. COLD PRESSED COTTONSEED CAKE FOR BEEF COWS.

PART II. MIXED GRAIN VS. COTTONSEED CAKE FOR GROWING BEEF CATTLE.

PART I.

Introduction.

Within the last few years cottonseed products have come into common use throughout many parts of Wyoming and the question is often raised as to the relative merits of these stock concentrates. The two bi-products, a test of which is reported in the following pages, find many buyers among both cattle and sheepmen. Cottonseed cake is the residue of the cottonseed kernel after the hull has been removed and the oil extracted. When ground it is known as cottonseed meal. "Cold-pressed cottonseed cake is produced by subjecting the entire uncrushed, unheated seed to great pressure. In the residual cake there is a larger proportion of hull to meal than in normal cake with a correspondingly lower feeding value."*

A study of the following composition table brings out the difference in the two products:

*Henry's Feeds & Feeding.
TABLE "A." ANALYSIS OF FEEDS.*

Percentage composition, air-dry substance.

<table>
<thead>
<tr>
<th>FEED</th>
<th>Water:</th>
<th>Ash:</th>
<th>Crude protein:</th>
<th>Crude fiber:</th>
<th>Nitrogen free extract:</th>
<th>Ether extract:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cottonseed cake</td>
<td>7.66</td>
<td>6.22</td>
<td>41.38</td>
<td>11.69</td>
<td>26.72</td>
<td>6.33</td>
</tr>
<tr>
<td>Cottonseed cake cold-pressed</td>
<td>7.68</td>
<td>4.43</td>
<td>25.39</td>
<td>27.79</td>
<td>29.01</td>
<td>5.70</td>
</tr>
</tbody>
</table>

Cottonseed cake runs high in crude protein and low in fiber, while the cold-pressed cake is much lower in protein and higher in fiber.

Outline of Experiment.

The available station beef cows, eight in number, were divided as evenly as possible into two lots. Lot I. contained 1 Shorthorn, 2 Aberdeen Angus, and 1 Hereford. Lot II. had 1 Shorthorn, 2 Herefords, and 1 Angus. Difficulty was experienced in arranging satisfactory groups due to the fact that a number of cows were due to freshen shortly after it was planned to begin experiment. Some of these animals were not included in the lots while others were dropped out at the end of six to fourteen weeks. Individual weights and records were kept in all cases.

An analysis of the cottonseed products has already been given. Native hay of good quality was fed. It was obtained near Laramie (from the Greaser ranch) and was very similar to that obtained in previous years. The cows were kept in a comfortable barn at night and turned out during the warmer part of the day. Both lots were run together during the time they were out of doors.

*Analysis by F. E. Hepner.
RESULTS.

Table “B” shows the initial weights and the gains made by the cows in each lot, also the length of time they were on experiment.

**TABLE “B.” WEIGHTS AND GAINS.**

<table>
<thead>
<tr>
<th>LOT I. Cold-pressed cottonseed cake</th>
<th>Weight at beginning lbs.</th>
<th>Weight at close lbs.</th>
<th>Gain lbs.</th>
<th>Weeks on experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorthorn</td>
<td>1226</td>
<td>1285</td>
<td>59</td>
<td>16</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>1091</td>
<td>1165</td>
<td>74</td>
<td>12</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>981</td>
<td>1090</td>
<td>109</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>1515</td>
<td>1540</td>
<td>25</td>
<td>6 *</td>
</tr>
<tr>
<td>Total</td>
<td>813</td>
<td>5080</td>
<td>267</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOT II. Cottonseed cake</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorthorn</td>
<td>1327</td>
<td>1345</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>1251</td>
<td>1335</td>
<td>84</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>950</td>
<td>1070</td>
<td>120</td>
<td>16</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>1150</td>
<td>1246</td>
<td>96</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>4678</td>
<td>4996</td>
<td>318</td>
<td>62</td>
</tr>
</tbody>
</table>

*This cow aborted.

Animals in Lot I. averaged heavier tho, as was previously stated, divisions were made as carefully as possible and from the standpoint of the individuals composing them it appeared to be a fair arrangement.

The lot on cottonseed cake made the heavier gains but the cows in the group were on experiment longer (12 weeks) than were those getting cold-pressed cottonseed.
Taking the total gain of each lot and dividing by the total number of weeks on experiment gives the average weekly gain each animal made for the whole period.

Lot I. (Cold-pressed Cottonseed Cake) Average gain per cow per week, 5.34 lbs.

Lot II. (Cottonseed Cake) Average gain per cow per week, 5.13 lbs.

In other words the animals in Lot I. made an average gain of 5.34 lbs. per week during the time they were on experiment while those in Lot II. put on 5.13 lbs. per week during the time they were tested.

It will thus be seen that gains were practically the same with both lots.

What were the feed requirements that produced these gains? Table “C” furnishes information on this point.

**TABLE “C.” TOTAL FEED REQUIREMENTS.**

<table>
<thead>
<tr>
<th>LOT I. Cold-pressed cottonseed cake</th>
<th>Hay fed lbs.</th>
<th>Waste hay lbs.</th>
<th>Grain fed lbs.</th>
<th>Weeks on experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorthorn</td>
<td>2030</td>
<td>36.5</td>
<td>334.5</td>
<td>16</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>1475</td>
<td>5.5</td>
<td>250.5</td>
<td>12</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>2035</td>
<td>16.0</td>
<td>334.5</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>739</td>
<td>5.0</td>
<td>124.5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LOT II. Cottonseed cake.</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorthorn</td>
<td>2035</td>
<td>13.5</td>
<td>250.5</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>2125</td>
<td>19.0</td>
<td>250.5</td>
<td>16</td>
</tr>
<tr>
<td>Hereford</td>
<td>2036</td>
<td>10.0</td>
<td>250.5</td>
<td>16</td>
</tr>
<tr>
<td>Aberdeen Angus</td>
<td>1755</td>
<td>21.0</td>
<td>222.5</td>
<td>14</td>
</tr>
</tbody>
</table>
The weekly ration per cow per week during the time the animals were on experiment works out as follows:

**LOT I.**
Pounds native hay per week ........................................... 125.6
Pounds cold-pressed cottonseed cake per week .......... 21.

**LOT II.**
Pounds native hay per week ........................................... 128.2
Pounds cottonseed cake per week ............................... 15.7

The hay ration was practically the same for both lots and the amount left was extremely small. Lot I. received three pounds of cold-pressed cake per day while Lot II. received about two and four-tenths pounds.

In round numbers two and four-tenths pounds of cottonseed cake such as was used in this trial, when fed with native hay, gave practically the same results as three pounds of the cold-pressed cake. This seems to agree with the results one would expect from a study of the analysis of the two feeds.

With these facts in mind and knowing local prices it becomes an easy matter to compare the concentrates as to their feeding value.

**PART II.**

**MIXED GRAIN VS. COTTONSEED CAKE FOR GROWING BEEF CATTLE.**

Introduction.

Winter rations for Wyoming young stock are often composed largely of native hay, a small grain allowance being occasionally fed as a supplement to this roughage. What available grains are most satisfactory for young beef stock when native hay is utilized? As was stated in Part I. cottonseed products find extensive use in many parts of the state. The cake is easily handled and cattle will waste very little even when fed directly from the ground. Mill run bran and corn are both staples thruout large areas of the West. How do these concentrates compare when fed with our western native hay?
Outline of Experiment.

The cattle used in this experiment were heifers kept in the college herd. Each of the two lots consisted of two Aberdeen Angus and two Polled Herefords. Lot I. averaged ten months and eight days in age while Lot II. averaged nine months and twenty-nine days. The preliminary feeds were the same in all cases and consisted of a mixture of the three concentrates tested later. Individual records were kept and every attempt was made to have the two lots as uniform as possible. Both the initial and final weights represented an average of the weights for three successive days. Single weighings were taken every two weeks. The feeding period lasted 141 days.

TABLE "A." COMPOSITION OF FEEDS USED IN EXPERIMENT.*

<table>
<thead>
<tr>
<th>FEED</th>
<th>Water</th>
<th>Ash</th>
<th>Crude Protein</th>
<th>Crude Fiber</th>
<th>Nitrogen Free Extract</th>
<th>Ether Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn meal</td>
<td>10.20</td>
<td>1.59</td>
<td>10.02</td>
<td>2.67</td>
<td>71.94</td>
<td>3.58</td>
</tr>
<tr>
<td>Bran**</td>
<td>9.13</td>
<td>5.10</td>
<td>16.93</td>
<td>7.33</td>
<td>57.68</td>
<td>3.83</td>
</tr>
<tr>
<td>Cottonseed cake</td>
<td>7.51</td>
<td>5.87</td>
<td>40.77</td>
<td>11.66</td>
<td>26.19</td>
<td>8.00</td>
</tr>
<tr>
<td>Native hay ***</td>
<td>6.63</td>
<td>6.70</td>
<td>8.86</td>
<td>30.21</td>
<td>45.32</td>
<td>2.28</td>
</tr>
</tbody>
</table>

*Analysis by F. E. Hepner.
**The bran was what is known as mill feed or mill run bran. No attempt had been made to separate the bran and middlings.
***Figures taken from previous analysis.

Both lots had native hay. Lot I. received a grain mixture consisting of equal parts of corn meal and bran; Lot II. ate cottonseed cake.
RESULTS.

The weights and gains of the individuals in each lot are shown in Table "B."

TABLE "B." WEIGHTS AND GAINS (141 days.)

<table>
<thead>
<tr>
<th>No. of animal</th>
<th>Breed</th>
<th>Weight at beginning lbs.</th>
<th>Weight at close lbs.</th>
<th>Total gain lbs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOT I.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn and bran</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>203</td>
<td>Hereford</td>
<td>580</td>
<td>719</td>
<td>139</td>
</tr>
<tr>
<td>204</td>
<td>Hereford</td>
<td>758</td>
<td>850</td>
<td>92</td>
</tr>
<tr>
<td>205</td>
<td>Angus</td>
<td>468</td>
<td>620</td>
<td>152</td>
</tr>
<tr>
<td>215</td>
<td>Angus</td>
<td>444</td>
<td>600</td>
<td>156</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>562.5</td>
<td>697.3</td>
<td>134.8</td>
</tr>
<tr>
<td>LOT II.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cottonseed cake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>153</td>
<td>Hereford</td>
<td>741</td>
<td>805</td>
<td>64</td>
</tr>
<tr>
<td>206</td>
<td>Hereford</td>
<td>407</td>
<td>508</td>
<td>101</td>
</tr>
<tr>
<td>179</td>
<td>Angus</td>
<td>507</td>
<td>585</td>
<td>78</td>
</tr>
<tr>
<td>200</td>
<td>Angus</td>
<td>470</td>
<td>615</td>
<td>145</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>531.3</td>
<td>628.3</td>
<td>97</td>
</tr>
</tbody>
</table>

Lot I. receiving corn and mill run bran averaged considerably better gains than did Lot II. getting the cottonseed cake. Native hay was used rather than alfalfa because of the fact that it is the common Wyoming roughage.

The amount eaten by each animal during the feeding period is shown in Table "C."
TABLE “C.” AVERAGE FEED EATEN AND LEFT (141 days.)

<table>
<thead>
<tr>
<th>Lot.</th>
<th>Hay offered</th>
<th>Grain offered</th>
<th>Waste hay</th>
<th>Waste grain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
<td>lbs.</td>
</tr>
<tr>
<td>I. Corn and bran</td>
<td>1279</td>
<td>564</td>
<td>72</td>
<td>1.6</td>
</tr>
<tr>
<td>II. Cottonseed cake</td>
<td>1292</td>
<td>282</td>
<td>61</td>
<td>30.</td>
</tr>
</tbody>
</table>

One animal in Lot II., No. 206, almost always left some cake, the others cleaned theirs up in good shape. Hay was of a quality above the average, hence little was wasted. The average daily ration per heifer worked out as follows:

Lot I. Hay 9.1 lbs., Corn and Bran 4. lbs.
Lot II. Hay 9.2 lbs., Cottonseed Cake 2 lbs.

The average weight of Lot I. for the period was 630 lbs., while Lot II. averaged 580 pounds.

The animals were not on a heavy ration as it did not seem desirable to feed for extremely rapid growth.

TABLE “D.” FEED FOR 100 LBS. GAIN. (Waste deducted.)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot I. Corn and bran</td>
<td>896</td>
<td>209</td>
<td>209</td>
<td>209</td>
</tr>
<tr>
<td>Lot II. Cottonseed cake</td>
<td>1269</td>
<td>260</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It is to be expected that feed requirements for a pound of gain will be rather high when native hay is used and the grain ration is small.

Some interesting cost figures were obtained using prices prevailing in Laramie during the time of the experiment. With native hay at $12.00, corn meal at $30.00, mill run bran at $30.00 and cottonseed cake at $35.00 per
ton it cost $11.64 to put 100 pounds gain on the animals
of Lot I. and $12.16 to put the same gain on those of Lot II. Figuring hay at $6.00 per ton instead of $12.00 and
leaving the other prices the same, a 100 pound gain in
Lot I. cost $8.95 and a corresponding gain in Lot II.,
$8.35. With hay high in price the ration used for Lot I.
proved somewhat cheaper but with hay low the cotton-
seed ration was a trifle less expensive. Stated in another
way, with native hay high and concentrates at the prices
given one pound of cottonseed cake gave smaller and
more expensive gains than two pounds of a mixture of
equal parts of corn meal and mill run bran. With hay
low in price and no change made in price of concentrates,
while the cottonseed ration still gave the smaller gains,
they were a trifle less expensive than were those obtained
when the corn and bran were fed.

ACKNOWLEDGEMENT.

The author wishes to acknowledge his indebtedness
to Mr. Frank E. Hepner, the Assistant Station Chemist,
who made the analyses of the feeds used in these experi-
ments.

CONCLUSION.

In rations for beef cows two and four-tenths pounds
of cottonseed cake when fed with native hay proved prac-
tically equal in feeding value to three pounds of cold-
pressed cake.

Page 7.

In growing rations for beef heifers a ration of four
pounds of a mixture of equal parts of corn meal and mill
run bran gave better gains than did two pounds of
cottonseed cake.

Page 9.

Under certain conditions the ration in which the
grain mixture was used made the cheaper gains; under
other conditions the cottonseed ration was more economi-
cal.

Pages 10-11.