Supplementing Potato Diets for fattening cattle

E. N. Hoffman
J. E. Oldfield

Station Circular of Information 595
September 1958

Agricultural Experiment Station
Oregon State College
Corvallis
Supplementing Potato Diets for Fattening Cattle

by E. N. Hoffman and J. E. Oldfield*

Substantial quantities of potatoes are often available for feeding to livestock, because of the almost uniform demand for potatoes for human consumption coupled with rather wide variation in yearly supply. In areas where potatoes are a major crop, they can often be obtained at prices which make them attractive to the livestock feeder, who then becomes interested in how best to include them in his animal rations. Two major questions arise: (a) How large a part of the ration may be made up of potatoes, and how many pounds of potatoes may be fed per animal daily, and (b) what types and amounts of supplementary materials lend themselves best to the economical improvement of a potato diet.

The use of potatoes in livestock rations is not new; some published reports on the subject date back to 1892 (1).** Experiments comparing potatoes with other succulent feeds, such as corn silage, show satisfactory performance equaling that on the silage, with dairy cattle (2, 3) and with fattening cattle and lambs (4, 5, 6). In all these studies, however, potatoes were fed at moderate levels, and were not the major dry matter source. Indeed, the recommended levels per animal were cited as 25–40 pounds daily for dairy cattle, 17 pounds for yearling steers, and 2 pounds daily for fattening lambs.

The present study was designed to test the effects of high levels of potatoes in rations for fattening yearling steers and to investigate the usefulness of protein, non-protein nitrogen (urea), and diethylstilbestrol supplements to such rations.

Materials and Methods

Five groups of 8 or 9 each yearling Hereford steers were fed in dry lot during a 125-day period. The basal ration consisted of potatoes and straw, both fed free choice; a standard ration of chopped alfalfa hay and ground ear corn was included for comparison. All potatoes were fed whole and uncooked under a horizontal pole which forced the animals to keep their heads down while eating. Fresh potatoes were added daily and spoiled ones removed. Straw was fed in separate bunks. Protein supplements, where used, were fed with the straw. Complete ration treatments are listed in table 1.

The two supplements were formulated to supply the same amount of total nitrogen. All experimental lots received salt, steamed bone meal and water, free choice. A small quantity of mixed alfalfa and grass hay was fed all lots during the first 10 days on experiment, until all steers in lots 1–4 were eating potatoes.

---

* Superintendent, Malheur Branch Experiment Station and Associate Animal Husbandman, Department of Dairy and Animal Husbandry, Oregon State College, respectively.

** Numbers in parentheses refer to references listed at end of this circular.
Table 1. Plan of experiment

<table>
<thead>
<tr>
<th>Lot no.</th>
<th>No. of animals</th>
<th>Ration treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>Potatoes, straw, ad lib.</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
<td>Potatoes, straw, ad lib. + 2 lbs./head/day protein supplement*</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>Potatoes, straw, ad lib. + 2 lbs./head/day protein supplement* containing 10 mg. diethylstilbestrol</td>
</tr>
<tr>
<td>4</td>
<td>8</td>
<td>Potatoes, straw, ad lib. + 2 lbs./head/day protein supplement** containing urea.</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>Chopped alfalfa hay, ad lib. + ground ear corn fed to average 10 lbs./head/day.</td>
</tr>
</tbody>
</table>

* Protein supplement contained: cottonseed oil meal 64%, wheat mill run 26%, cane molasses 6%, ground limestone 2%, and iodized salt and dicalcium phosphate 1% each.

** The urea and protein supplement contained: cottonseed oil meal 34%, wheat mill run 53%, cane molasses 6%, urea 3%, ground limestone 2%, and iodized salt and dicalcium phosphate 1% each.

Results

The average daily gains, feed consumption, and carcass grade data for the experimental animals are listed in table 2.

Table 2. Feed intake and performance data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Avg. Crude Dry</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total matter</td>
<td>protein</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Basal</td>
<td>1.61</td>
<td>82.05</td>
<td>18.58</td>
<td>14.1</td>
</tr>
<tr>
<td>2</td>
<td>Protein</td>
<td>1.98</td>
<td>77.40</td>
<td>18.20</td>
<td>14.5</td>
</tr>
<tr>
<td>3</td>
<td>Protein + stilbestrol</td>
<td>2.11</td>
<td>83.19</td>
<td>19.37</td>
<td>14.6</td>
</tr>
<tr>
<td>4*</td>
<td>Protein with urea</td>
<td>1.80</td>
<td>81.85</td>
<td>19.39</td>
<td>16.4</td>
</tr>
<tr>
<td>5</td>
<td>Standard</td>
<td>2.03</td>
<td>24.00</td>
<td>20.36</td>
<td>19.8</td>
</tr>
</tbody>
</table>

* One animal in lot 4 lodged a potato in its throat and was destroyed. Its performance is not included in the average above.
Intakes of potatoes in lots 1-4 inclusive averaged 78.5, 73.2, 78.9, and 77.2 pounds per head daily, respectively. Weather conditions during the trial included periods of intense cold interspersed with heavy rainfall. Although the potatoes were stored in covered stacks, they were frozen to some extent, and each potato-fed lot actually refused about two tons of potatoes (which have been subtracted in arriving at the intake figures listed) during the experiment.

Three steers choked on potatoes and had to be treated for their removal. One of the animals was injured in the operation and was destroyed, as indicated in table 2. Four mild cases of bloat occurred among the four potato-fed lots, as compared with three in the single lot fed alfalfa hay and ground ear corn. Considerable lameness due to swelling and stiffening of the front legs occurred in animals in all potato-fed lots. This lameness was most marked during the coldest weather when the ground was frozen, and at times affected almost all the animals in these lots. In most cases, it eventually disappeared naturally without treatment.

Discussion

Potatoes apparently can be fed successfully as the major part of the ration for fattening steers. The chief difficulty encountered, a lameness or "founder", did not seriously interfere with the animal gains under the conditions of this experiment. It is interesting that lameness was not lessened by the feeding of limited amounts of protein supplements in lots 2, 3, and 4. The feeding of these various supplements increased the weight gains of the animals and improved the final carcass grades over those attained by lot 1, which was fed only potatoes and straw.

An analysis of variance was run on the animals' gains in the various groups to determine whether the differences observed were real, or could have been due to chance. This analysis showed that gains were significantly greater ($P < 0.01$) when any of the supplements were used, than when potatoes and straw were fed alone. There were no significant differences among the gains made on the 3 supplemented rations, indicating that these supplements are about equally effective in improving the potato-straw combination. It is interesting, however, that the trend noticed in favor of the stilbestrol-containing supplement (lot 3) over the straight protein supplement (lot 2) is in the same direction as the majority of published reports concerning stilbestrol feeding.

Large amounts of potatoes were consumed by the steers, average daily intake of the four lots receiving potatoes being 76.94 pounds per head per day. In terms of cost applying in this experiment, feeding potatoes was economically advantageous in view of higher grades at slaughter of animals so fed.

Summary

1. Potatoes can be fed successfully as the major ingredient of diets for fattening yearling steers.

2. Potatoes fed raw and whole appeared palatable, and high intakes were recorded: an average of nearly 77 pounds per head daily for 31 animals. The precaution of feeding potatoes under a horizontal bar to keep the animals' heads down while eating was felt necessary.
3. A swelling and stiffening of the front legs similar to laminitis or founder was observed from time to time in all potato-fed lots. This stiffness was occasionally quite severe, and was most noticeable during periods of cold weather when footing was difficult.

4. Supplementation of potatoes with concentrate mixes containing 32% crude protein increased animal gains and improved carcass grades. Gains made on these supplemented potato rations were equivalent to those made on a conventional corn-alfalfa ration, and costs of feed per pound gain were lower, under conditions of this experiment.

Acknowledgment:

The diethylstilbestrol used in this study was supplied as "Stilbosol" premix through the courtesy of the Eli Lilly Co., and the urea was provided by the Nitrogen Division, Allied Chemical and Dye Corporation.

References


