Wintering Stock Steers

By

E. L. Potter

and

Robert Withycombe
Wintering Stock Steers

By

E. L. POTTER

and

ROBERT WITHYCOMBE

By the wintering of stock steers we mean the wintering of steer calves or yearlings that are to be run on the range the following summer rather than sent from the winter feed lot direct to market. Steers that are to be turned out of the feed lot onto grass must be fed quite differently from those that are to go from the feed lot direct to the slaughter.

This bulletin is based upon tests conducted at the Eastern Oregon Branch Experiment Station at Union, Oregon, during the last ten years. The first test began in the fall of 1916 with five lots of weanling calves. These calves were fed in different ways through the winter and then run on the range all together during the summer. During the second winter they were again separated and wintered on the same feeds as were used the first winter. During the second summer they were again run on the range together. The calves were kept under test from weaning until ready for market. A second test with five lots was begun in 1918; a third test with five lots, in 1919; a fourth, with nine lots, in 1921; and a fifth with nine lots, in 1923. Altogether 33 lots of cattle, 10 head in each lot, were used in these tests, and the time of the experiment covered ten years. The cattle were all wintered in an open lot at Union under conditions typical of the Eastern Oregon cattle ranch. In the spring they were grazed in a neighboring foot-hill pasture; in the summer, on the National Forest; in the fall, on the fields and meadows of the home ranch. The cattle were all handled alike during the grazing season. It was only during the winter that the lots were handled differently. The illustrations show the type of cattle and the lots in which they were fed. In addition to giving much detailed information as to the value of various feeds for wintering cattle, these tests have taught us the several fundamental principles which are enumerated below.

I. The gains made in the winter time on any kind of hay, straw, silage, or grain are very expensive, so much so that every pound of gain put on costs more than the market price of beef, even when beef is high. This expense of winter gains is not apparently due so much to the adverse influence of cold winter weather, but rather to the high cost of hay, silage, and grain as compared with summer grass. This is illustrated by the fact that with barley at $30.00 a ton, each pound of digestible nutrients costs 1.9 cents. With alfalfa at $8.00 a ton, each pound of digestible nutrients costs 0.8 cent. With silage at $6.00 a ton, each pound of digestible nutrients costs 1.7 cents. With good pasture at 80 cents a month, each pound of digestible nutrients costs approximately .2 cent. The financial problem of wintering, therefore, is not one of profit but one of minimum net expense. If stock cattle are so fed during the winter that they make no gains in weight, all of the feed and labor used must be charged as expense. If, on the other hand, some gains are made,
these gains will be credited against the feed bill and only the balance charged as expense. In any case, however, there is a net expense. The question at issue is how this net expense can be kept to the lowest point and yet turn out cattle that will make satisfactory gains the following summer on grass. The latter point is most important, since it is in the summer that we expect to make the largest and cheapest gains. It is also in summer that we expect to make gains cheaply enough not only to pay a profit in themselves but to offset the expense of wintering.

II. Calves or yearlings may gain in weight and lose in fat at the same time. The tendency toward growth in young animals is very strong, so strong, in fact, that when short of feed they will use up the fat which they carry on their backs and thus continue to grow in frame while losing in fat and in total weight. A calf that has been fed so that he neither gains nor loses in weight during the winter will at the end of that time be taller, longer, and have a larger frame than at the beginning of the winter, but he will carry much less fat and will not look nearly as well. A calf may even be gaining in weight and still losing in fat. In fact, in our test, calves gaining less than one-half pound a day in weight have practically all lost in fat. As a rule, it was only when the calves were gaining more than one pound a day in weight that there was any noticeable improvement in condition. There is a marked difference, however, in calves in this respect. Some have much more of a tendency to grow than do others.

What has been said of calves applies in the same way but in a less degree to yearlings. With the yearling, the tendency to growth is a little less than with calves, but it is still very strong, and no feed is converted into fat until all the needs for growth have been met. When we speak, therefore, of feeding a calf or yearling so that he "holds his own" we
should be careful to indicate whether we mean that he holds his own in weight or in fat, for the two are very different. Students of animal feeding use the term "maintenance ration." This means the amount of feed necessary to maintain the weight of the animal without gain or loss for one day. It does not mean that the calf would not grow, that is, increase in frame, on such a ration. In our tests, calves and yearlings on a maintenance ration grew in frame and lost in fat. They were not, however, kept on a maintenance ration for more than five months. What they would have done if kept on a maintenance ration indefinitely is not shown by these tests.

Fig. 2. Lot 8, Test 4, at beginning of test. Approximate age 8 months. All lots were at this time as nearly alike as it was possible to get them.

III. If stock steers are so fed as to make large gains in the winter, they will make smaller gains the following summer on grass. For every extra pound that a steer gains in winter, he will make at least one-half pound less gain the following summer on grass. This point was most thoroughly demonstrated by all of our tests at Union, and similar results have been obtained by other experiment stations. The actual gains are given in the table below. There were so many different lots used in these tests that to give the data for each lot would be confusing; consequently, we have grouped the calves into five groups and arranged the groups in the order of the gains made in winter. The yearlings we have likewise arranged in three groups. These groups were also so arranged as to give equal weight to each test and thereby avoid any differences which might occur through the fact that the grazing seasons for some of the tests were more favorable than for others. Group I includes those lots receiving the poorest winter feed and consequently making the least winter gains. Group II includes those lots receiving the second lightest feed and therefore making the second lowest winter gains. The other groups are likewise in order of the amount of winter feed received. All groups were treated exactly alike during the summer. Any differ-
ence in summer gains, therefore, is presumed to be due to the way the cattle were wintered. Each group contained from 50 to 70 animals.

### COMPARISON OF WINTER AND SUMMER GAINS

<table>
<thead>
<tr>
<th></th>
<th>I Lightest winter feed</th>
<th>II 2d Lightest winter feed</th>
<th>III 3d Lightest winter feed</th>
<th>IV 4th Lightest winter feed</th>
<th>V Heaviest winter feed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calves</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter gains per head</td>
<td>21 lbs.</td>
<td>63 lbs.</td>
<td>115 lbs.</td>
<td>162 lbs.</td>
<td>187 lbs.</td>
</tr>
<tr>
<td>Advantage over Group I at end of winter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer gains per head</td>
<td></td>
<td>238 lbs.</td>
<td>247 lbs.</td>
<td>219 lbs.</td>
<td>195 lbs.</td>
</tr>
<tr>
<td>Total gains per head and winter</td>
<td></td>
<td>293 lbs.</td>
<td>310 lbs.</td>
<td>334 lbs.</td>
<td>357 lbs.</td>
</tr>
<tr>
<td>Advantage over Group I at end of summer</td>
<td></td>
<td>17 lbs.</td>
<td>41 lbs.</td>
<td>64 lbs.</td>
<td>76 lbs.</td>
</tr>
<tr>
<td>Percent of winter advantage lost by lower summer gains</td>
<td></td>
<td>59 %</td>
<td>56 %</td>
<td>55 %</td>
<td>54 %</td>
</tr>
<tr>
<td><strong>Yearlings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter gains per head</td>
<td>21 lbs.</td>
<td>69 lbs.</td>
<td>127 lbs.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advantage over Group I at end of winter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summer gains per head</td>
<td></td>
<td>272 lbs.</td>
<td>48 lbs.</td>
<td>106 lbs.</td>
<td></td>
</tr>
<tr>
<td>Total gains per head winter and summer</td>
<td></td>
<td>259 lbs.</td>
<td>209 lbs.</td>
<td>174 lbs.</td>
<td></td>
</tr>
<tr>
<td>Advantage over Group I at end of summer</td>
<td></td>
<td>19 lbs.</td>
<td></td>
<td>42 lbs.</td>
<td></td>
</tr>
<tr>
<td>Percent of winter advantage lost by lower summer gains</td>
<td></td>
<td>62 %</td>
<td></td>
<td>60 %</td>
<td></td>
</tr>
</tbody>
</table>

This table will repay careful study. If, for example, Group II of the calves is compared with Group I, it will be noted that at the end of the winter Group II was 42 pounds larger than Group I, but by the end of the following summer it was only 17 pounds larger. In other words, the 42 pounds of extra gain made by Group II during the winter was partly offset by 25 pounds less gain the following summer. Of the extra gain...
made by Group II in the winter, 59 percent was lost through poorer gains made the following summer. Similar results are shown by the other groups of calves and also by the yearlings. In every case, the advantage which the more heavily fed groups had at the end of the winter was reduced from 54 percent to 62 percent by the smaller gains made by these groups the following summer. It will be noted that each group contained from five to ten lots and the lots each contained ten head of cattle, so that the figures given for each group are not the result of one test, but are the average of several.

In these tests it must be remembered that even the lots that gained the least were in strong, thrifty condition. Some were quite thin but none were so thin as to be stunted or weakened in vitality. What would have happened had some of the lots been fed so lightly as to make them stunted or weakened in vitality is not shown in these tests. The relative profit to be obtained from wintering steers in these various ways will depend upon prices of feed, market conditions, and other factors. In these tests, however, the steers that were so wintered as to gain from nothing up to 50 pounds a head were at the final marketing time the cheapest steers. This, however, never appeared to be the case at the end of the winter season since the light wintered steers not only did not look as well as the heavier wintered steers, but if they had been sold by the pound, it would have been necessary to get a higher price per pound for them than for the heavier wintered steers. By the end of the grazing season, however, the reverse was true and the light wintered steers could have been sold for less money with equal profit. On hay at $8.00 a ton and pasture and range at 80c a month, it has been possible to produce steers two and one-half years old at 8c a pound, farm price, and pay for all feed, interest, labor, death losses, and other charges. This was not possible, however, with the steers that were given heavy winter feed.
Of course, the heavily fed steers were a little smoother, better steers, but the difference was too small to pay the difference in cost. Under Eastern Oregon conditions, steers that were fed all the hay or hay and silage they would eat, but no grain, for two winters were almost, but not quite, ready for market at the end of the second winter. By the end of the following grazing season they were still rather better cattle than the steers that had not had all the hay or hay and silage they would eat, but were, as a rule, rather too large. It is possible, of course, that different conditions might have made the heavier feeding more profitable, particularly where it was desirable to market the steers early in the summer. The following, however, can be considered as final:

First, that at least one-half the extra gains obtained by heavy winter feeding will be lost by poorer gains the following summer; and, second, that where extra feed is available it should be given to steers that are about mature and that will go to market from the feed lot rather than out on the range.

IV. The kind of feed used for wintering purposes does not seem to influence the gains made the following summer on grass, provided that the amount of gains made during the winter remains the same. In these tests dealing with various rations of alfalfa, corn silage, sunflower silage, peas-and-barley silage, barley grain, straw, and cottonseed-meal, steers that made the same gains in the winter made similar gains the following summer, regardless of the feed used during the winter. Likewise, steers making large gains in the winter have made smaller summer gains than others which made small winter gains.

V. The value of any given feed for wintering purposes may be altogether different from its value for fattening purposes. This is particularly true in comparing coarse, unpalatable roughages with the more con-
Wintering Stock Steers

centrated and nutritious feeds. For example; oats or barley straw supplemented with cottonseed cake makes a very satisfactory substitute for alfalfa hay, where it is the intention merely to maintain the animals through the winter without any especial gain in weight. If, however, some real gain in weight and finish is desired, the straw and cottonseed cake have no value since the cattle will not eat enough of it to do more than hold their own, while with alfalfa hay a steer, if given all he will eat, will consume almost twice as much as is necessary merely to maintain him and consequently will make a considerable gain. Likewise, the grain, which is so valuable for fattening purposes, has a much lower value for wintering.

![Fig. 6. Lot 6, Test 4, after 120 days on 21 pounds of alfalfa per head per day. Gain 126 pounds per head in 120 days. Approximate age 12 months.]

VI. Within reasonable limits, the amount of feed necessary to winter a calf or yearling without gain or loss depends upon his size. A 600-pound calf, for example, requires 20 percent more feed than a 500-pound calf. A small calf requires slightly more feed in proportion to weight than does the older animal, but with steers weighing between 450 and 850 pounds, this difference was found to be 5 percent or less; in other words too small to be of any practical importance.

VII. The gains made by wintering cattle are not in proportion to the total feed consumed but are in proportion to the amount of feed in addition to that required merely to maintain the animal’s weight. For example, one group of calves gained 1 pound a day on a ration of 19 pounds of alfalfa. On this basis, there should be a gain of one-half pound a day on a ration of 9.5 pounds of alfalfa. The actual fact, however, was that calves of this size had to have 11.5 pounds of hay in order barely to hold their own. In checking up on all the lots, we found that the gains made on alfalfa hay were at the rate of 1 pound of gain for each 7 to 7.5 pounds of alfalfa eaten in addition to the amount necessary for mainten-
A similar situation was found with other feeds. Apparently yearlings require more feed to make a pound of gain than do calves, even after allowance is made for maintenance. In these tests, however, this difference was slight and the exact amount of the difference is yet to be determined.
VIII. The amount of feed that will make a steer gain two pounds a day is approximately twice the amount necessary merely to maintain him. In other words, the feed necessary for maintenance is about half of what he can eat. It should be remembered, however, that a steer will not eat to his full capacity on low-grade feed, such as straw or poor hay; in fact, he will not reach full capacity except on a ration consisting of good, palatable grain, supplemented by a good quality of hay or hay and silage.
Alfalfa. Alfalfa is the standard feed for wintering stock cattle throughout most of the Northwest. It has no superior for wintering purposes, but that does not imply that other feeds may not often take its place where economic conditions warrant the substitution.

In the tests which covered a large number of lots scattered through several years, we found that with steer calves or yearlings weighing from 450 up to 900 pounds, 2 pounds of alfalfa a day for each 100 pounds of live weight was required to make the steers hold their own in weight.

Where more alfalfa was fed than was actually needed for maintenance, we found that each 7 to 7.5 pounds of alfalfa in addition to maintenance produced one pound of gain. By feeding the calves all the alfalfa they would eat, it was possible to obtain gains of from 1 to 1.25 pounds, with occasional gains approaching 1.5 pounds. The amounts of hay quoted, however, are for the amounts actually eaten, and do not include waste. We found that we could feed a calf from 12 to 14 pounds of alfalfa hay with little or no waste. Yearlings would eat 20 pounds or better without waste. On the other hand, when we attempted to make the steers consume the largest possible amount of hay, some wastage was necessary. For example, calves getting all the alfalfa they could be persuaded to eat actually consumed 18.5 to 20.5 pounds a day, but in addition to what they consumed wasted from 2 to 2.5 pounds. Yearlings weighing about 800 pounds can be made actually to eat 25 pounds of alfalfa, but here again an additional allowance of from 2 to 5 pounds must be made to cover the wastage, so that the actual amount of hay used ranged from 27 to 30 pounds.
Straw. The use of straw, especially barley or oat straw, for wintering cattle has long been common, but has not generally been regarded with favor because of the poor results obtained. These poor results seem to have been due to the very low protein content of the straw. This led us to test the use of barley and oat straw supplemented with a sufficient amount of cottonseed cake or meal to bring the protein content up to the normal standard. In the first tests we used 2 pounds of cottonseed cake as a supplement to the straw. Later this was reduced to 1 pound. Calves and yearlings fed on the straw supplemented with 1 pound of cottonseed cake wintered in very satisfactory condition. Practically all of them gained a little in weight but lost, of course, in fat.

Calves on straw supplemented with cottonseed cake were fed approximately 15 pounds of straw, of which they actually ate 11 to 14 pounds. Calves fed 2 pounds of cottonseed-meal instead of 1 pound made slightly better gains, but not enough to justify the difference in cost. Yearlings did about the same as the calves, except that they required more straw. The yearlings were fed approximately 21 pounds of straw and actually consumed 18 to 19 pounds. On this ration, they all made slight gains but hardly enough to count.

In addition to the tests with cottonseed cake, one test was run with alfalfa as a supplement to straw. Calves given all the straw they would eat, with 4 pounds of alfalfa hay in addition, a little more than held their own in weight. The same cattle the next winter as yearlings were given 5 pounds of alfalfa and all the straw they would eat. On this they made a very slight loss. It is safe to say from these tests that oat or barley straw supplemented with 4 pounds of alfalfa for calves and 5 pounds of alfalfa for yearlings will bring them through the winter without any particular loss of weight. This amount of alfalfa had the same value as
1 pound of cottonseed-meal as a supplement to straw and was, of course, less expensive. For maintenance purposes, 2100 to 2200 pounds of barley straw supplemented with either 165 pounds of cottonseed cake or 650 pounds of alfalfa was equivalent to one ton of alfalfa. It was not possible, however, to obtain any appreciable amount of gain in weight on the straw. In fact, the cattle had to be encouraged to eat every bit they could in order to hold their own. The straw, therefore, has no place where any appreciable amount of gain is expected and the values given are applicable for maintenance purposes only.

Silage. Silage of any kind along with alfalfa hay affords a most satisfactory ration for wintering calves and yearlings. Usually slightly better gains can be obtained on the silage and hay than on the hay alone.

The gains made the following summer by cattle fed on silage and hay are the same as those made by cattle fed hay alone, providing they are all fed so as to make the same amount of winter gain. From the standpoint of economy, however, the silage was not very promising. In these tests when silage was substituted for part of the hay, one ton of silage had 40 percent of the value of a ton of alfalfa. In no case have we been able to produce one ton of silage for 40 percent of the cost of a ton of alfalfa. Hence, the use of silage has added to the expense of winter operation. If silage is available, it should be saved for fattening steers rather than for stock cattle. Other tests recorded in Station Bulletin 193 show a very high value for silage when used as a supplement to alfalfa for fattening purposes. In fact, it is worth for fattening purposes fully twice its value for maintenance purposes. Various kinds of silage were tested in the course of these experiments—corn silage, peas-and-bald-barley silage, and sunflower silage. In these particular tests, there was very little difference in the three kinds of silage, but other tests have indicated that the peas-and-barley silage and the corn silage are very
similar in value, with the sunflower silage somewhat less desirable. Silage fed alone has not been as satisfactory as when supplemented with some feed high in protein, such as alfalfa. Silage supplemented with cottonseed cake gave excellent gains, but at too high a cost to be practical.

**Grain.** The use of grain for wintering calves and yearlings was somewhat disappointing. In Oregon Station Bulletin 193, Fattening Steers, a ton of barley was valued as equal to three tons of alfalfa for fattening purposes. For wintering purposes, it was found to be not worth over one-half that figure. The chief value of grain lies in the fact that it is a palatable, highly-concentrated feed, and that with its use cattle can be made to consume a very large amount of nutrients and thus make a very rapid gain and acquire high finish. On the other hand, where the cattle are being fed only a limited amount of feed, the palatability and concentration of the grain is not an asset and the grain must be valued solely on the basis of the nutrients it contains. A pound of barley contains approximately 60 percent more nutrients than a pound of alfalfa, and this is apparently its value for wintering purposes. In view, therefore, of the poor results obtained with grain for wintering purposes, together with its usual scarcity and high price, it should not be used for wintering steers that are to be turned out on grass.

---

**O. A. C. BULLETINS FOR OREGON STOCKMEN**

Available for the asking

Bul. 183. Shelter and Warm Water for Fattening Steers.
Cir. 62. Costs and Profits of Sheep on Irrigated Farms.
Bul. 218. Fattening Lambs for the Late Winter Market.
Cir. 56. Cost of Producing Pork.
WINTERING STOCK STEERS

1. The gains made in the winter time on any kind of hay, straw, silage, or grain are very expensive, so much so that every pound of gain put on costs more than the market price of beef, even when beef is high.

2. Calves or yearlings may gain in weight and lose in fat at the same time.

3. If stock steers are so fed as to make large gains in the winter, they will make smaller gains the following summer on grass. For every extra pound that a steer gains in winter, he will make at least one-half pound less gain the following summer on grass.

4. The kind of feed used for wintering purposes does not seem to influence the gains made the following summer on grass, provided that the amount of gains made during the winter remains the same.

5. The value of any given feed for wintering purposes may be altogether different from its value for fattening purposes.

6. Within reasonable limits, the amount of feed necessary to winter a calf or yearling without gain or loss depends upon his size.

7. The gains made by wintering cattle are not in proportion to the total feed consumed but are in proportion to the amount of feed in addition to that required merely to maintain the animal's weight.

ILLUSTRATIONS

The illustrations in this bulletin show three typical lots at the beginning and at the end of the experiment and also at two intermediate stages.