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Journal Title: Ground mesquite wood as a roughage in rations for yearling steers / 1972 ed

Volume: Issue:
Month/Year: 1972 Pages:

Article Author: Marion, P. T.

Article Title: Ground mesquite wood as a roughage in rations for yearling steers / 1972 ed

Imprint:

ILL Number: 86935456

Call #: E 11.110:1972

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Ground Mesquite Wood

As a Roughage in Rations for Yearling Steers

P. T. Marion, C. E. Fisher and E. D. Robison*

SUMMARY

Yearling steers fed a ration containing 7.2 pounds of ground mesquite wood gained 2.20 pounds per head daily in a 140-day feeding trial in 1955-56 at the Spur station. Similar steers fed cottonseed hulls instead of mesquite meal gained 2.29 pounds per head daily. The steers fed the mesquite meal made a higher net return on the basis of $10 per ton for ground wood and $18 per ton for cottonseed hulls than those fed the cottonseed hull ration.

Yearling steers fed a ration containing 12.23 pounds of ground mesquite wood per head daily in a 112-day trial in 1956-57 made an average daily gain of 2.54 pounds, compared with 2.71 pounds for steers fed a silage ration. Both groups were fed a concentrate mixture with stilbestrol and aureomycin.

No ill effects resulted from feeding the ground wood. After 70 days of the 112-day trial, the steers weighed 1,050 pounds and consumed 16 pounds of mesquite meal per head daily in addition to 16 pounds of concentrate feed.

A preliminary trial of 86 days was conducted during the winter of 1954-55 with two 450-pound calves fed a ration of 2 pounds each of cottonseed meal, grain, molasses and cottonseed hulls mixed with 6 pounds of mesquite meal. Two other calves were fed the same ration with cottonseed hulls substituted for the mesquite meal. The calves fed the mesquite meal ration gained an average of 1.35 pounds daily, while those fed the hull ration gained 1.54 pounds. Nightblindness, the first symptom of vitamin A deficiency, was observed in the calves fed the cottonseed hull ration, but those on the mesquite meal ration had normal night vision at the end of the trial.

Meanwhile, it was learned that C. E. Doolin had been feeding a ration containing mesquite

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TABLE 1. CHEMICAL COMPOSITION OF GROUND MESQUITE WOOD, COTTONSEED HULLS, SUMAC FODDER AND SILAGE

<table>
<thead>
<tr>
<th>Feed</th>
<th>Protein</th>
<th>Fat</th>
<th>N-free extract</th>
<th>Fiber</th>
<th>Water</th>
<th>Ash</th>
<th>Lime</th>
<th>Phos.</th>
<th>Carotene, ppm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesquite meal</td>
<td>5.94</td>
<td>.78</td>
<td>35.39</td>
<td>48.65</td>
<td>5.60</td>
<td>3.63</td>
<td>1.32</td>
<td>.06</td>
<td>24.6</td>
</tr>
<tr>
<td>Cottonseed hulls</td>
<td>4.10</td>
<td>.93</td>
<td>35.30</td>
<td>47.60</td>
<td>5.40</td>
<td>2.70</td>
<td>.21</td>
<td>.03</td>
<td>None</td>
</tr>
<tr>
<td>Sumac fodder</td>
<td>4.80</td>
<td>2.00</td>
<td>43.70</td>
<td>19.10</td>
<td>24.50</td>
<td>5.80</td>
<td>.49</td>
<td>.14</td>
<td>None</td>
</tr>
<tr>
<td>Sumac silage</td>
<td>3.73</td>
<td>.76</td>
<td>12.72</td>
<td>6.03</td>
<td>74.46</td>
<td>2.24</td>
<td>.07</td>
<td>.04</td>
<td>69.0</td>
</tr>
</tbody>
</table>

meal to cattle on his Rio Vista ranch in Dimmit county. He fed a mixture of 1,000 pounds of mesquite meal, 500 pounds of molasses, 200 pounds of grain and 200 pounds of cottonseed meal as a maintenance ration for his cow herd. He also finished steers for the market on a ration consisting of 1,000 pounds of mesquite meal, 1,200 pounds of grain, 700 pounds of molasses and 200 pounds of cottonseed meal.

In the exploratory trials reported here, a ration with mesquite meal was compared with a cottonseed hull ration in a 140-day trial in 1955-56, and with a silage ration containing small amounts of cottonseed hulls and sorghum bundles in a 112-day trial in 1955-56.

PREPARATION OF MESQUITE MEAL

Chopping

The first step in preparing the wood was to cut green mesquite stems and branches 1 to 3 inches in diameter. Second growth stems from stumps killed above ground by frost, fire or other means made the best feed. These branches usually have thick bark and a higher percentage of sapwood than heartwood (Figure 1). The water content in mature, rough-bark branches is lower, and such compounds as oils, resins, gums and tannins accumulate in the heartwood. These substances and lignocellulose in the wood are thought to be largely indigestible.

After the wood was chopped, it was allowed to cure for 5 to 7 days. Freshly cut wood was high in moisture and molded when stored after chopping. The cured wood had a moisture content of about 28 percent and did not become moldy. It also was easier to grind.

The wood apparently may be harvested at any time of the year, but it usually has the highest nutritive value in the spring before leaf development begins.

The yield of stems and branches of second growth mesquite in a fairly dense thicket of brush was approximately 9 tons of oven-dry wood per acre. The area had been cutover in 1939 and had an average stand of 1,060 trees per acre. The moisture of the green wood cut during November was 44.3 percent.

Chipping

After the wood had cured, the limbs were fed into the mechanical chipper, as shown in Figure 2. The wood chipper used in these tests can chip 2 to 3 tons of mesquite per hour. The chips are shown on the left in Figure 3.

Grinding

A heavy-duty hammer mill with a 3/16-inch screen was used to grind the chips into a fine meal that was similar to sawdust. Freshly-ground wood is more palatable than dry wood, and a fresh supply was prepared each week. The wood shown in the center of Figure 3 was mixed with the concentrate feeds.

Mixing Rations

It is important to get a uniform mixture of the mesquite wood with the concentrates used
in the ration. The palatability of the ration was increased by blending the proper amount of molasses in the mixture. In addition to sweetening and giving the feed a more desirable odor, the molasses moistened and prevented the wood particles from becoming dry and hard.

The steers consumed a maximum of 10 pounds of mesquite meal per head daily without the addition of molasses in the 1955-56 trial. With molasses blended properly into the ration in the 1956-57 trial, the steers consumed up to 16 pounds of mesquite meal per head daily. The addition of stilbestrol and an antibacterial ( Aureomycin, terramycin or Iotycin) also improved the animals’ appetites and increased the efficiency of feed utilization.

1955-56 TRIAL

Procedure

The 8 yearling steers used in this 140-day trial averaged 645 pounds. After a preliminary feeding period of 2 weeks, they were divided into two lots of 4 head each. An average daily ration of 2 pounds of cottonseed meal, 3.1 pounds of sorghum grain and 2 pounds of alfalfa hay was fed to both groups of steers. Those in the control group also consumed 13.15 pounds of cottonseed hulls per head daily, while those in the test lot also were fed 7.2 pounds of mesquite meal and 1.89 pounds of hulls. Stilbestrol was fed at a level of 10 milligrams per head daily to both groups (Table 3).

Alfalfa hay was included in the ration of the control group to prevent vitamin A deficiency. The mesquite meal contained enough carotene to supply an adequate amount of the vitamin to the test group.

After 56 days on feed, the mesquite meal for the test group was increased to 10 pounds per head daily and replaced all of the hulls. All of the wood used in the trial was chipped at one time and it became less palatable as the chips dried. During the last 28-day period, the steers would eat only 8 pounds of the wood meal per head daily. The palatability of this ration could have been improved by chipping and grinding a fresh supply of mesquite wood each week and blending it with molasses.

Table 2 shows the prices paid for the feeds. The cost of preparing the mesquite meal included labor, machinery and grinding and mixing charges.

Results and Discussion

The 4 steers fed the mesquite meal made an average daily gain of 2.20 pounds, compared with 2.29 pounds for those on the cottonseed hull ration (Table 3). Shrink enroute to market was

| TABLE 2. AVERAGE DAILY RATION AND FEED COST USED IN THE 140 AND THE 112-DAY TRIALS |
|-------------------------------------------------|-------------------|--------------|----------------|-------------------|
| Feed                                           | Mesquite          | Control      | Price per ton  | Mesquite          | Control      | Price per ton  |
|                                                 |                   |              |                |                   |              |                |
| Cottonseed meal                                | 2.00              | 2.00         | $65.00          | 2.00              | 2.00         | $56.50          |
| Sorghum grain                                  | 8.10              | 8.10         | 33.00           | 8.34              | 8.99         | 41.00           |
| Molasses                                       |                   |              |                  |                   |              |                  |
| Alfalfa hay                                    | 2.00              | 2.00         | 34.00           | 4.02              | 40.00        |                  |
| Mesquite meal†                                 | 7.20              | 10.15        | 18.00           | 9.34              | 9.34         | 41.00           |
| Cottonseed hulls                               | 1.89              | 10.15        | 2.54            | 4.17              | 4.17         | 25.00           |
| Sorghum bundles or silage (dry basis)          |                   |              |                  |                   |              |                  |
| Cost per day, cents                            | 26.7              | 34.9         | 43.5            | 45.1              |              |                |

† Cost of preparing mesquite wool meal included labor at $1.00 per hour, normal machinery operation and depreciation charges and $4.00 per ton charged by a local feed store for grinding the chips in a hammer mill. With cheaper labor and a larger operation, C. E. Doolin reports a cost of $5.00 per ton for preparing mesquite meal.
slightly lower for the mesquite-fed steers, and their dressing percentage was lower than for those fed cottonseed hulls. Carcass grades for the two groups were equal, and they sold for the same price.

With the feed prices shown in Table 2, the greatest difference between the two groups of steers was in the cost of the ration, 26.7 cents per head daily for the steers fed the mesquite meal and 39.9 cents for those fed cottonseed hulls. This difference gave an advantage in net return of $8.30 per head for the mesquite-fed steers.

1956-57 TRIAL

Procedure

After a preliminary feeding period of 1 week, 8 yearling steers averaging 873 pounds were started on a mesquite meal ration. These steers were compared with another group of 9 steers weighing 660 pounds which were fed a ration with a mixed roughage of cottonseed hulls, silage and sorghum bundles. Both groups were fed a level of 10 milligrams of stilbestrol and 70 milligrams of aureomycin. The average daily ration for the 112-day feeding period is shown in Table 2.

Several improvements over previous tests were made to increase the palatability of the mesquite meal ration used in this trial. Molasses was blended in the ration at the rate of 4 pounds per head daily. A fresh supply of green wood was chopped each week. A mechanical mixer was used to make a more uniform mixture of the feeds.

The difference in initial weights of the two groups of steers was greater than normally is desirable, but it is believed this factor did not seriously influence the data.

Results and Discussion

The starting ration for the mesquite-fed steers contained 8 pounds of ground wood per head daily. This amount was increased each week, and the amounts of hulls and bundles were decreased until the entire roughage consisted of mesquite meal. At the end of 70 days, the steers were eating 16 pounds of mesquite meal per head with 16 pounds of concentrates. Their average daily gain for the 112-day period was 2.54 pounds, compared with 2.71 pounds for the silage-fed steers.

There was very little difference in the slaughter and carcass data for the two groups of steers, as shown in Table 3. Both lots showed a net loss, but the mesquite-fed steers had an advantage of 32 cents per head over those fed silage.

Mesquite meal is a possible source of bulk in rations for cattle when other roughages are scarce and relatively high in price. The wood chipping machine, which costs $1,200 delivered in Texas, a heavy-duty hammer mill and a molasses mixer are needed to prepare and mix a mesquite meal ration properly. When other feeds are cheap and plentiful, there likely would be little or no demand for this type of roughage. However, mesquite may prove to be a dependable source of rough feed during a drought.

ACKNOWLEDGMENTS

The Fitchburg Engineering Company of Fitchburg, Massachusetts, provided the wood chipping machine which made these studies possible, and the Dodge Jones Foundation, Abilene, Texas, provided funds to support certain phases of this work.

The assistance of Earl Burrett and Cecil H. Meadors, Jr., in the preparation of the mesquite meal is gratefully acknowledged.

Figure 1 was borrowed from the Lubbock Avalanche-Journal, Figure 2 from the Farm Journal and Figure 3 from Farm and Ranch.