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# Wintering Steer Calves at the Spur Station

TEXAS AGRICULTURAL EXPERIMENT STATION
R. D. LEWIS, Director, College Station, Texas

## SUMMARY

Winter maintenance experiments were conducted with 1,034 steer calves at the Spur station during the 14-year period from the fall of 1941 to the spring of 1955. Results of these comparative trials, in most instances, were based on 3 or more years of work.

Roughages used in wintering steer calves weighing 325 to 400 pounds were wheat pasture, native grass, sorghum silage, bundle feeds and stalk fields. Protein supplements were fed with sorghum silage and chopped bundles in the drylot, and on native grass and stalk fields.

Calves wintered on wheat pasture in 10 of the 14 years made the second highest average winter gain, third highest summer gain and the highest total winter and summer gain. When stocked at the same rate, almost identical gains were made by calves grazed on all wheat and wheat-sorghum pasture combinations. The winter-grazing season averaged 84 days.

Lightly grazed or summer-deferred native grass supplemented with cottonseed cake provided the most dependable method of wintering calves. In 12 of the 14 years, calves wintered on lightly grazed or deferred native grass with 1 to 2 pounds of cottonseed cake per head daily, made the lowest winter gain, highest summer gain and the third highest total winter and summer gain. The grazing season on native grass averaged 105 days.

Calves wintered on native grass supplemented with 2 pounds of cottonseed cake gained 20 pounds more during the winter, 9 pounds less during the summer and 11 pounds more during the winter and summer period than calves fed only 1 pound of cottonseed cake.

The amount and quality of winter forage on native grass pastures in different seasons greatly influenced the gain of calves fed 1 and 2 pounds of cottonseed cake per head daily.

Calves fed 2 pounds of 41 percent cottonseed cake, 2 pounds of 20 percent range feed or 2 pounds of cottonseed meal in a salt mixture on native grass made approximately the same gain.

Calves made fair to good gains on sorghum fields during an average grazing season of 64 days in 8 out of the 14 years. The highest gains were obtained from grazing drouth-stricken, immature sorghum crops during the late fall and early winter.

The highest winter gain was made by calves fed Sumac silage, 2 pounds of cottonseed meal and 1 pound of alfalfa hay in drylot. They made the lowest summer gain on native grass, but their total winter and summer gain was second highest. Calves fed Sumac silage and 1 pound of cottonseed meal during the winter made the lowest total winter and summer gain.

Gains on well-headed grain sorghum silage or fodder were markedly higher than those for Sumac roughage when 1 pound of cottonseed meal was fed daily per head.

There was little difference in winter gain between first-cross Jersey x Hereford calves and Good to Choice Hereford calves. First-cross Aberdeen-Angus x Hereford calves produced slightly higher gain than Hereford calves.

Light calves with an initial weight of 376 pounds made approximately the same gain during the winter as heavy calves averaging 466 pounds.

Wheat pasture provided the lowest cost of winter maintenance for calves. Sorghum fields and native grass supplemented with cottonseed cake were intermediate in cost, while winter maintenance in drylot was the most expensive.

The price of stocker calves at Kansas City was higher in May than in the preceding November during 15 of 19 years from 1936 to 1954.


## COVER PICTURE

A group of steer calves wintered on lightly grazed native grass supplemented with cottonseed cake. This was the most dependable method of wintering calves. The calves gained an average of 83 pounds in 105 days during the winter and 250 pounds on native grass in the spring and summer.

Other methods of wintering included wheat pastures and stalk fields, and silage and bundles fed in drylot.

Picture courtesy of Southwestern Crop and Stock, Lubbock, Texas.

# Wintering Steer Calves at the Spur Station

P. T. MARION, C. E. FISHER and J. H. JONES*

GROWING WEANED BEEF CALVES during the fall and winter usually affords an opportunity to increase farm income on the Rolling Plains of Texas. It provides a practical and economical means of utilizing and marketing small grain pasturage, native grass, stalk fields, sorghum silage and bundle feed. During drouth years, beef calves also provide an opportunity to salvage immature crops.

Feeder calves of Commercial to Choice grade are produced on local ranches and are available in a weight range of 300 to 500 pounds. The price of these calves normally is lowest in the fall when heavy marketing occurs and is highest in the spring when there is a strong demand for wintered calves or short yearlings. In 15 of 19 years from 1936 to 1954, prices of stocker cattle on the Kansas City market were higher in May than in the preceding November, Figure 1. This favorable price situation and the economical utilization of cheap roughages usually provide a good opportunity to obtain profitable returns with thrifty beef calves.

Wintering calves is well suited to farms that produce such crops as sorghums, cotton and wheat, and which have native grass available. After wintering, the calves may be sold as stockers, retained for summer grazing or finished in drylot for slaughter. This flexibility of managing beef calves provides an excellent opportunity to make adjustments in line with crop prospects.

## OBJECT OF WORK

The main problem of wintering calves is to obtain economical gains on low-value roughages. Experimental studies conducted from 1941 to 1955 at Substation No. 7 at Spur were designed to evaluate locally available roughages for wintering beef calves, evaluate methods of feeding various supplements and to determine practical levels of supplemental feeding consistent with economical gain.

## PLAN OF WORK

Wintering experiments were conducted with 50 to 120 beef calves each fall from 1941 to 1955. Methods of wintering calves and numbers used depended on growing conditions for wheat pasture and reserves of native grass, sorghum silage and bundle feed. Comparative wintering trials usually began about December 15 and extended to March 31, but varied considerably for different roughages from year to year. In most instances, experimental results were based on records of 3 years or longer. The records obtained included gains in weight, amounts of supplement fed, length of the feeding or grazing period and economy of gain.

Following wintering, the usual procedure was to graze calves on native grass from April 1 to October 31. Then fall weights were obtained to determine the influence of different wintering treatments on summer gain and total gain. In one instance, calves that made exceptional gain on wheat pasture were fed an additional 60 days in drylot and were sold for slaughter. In another instance, some of the calves were sold following wintering because drouth reduced the amount of native grass available. In most years, however, the calves were wintered for about 112 days, grazed on native grass during the spring and summer for 180 days and then were finished in drylot for slaughter in 100 to 140 days.

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*Respectively, associate animal husbandman and superintendent, Substation No. 7, Spur, Texas; and professor, Department of Animal Husbandry, College Station, Texas.

## Cattle Used

Good to Choice grade steer calves were received in October and November. A total of 1,034 head, averaging 325 pounds at purchase, were used in wintering trials from 1941 to 1955. These calves were delivered directly from local ranches and no trouble was encountered with shipping fever. Upon delivery the calves were vaccinated for blackleg and malignant edema and were numbered individually. During the weaning period of 10 to 30 days, the calves were fed chopped sorghum bundles and 1 pound of cottonseed meal.

After the calves were weaned in drylot, they were weighed, graded and divided into experimental groups of 10 head or more as needed for comparative wintering trials. Individual weights were taken on 2 consecutive days at the beginning and close of the major trials and at monthly intervals.

## Pastures and Roughages Used

Wheat pasture, native grass and sorghum stalk fields, and sorghum silage and bundle feeds fed in drylot, were used in the wintering trials.

### Wheat Pasture

Approximately 1,500,000 acres are seeded to wheat annually in the Rolling Plains area. With few exceptions, the entire acreage is grazed to some extent. Wheat furnished good to excellent grazing for 6 of the 14 years of this study. No grazing was available for 3 years and poor to fair grazing was encountered in 5 years.

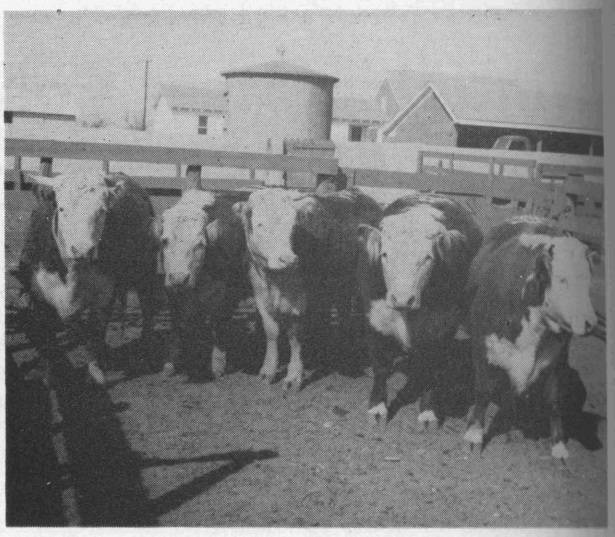

Figure 2. A typical group of steers ready for market following wintering, summer grazing and fattening in drylot at the Spur station. The average gain of calves for all treatments from purchase was 176 pounds during the winter, 231 pounds on summer pasture and 320 pounds on a silage ration in drylot, a total gain of 727 pounds per head.

The length of time wheat was grazed and the amount of forage produced was determined largely by moisture conditions. Terracing, water spreading, summer fallow and stubble mulch tillage are water conservation practices that increased the production of wheat pasture at Spur.

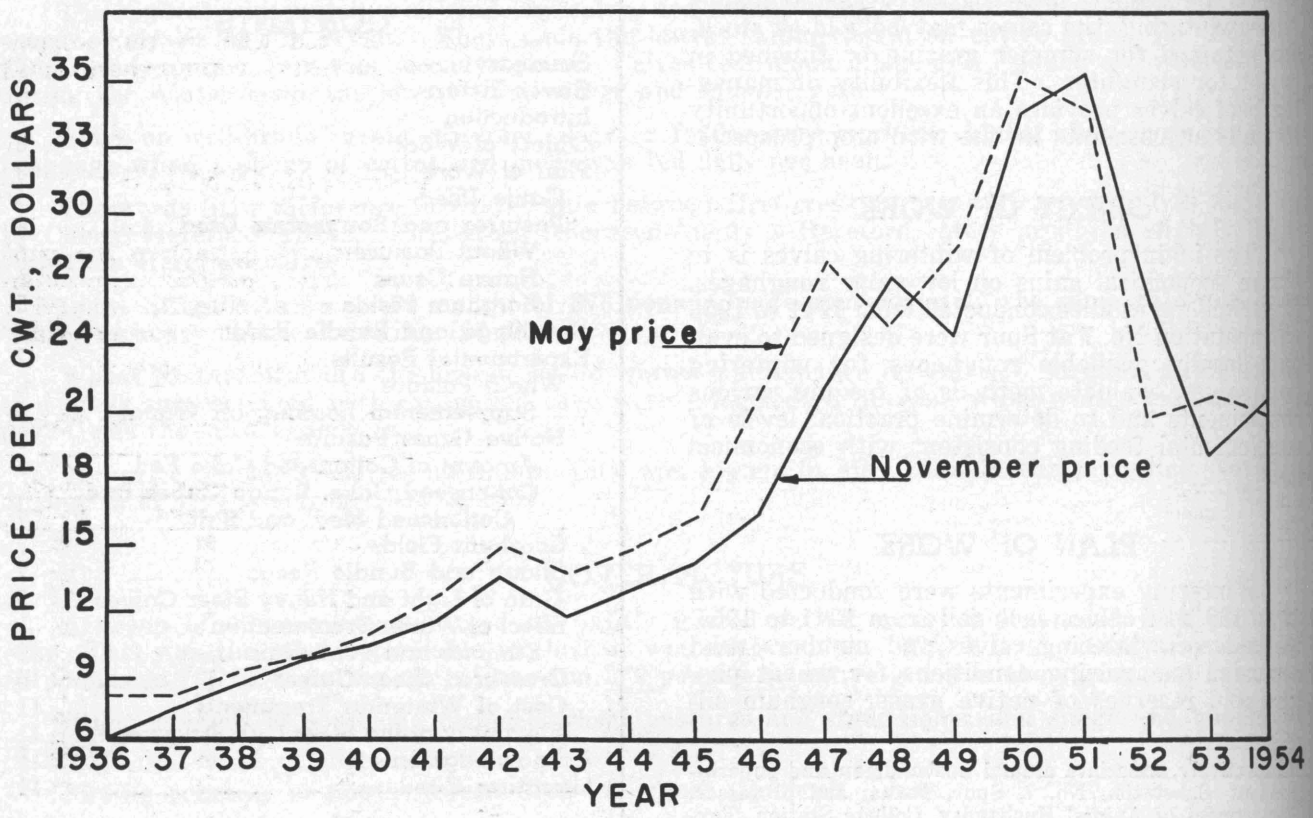


Figure 1. Average price of feeder and stocker steers at Kansas City in November and in May of the following year, 1936-54.

TABLE 1. CHEMICAL COMPOSITION OF WHEAT CLIPPINGS, SORGHUM GRAIN, SUMAC FODDER, SUMAC SILAGE AND BUFFALOGRASS HAY

| Feed[1] | Average composition, percent | | | | | | | | Carotene, ppm dry basis |
|---|---|---|---|---|---|---|---|---|---|
| | Protein | Fat | Fiber | N-free extract | Water | Ash | Lime | Phosphoric acid | |
| Wheat clippings | 24.8 | 4.0 | 14.5 | 34.6 | 8.4 | 12.2 | .56 | .89 | 276.7 |
| Sorghum grain | 11.1 | 2.9 | 2.5 | 70.9 | 10.7 | 1.9 | | .34 | |
| Sorghum fodder | 5.87 | 2.2 | 19.0 | 48.5 | 18.6 | 6.0 | | .19 | |
| Sorghum silage | 2.1 | 0.8 | 7.0 | 17.5 | 69.1 | 2.6 | .07 | .04 | 97.4 |
| Buffalograss hay, fall clipping | 6.6 | 1.2 | 23.4 | 47.3 | 7.2 | 14.3 | .47 | .27 | |

[1]Wheat analysis TAES Bul. 539; buffalograss, TAES Bul. 587; other analyses TAES Bul. 461.

### Native Grass

Approximately 70 percent of the Rolling Plains area is in native grass which may be grazed yearlong. In most cases, however, some native grass is lightly stocked or saved during the summer for wintering cattle from November 1 to March 31.

The principal grass cover on the experimental pastures used for wintering calves consisted of buffalo, tobosa and vine mesquite, with small amounts of blue and sideoats grama. Cool-season grasses that provide some forage when winter moisture conditions are favorable include Texas winter grass, little barley, rescue and western wheat. Some of the more palatable forbs were bladderpod, red-seeded plantain and California and Texas filaree. Brush control, water spreading, light stocking and deferred summer use contributed to the increased production of grass and a reduction in the amount of supplemental feeds needed to winter calves in good, thrifty condition. Calves were wintered on native grass with supplements in 12 of the 14 years.

### Sorghum Fields

Combine grain sorghums are grown on approximately 7,000,000 acres on the Rolling Plains. It is common practice to graze sorghum fields after combining and also unharvested, immature crops. The amount and quality of feed from sorghum fields depend on moisture conditions, varieties grown and methods of harvesting. Calves were grazed on sorghum fields 50 to 87 days in the fall in 8 of the 14 years.

TABLE 2. SUMMARY OF GRAZING TRIALS ON WHEAT PASTURE, 1942-54

| Winter ending in | No. steers | Average days grazed | Date grazing began | Average gain, lb. | |
|---|---|---|---|---|---|
| | | | | Per head | Daily |
| 1942 | 15 | 112 | Dec. 2 | 126 | 1.13 |
| 1943 | 27 | 112 | Dec. 14 | 128 | 1.14 |
| 1945 | 10 | 99 | Dec. 28 | 218 | 2.20 |
| 1946 | 43 | 31 | Feb. 28 | 62 | 2.00 |
| 1947 | 42 | 112 | Nov. 8 | 208 | 1.86 |
| 1948 | 15 | 30 | Mar. 1 | 42 | 1.40 |
| 1950 | 45 | 137 | Dec. 15 | 288 | 2.10 |
| 1952 | 33 | 40 | Dec. 6 | 23 | .58 |
| 1953 | 15 | 28 | Mar. 13 | 27 | .95 |
| 1954 | 38 | 98 | Dec. 15 | 149 | 1.52 |
| Total | 283 | 23,810 | | 39,332 | |
| Average | 28 | 84 | | 139 | 1.65 |

### Silage and Bundle Feeds

Forage sorghums, grown for silage and bundle feed, are used widely for wintering livestock. Sumac, Atlas and Sourless forage varieties usually produce some roughage, even in dry years. High yields in good years permit the storage of silage reserves which may be kept several years without loss of feeding quality. Bundles usually are fed the first winter after harvest to prevent excessive losses from rodents and the weather.

TABLE 3. SUMMARY OF GAINS ON WHEAT PASTURE AND WHEAT-SORGHUM COMBINATION PASTURES, 3-YEAR AVERAGE

| Item | Wheat alone | Wheat-grain sorghum stubble | Wheat-Sumac |
|---|---|---|---|
| Average number of days grazed | 116 | 116 | 116 |
| Number steers | 33 | 36 | 33 |
| Average daily gain, lb. | 1.90 | 1.92 | 1.94 |
| Average steer gain, lb. | 220 | 223 | 225 |

These roughages were fed with protein supplements in 9 of the 14 years of the experimental studies.

## EXPERIMENTAL RESULTS

The results of wintering trials for the 14-year period are summarized for each of the principal roughages used. The chemical composition of these feeds is shown in Table 1. Figure 3 shows the average length of the wintering season and daily gain of calves on each roughage.

TABLE 4. SUMMARY OF GRAZING TRIALS ON NATIVE GRASS, 1942-55

| Year | No. steers | Average days grazed | Average gain, pounds | |
|---|---|---|---|---|
| | | | Per head | Daily |
| 1942 | 14 | 112 | 92 | .82 |
| 1943 | 53 | 112 | 79 | .71 |
| 1944 | 56 | 62 | 45 | .73 |
| 1945 | 9 | 99 | 63 | .64 |
| 1946 | 10 | 91 | 47 | .52 |
| 1948 | 38 | 91 | 94 | 1.03 |
| 1950 | 20 | 105 | 91 | .87 |
| 1951 | 40 | 86 | 83 | .97 |
| 1952 | 45 | 126 | 115 | .92 |
| 1953 | 45 | 94 | 77 | .82 |
| 1954 | 21 | 122 | 105 | .86 |
| 1955 | 77 | 138 | 92 | .67 |
| Total | 428 | 44,863 | 35,703 | |
| Average | 36 | 105 | 83 | .80 |

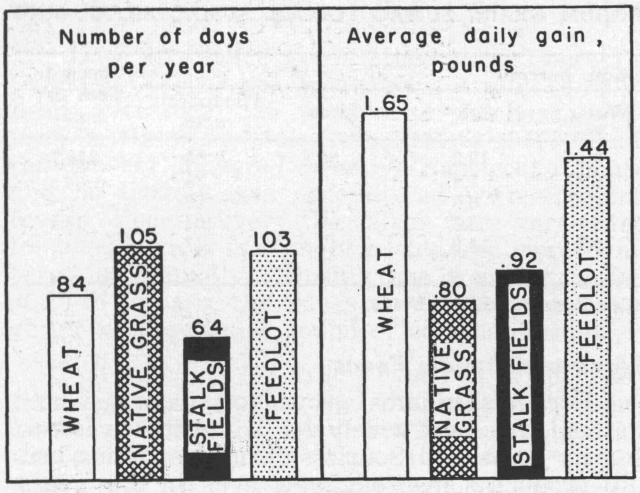


**Figure 3. Average number of days and average daily gain of calves wintered on wheat and native grass pastures, stalk fields and in drylot for 14 years, 1941-55.**

## Wheat Pasture

Good wheat pasture provides a cheap source of forage that is succulent, nutritious and highly palatable to beef calves. The average gain of 283 steer calves pastured on wheat during 10 trials was 139 pounds, or 1.65 pounds daily for 84 days, Table 2. Gains exceeded 200 pounds per head in 3 seasons, 100 pounds in 3 seasons and were less than 100 pounds in 4 seasons. Gains ranged from 23 to 288 pounds per head.

The stocking rate varied from 1 to 10 acres per head, with an average of 3 acres, while the length of the grazing season varied from 28 to 137 days for an average of 84 days.

Wheat seeded the first week of October was ready for grazing only once in November and six times in December or later. Wheat was not pastured later than March 15 unless it appeared there was not enough moisture to mature a grain crop.

### Supplemental Feeding on Wheat

Comparisons were made for a 3-year period with wheat alone, wheat supplemented with grain sorghum stubble and unharvested Sumac sorghum. The calves had free access to the roughages.

When stocked at the same rate, there was little difference in steer gain between the all-wheat pastures and the wheat-sorghum combinations, Table 3. The combination pastures extended the grazing period and permitted heavier stocking rates when growing conditions were unfavorable for wheat. Native grass used in combination with wheat pastures gave about the same results as the wheat-sorghum combination.

## Native Grass Pastures

Wintering calves on native grass that was lightly stocked or not grazed during the preceding summer provided one of the most dependable methods of getting calves through the winter at low cost. A total of 428 beef calves in 12 trials made an average steer gain of 83 pounds during an annual grazing season of 105 days, Table 4. These calves were fed an average of 147 pounds of cottonseed cake, 28 pounds of alfalfa hay and 56 pounds of sorghum bundles each year. The roughages were supplied during unusually cold weather.

### Amount of Cottonseed Cake Fed

Summer grasses saved for wintering usually do not produce satisfactory gain unless a protein supplement is used. If sufficient winter rainfall occurs, cool-season grasses and palatable weeds may make sufficient growth to provide most of the protein and phosphorus needed. Results of feeding different amounts of 41 percent protein cottonseed cake to calves wintered on native grass are shown in Table 5.

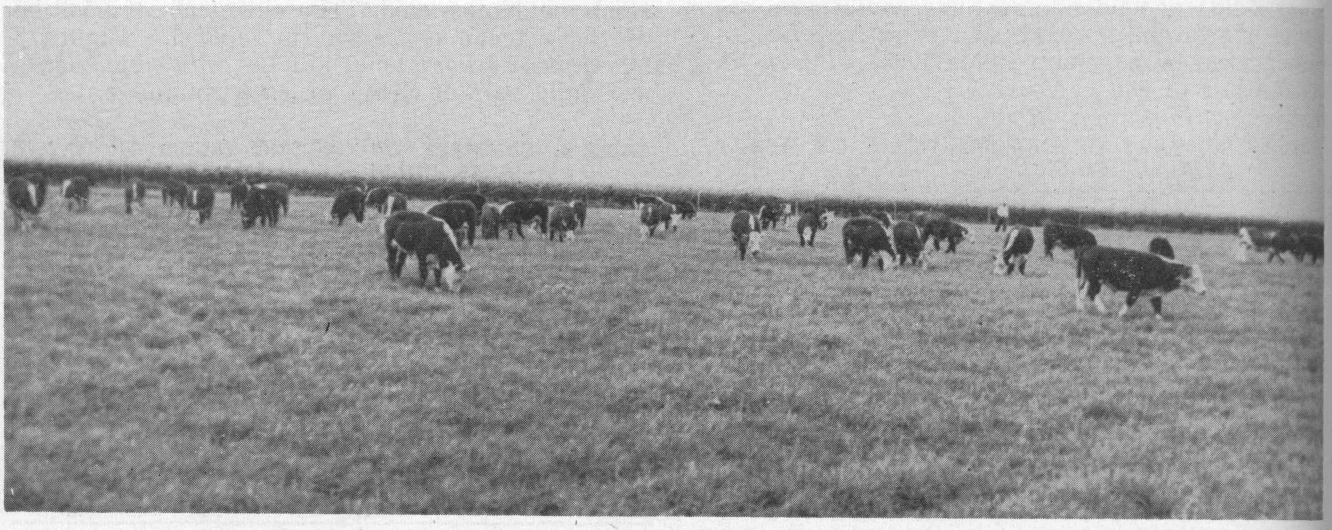

**Figure 4. Steer calves wintered on wheat pasture made the highest average gain, 139 pounds per head, in an 84-day grazing season at the lowest cost, $5.97 per hundredweight. Picture courtesy of Southwestern Crop and Stock, Lubbock, Texas.**

During the winter of 1942-43, calves fed 1 pound of cottonseed cake for 112 days gained 81 pounds per head, while calves carried on grass and weeds alone gained 78 pounds. The winter was mild with above average rainfall. Similar results were obtained during the favorable winter of 1953-54.

During dry winters, such as 1947-48, calves fed 1 and 2 pounds of cottonseed cake for 91 days gained 81 and 105 pounds per head, respectively. Under similar conditions during the winter of 1954-55, calves fed 1 and 2 pounds of cottonseed cake per head daily gained 79 and 105 pounds, respectively. Practically no forage was available other than dry summer grasses during these two wintering periods.

The average gain of calves fed 1 and 2 pounds cottonseed cake was 86 and 106 pounds per head, respectively. In most winters, it was desirable to feed at least 1 pound of cottonseed cake daily per head and additional roughages during severe storm periods.

### Cottonseed Cake, Range Cubes and Cottonseed Meal and Salt

Wintering trials were conducted in a 3-year period with groups of calves fed 2 pounds of 41 percent cottonseed cake per head daily, 2 pounds of 20 percent protein range cubes and mixtures of salt and cottonseed meal so as to restrict consumption of meal to 2 pounds per head daily. Table 6 indicates negligible differences in steer gain among the supplements fed.

The cottonseed cake and range cubes were hand-fed on alternate days and the mixtures of salt and cottonseed meal were self-fed. During cold weather and with hard water, a mixture of 1 part salt to 6 parts cottonseed meal limited the consumption of meal to 2 pounds daily per head. With warmer weather, the calves drank more water and showed a higher tolerance for salt. Under these conditions, the mixture was changed to 1 part salt and 4 parts meal. The calves had adequate native grass and the self-feeder was located at the watering place. No ill effects were observed from the salt-meal feeding and the method saved labor.

## Sorghum Fields

Stalk fields were grazed for an average of 64 days during the fall in eight trials. The average gain per steer was 58 pounds, Table 7. Because of the large variation in amount and quality of forage on stalk fields from year to year, steer gains ranged from a low of 12 pounds for 87 days to a high of 111 pounds for an 85-day grazing period. The highest gains in most years were made on drouth-stricken, immature sorghum crops.

Field grazing seldom lasted more than 60 days. Further use tended to reduce gains and increase the hazard of wind erosion following the removal of protective cover. It appeared desirable in most instances to feed calves a protein supplement, especially during the late fall and early winter when sorghum stalks usually decreased in nutritive value.

TABLE 6. SUMMARY OF A 3-YEAR COMPARISON OF 20 PERCENT PROTEIN RANGE CUBES AND 41 PERCENT PROTEIN COTTONSEED CAKE HAND-FED, AND COTTONSEED MEAL AND SALT SELF-FED, FOR WINTER MAINTENANCE ON NATIVE PASTURE, 1951-53

| Supplement on native grass pasture | 20 percent protein, range cubes | 41 percent protein, cottonseed cake | Cottonseed meal and salt |
|---|---|---|---|
| Total number of steers | 35 | 35 | 35 |
| Average number of days | 102 | 102 | 102 |
| Average per steer, lb.: | | | |
| Initial weight | 429 | 429 | 429 |
| Final weight | 510 | 518 | 515 |
| Gain | 81 | 88 | 86 |
| Daily gain | .77 | .84 | .82 |
| Supplemental feed: | | | |
| Protein | 211 | 211 | 186[1] |
| Alfalfa hay | 65 | 65 | 65 |
| Feed cost[2] | $10.78 | 10.57 | 9.31 |
| Charge for pasturage | 4.20 | 4.20 | 4.20 |
| Labor charge | 1.40 | 1.40 | .30 |
| Total charge | 16.38 | 16.17 | 13.81 |
| Cost per cwt. gain | 20.22 | 18.37 | 16.06 |

[1]Steers would not eat 2 pounds of the cottonseed meal when mixed 4 to 1 with salt. Mixture was changed to 6 to 1 ratio at the start of the last two tests and reduced to 4 to 1 by end of tests.

[2]Feed prices per ton, 3-year average: 20 percent protein range cubes, $87; 41 percent protein cottonseed cake, $86; 41 percent protein cottonseed meal, $84; pasturage $2 per acre per year, 7.5 acres per head for 102 days, $4.20.

## Silage and Bundle Feeds

Winter maintenance studies with calves in drylot were conducted in 13 trials. Forage and grain sorghum silage and fodder were full-fed twice daily with limited amounts of concentrates. The average gain of 204 calves fed 103 days in

TABLE 5. AVERAGE WEIGHT AND GAIN OF STEER CALVES FED VARYING AMOUNTS OF 41 PERCENT PROTEIN COTTONSEED MEAL PELLETS ON NATIVE GRASS

| Year | 1942-43 | | 1947-48 | | 1953-54 | | 1954-55 | | 3-year average | |
|---|---|---|---|---|---|---|---|---|---|---|
| Supplement | None | 1 lb. | 1 lb. | 2 lb. | 1 lb. | 2 lb. | 1 lb. | 2 lb. | 1 lb. | 2 lb. |
| No. steers | 27 | 26 | 20 | 20 | 11 | 10 | 14 | 14 | 15 | 15 |
| No. days | 112 | 112 | 91 | 91 | 122 | 122 | 138 | 138 | 117 | 117 |
| Initial weight, lb. | 402 | 399 | 333 | 333 | 412 | 417 | 464 | 465 | 404 | 405 |
| Final weight, lb. | 480 | 480 | 414 | 438 | 513 | 526 | 543 | 570 | 490 | 511 |
| Steer gain, lb. | 78 | 81 | 81 | 105 | 101 | 109 | 79 | 105 | 86 | 106 |
| Average daily gain, lb. | .70 | .72 | .89 | 1.15 | .83 | .89 | .57 | .76 | .74 | .91 |

**Figure 5. A group of calves fed 2 pounds of cottonseed cake per head daily while grazing sorghum stalk fields. These fields provided grazing for an average of 64 days and the calves gained 58 pounds at a cost of $10.80 per hundredweight.**

drylot was 148 pounds for a daily gain of 1.44 pounds, Table 8.

The rations fed over a period of years are not directly comparable since all were not used during the same feeding experiments. Nevertheless, the data indicate the feeding values of roughages and supplements.

Calves fed Sumac silage and 1 pound of 41 percent protein cottonseed meal made an average gain of 112 pounds per head, or a daily gain of 1.09 pounds in four trials averaging 103 days. When the silage was supplemented with 2 pounds of cottonseed meal and 1 pound of alfalfa hay in three trials averaging 85 days, the steer gain increased to 157 pounds with a daily gain of 1.85 pounds. Although these trials were not made during the same feeding period, the addition of alfalfa hay and larger amounts of cottonseed meal greatly increased the weight gains.

In a 2-year trial when grain sorghum was fed with 1 pound of cottonseed meal, the average steer gain was 152 pounds, or 1.43 pounds daily for 107 days. This silage contained less than 60 percent moisture while Sumac silage averaged 72 percent. The high rate of gain resulting from the use of comparatively dry grain sorghum silage suggests that some dry roughage should be added to Sumac silage rations for 300 to 400-pound calves. In other studies, Jones, *et. al.* (1) reported near equal gain for yearling steers fed grain sorghum and forage sorghum silage for fattening.

Chopped Sumac fodder fed with 1 pound of cottonseed meal to calves in two trials produced a slightly lower gain than Sumac silage. In one feeding trial, well-headed, chopped Hegari fodder produced a much higher gain when fed with 1 pound of cottonseed meal per head daily than either Sumac or Hegari silage.

**TABLE 7. SUMMARY OF GRAZING TRIALS ON STALK FIELDS, 1942-54**

| Year | No. steers | Average days grazed | Average gain, pounds | |
|---|---|---|---|---|
| | | | Per head | Daily |
| 1943 | 26 | 85 | 111 | 1.31 |
| 1944 | 56 | 50 | 34 | .68 |
| 1945 | 34 | 63 | 67 | 1.06 |
| 1946 | 43 | 60 | 26 | .43 |
| 1947 | 25 | 87 | 12 | .14 |
| 1948 | 15 | 60 | 61 | 1.02 |
| 1953 | 60 | 63 | 98 | 1.56 |
| 1954 | 29 | 60 | 52 | .86 |
| Total | 288 | 18,327 | 16,785 | |
| Average | 36 | 64 | 58 | .92 |

**Figure 6. Calves wintered in the feedlot on silage and bundle feeds made high winter gains, but their cost of gain was the highest of any of the four methods of wintering. These calves made the lowest gain on native grass pasture during the following summer.**

Figure 7. During storm periods when snow and ice covered pasture vegetation, these calves were fed alfalfa hay or sorghum bundles in addition to the regular protein supplement.

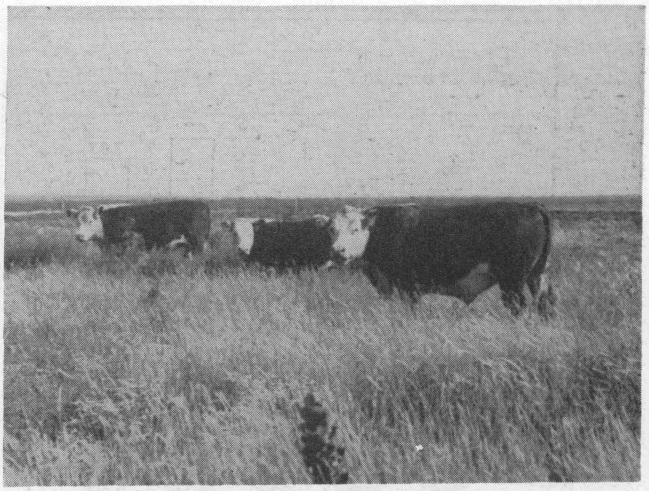

Figure 8. The highest total winter and summer gain, 411 pounds, was made by steers that gained 206 pounds on wheat pasture during the winter and 205 pounds on native grass during the summer.

## Gain of Light and Heavy Steer Calves

Some 1,034 steer calves used in the wintering experiments from 1941 to 1955 averaged 385 pounds. For any given year, however, the initial weight of the individual calves varied 60 to 90 pounds per head.

In five trials where calves received identical treatment, two groups of 49 head each averaging 376 and 466 pounds made approximately equal gain in an average period of 116 days, Table 9. The lower initial cost per head of the lighter calves was advantageous with low-cost feeds. The heavier calves, however, developed into heavier yearlings and attained slaughter grade in less time.

## Effect of Winter Treatment on Summer and Total Gain

Calves wintered on wheat pasture, native grass supplemented with 1 and 2 pounds of cottonseed cake and in the feedlot on two rations with silage from December 1 to April 1, were grazed together on comparable native grass pastures from about May 1 to November 1. The data in Table 10 are based on the average gain adjusted to a 120-day wintering period and a 180-day summer grazing season. These data do not include gains or losses during a 15 to 30-day preliminary grazing season in April that were influenced by differences in fill from previous winter rations.

TABLE 8. SUMMARY OF GAINS ON VARIOUS RATIONS IN THE DRYLOT, 1942-51

| Average daily ration | No. trials | No. steers | Average days fed | Average gain, pounds | |
|---|---|---|---|---|---|
| | | | | Per head | Daily |
| Sumac silage plus 1 lb. cottonseed meal | 4 | 61 | 103 | 112 | 1.09 |
| Sumac silage plus 2 lb. cottonseed meal and 1 lb. alfalfa hay | 3 | 38 | 85 | 157 | 1.85 |
| Kafir silage plus 1 lb. cottonseed meal | 2 | 24 | 107 | 152 | 1.43 |
| Sumac fodder plus 1 lb. cottonseed meal | 2 | 20 | 84 | 88 | 1.02 |
| Hegari fodder plus 1 lb. cottonseed meal | 1 | 10 | 99 | 164 | 1.66 |
| Sumac silage and fodder (1 to 1) plus 1 lb. alfalfa hay plus 2 lb. cottonseed meal | 1 | 51 | 121 | 201 | 1.66 |
| Total | 13 | 204 | 20922 | 30097 | |
| Average | | 16 | 103 | 148 | 1.44 |

TABLE 9. SUMMARY OF GAIN OF LIGHT AND HEAVY CALVES DURING THE WINTER, 5-YEAR AVERAGE

| Weight class | No. steers | Average no. days | Average weight, lb. | | Average gain, lb. | | Initial cost per head |
|---|---|---|---|---|---|---|---|
| | | | Initial | Final | Per head | Daily | |
| Light | 49 | 116 | 376 | 514 | 138 | 1.19 | $78.96 |
| Heavy | 49 | 116 | 466 | 610 | 144 | 1.24 | 97.86 |
| Difference | | | 90 | 96 | 6 | .05 | 16.90 |

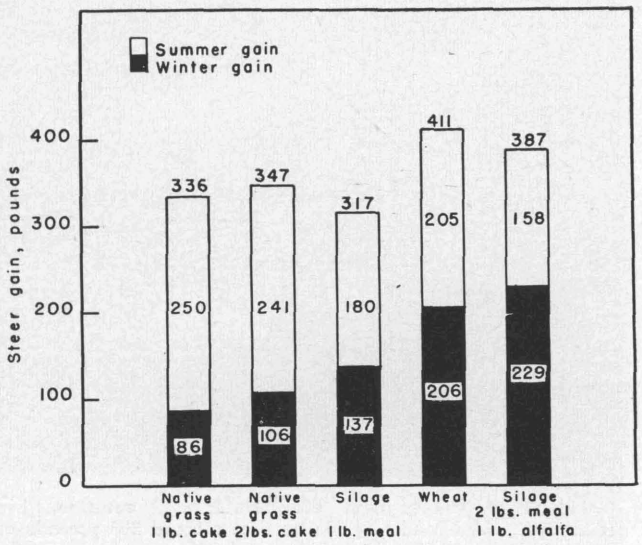


Figure 9. Effect of winter treatment on summer gain.

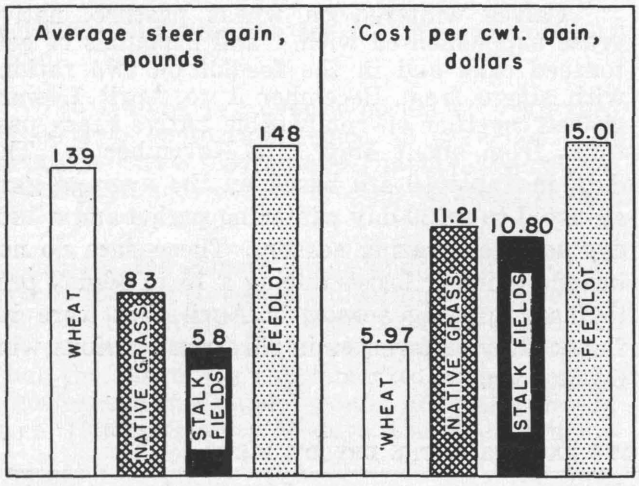


Figure 10. Average steer gain and cost of gain for 14 wintering seasons on wheat and native grass pastures, stalk fields and in drylot, 1941-55.

The highest summer gain, 250 pounds per head in four trials, was made by calves that gained only 86 pounds per head during the winter on a ration of native grass supplemented with 1 pound of cottonseed cake. These calves made a total gain of 336 pounds per head for the combined winter and summer treatments. When the amount of cottonseed cake was increased from 1 to 2 pounds per head, winter gain was 20 pounds higher, summer gain was 9 pounds lower and the total gain was only 11 pounds higher per head. Similar results were reported by McIlvain, *et al* (2).

The lowest summer gain on native grass, 158 pounds per head in two trials, was made by calves that had the highest winter gain, 220 pounds per head. These calves had been wintered in drylot on a ration of Sumac silage, 2 pounds of cottonseed meal and 1 pound of alfalfa hay per head. Even though the summer gain was low, the total gain for both winter and summer was 387 pounds per head, the second highest of all treatments.

The lowest total gain, 317 pounds per head, was made by calves fed silage and 1 pound of cottonseed meal during the winter. These calves gained 137 pounds in the winter and 180 pounds during the summer.

The highest total gain, 411 pounds per head in four trials, was made by calves wintered on wheat and then grazed on native grass during the summer. These calves gained 206 pounds during the winter and 205 pounds during the summer.

The influence of winter treatment on summer gain and on total gain is shown in Figure 9. These results indicate that low calf gain in the winter was followed by high gain in the summer. Treatments which resulted in high gain during the winter also were followed by low gain during the summer. The gain of calves on wheat pasture and on summer grass was intermediate for both periods. Apparently calves may be wintered too well for the most efficient use of native grass during the spring and summer.

## Crossbred Steer Calves

Comparisons were made between Hereford calves and first-cross Jersey x Hereford and Aberdeen-Angus x Hereford calves, Table 11. In two

TABLE 10. EFFECT OF WINTERING TREATMENT ON SUMMER GAIN ON NATIVE GRASS AND ON TOTAL GAIN

| Winter treatment | No. steers | Wintering, 120 days | | Summer grazing, 180 days | | Total winter and summer, 300 days | |
|---|---|---|---|---|---|---|---|
| | | Average gain, lb. | | Average gain, lb. | | Average gain, lb. | |
| | | Per head | Daily | Per head | Daily | Per head | Daily |
| Wheat pasture, 4 years | 44 | 206 | 1.72 | 205 | 1.14 | 411 | 1.37 |
| Native grass, 4 years: | | | | | | | |
| 1 lb. cottonseed cake | 36 | 86 | .72 | 250 | 1.39 | 336 | 1.12 |
| 2 lb. cottonseed cake | 40 | 106 | .88 | 241 | 1.34 | 347 | 1.16 |
| Feedlot, 2 years: | | | | | | | |
| Silage and 1 lb. cottonseed meal | 17 | 137 | 1.14 | 180 | 1.00 | 317 | 1.06 |
| Silage and 2 lb. cottonseed meal, 1 lb. alfalfa | 18 | 229 | 1.91 | 158 | .88 | 387 | 1.29 |

TABLE 11. SUMMARY OF GAINS OF HEREFORD STEER CALVES, JERSEY X HEREFORD AND ABERDEEN-ANGUS X HEREFORD CROSSBREDS

| Breeding | Years | Total no. steers | Average no. days | Average weight, lb. | | Average gain, lb. | |
|---|---|---|---|---|---|---|---|
| | | | | Initial | Final | Per head | Daily |
| Hereford | 1945-48 | 30 | 116 | 404 | 479 | 75 | .65 |
| Jersery x Hereford | 1945-48 | 30 | 116 | 401 | 475 | 74 | .64 |
| Hereford | 1948-51 | 32 | 104 | 416 | 541 | 125 | 1.20 |
| Aberdeen-Angus x Hereford | 1948-51 | 32 | 104 | 461 | 600 | 139 | 1.34 |

trials on native grass with 1 pound of cottonseed cake and one trial on stalk fields and wheat, the Jersey x Hereford crossbreds made approximately the same gain as the Hereford calves. The Aberdeen-Angus x Hereford crossbred calves made an average daily gain of 1.34 pounds and the Hereford calves 1.20 pounds in the three trials. In the first trial, the calves were fed Sumac silage, 2 pounds of cottonseed meal and 1 pound of alfalfa hay. The calves were fed 2 pounds of cottonseed cake on native grass the other two winters.

## Cost of Wintering Treatments

The efficiency of wintering calves is dependent largely on the use of low-cost roughages and protein supplements to obtain profitable gains with a minmum of labor and equipment. Table 12 summarizes the wintering trials conducted from 1941 to 1955 with 1,034 head of calves on four principal roughages. Average prices for feed and pasture for the period of study were used in calculating the cost per 100 pounds of gain.

Calves wintered on wheat pasture showed the lowest cost of gain, $5.97 per 100 pounds, Figure 10. This was due to the high rate of gain and the low requirement of labor. The next lowest cost of gain, $10.80 per 100 pounds, was obtained on stalk fields and was followed closely by the cost of gain on native grass. The advantage for stalk fields was due primarily to the utilization of drouth-stricken sorghum crops from 1951 to 1954. The highest cost of gain was $15.01 per 100 pounds gain for calves wintered on silage and fodder in drylot. Increased labor involved in feeding and harvesting was the principal factor that increased the cost of wintering in the feedlot.

In these studies, the cost of wintering treatments and gain of calves apply only to the comparative trials. These data do not include the cost of vaccination, weaning, shrink in marketing and death losses.

TABLE 12. SUMMARY OF WINTERING TREATMENTS FOR 1,034 STEER CALVES OVER A 14-YEAR PERIOD, 1941-55

| Treatment | Wheat pasture | Native grass | Stalk fields | Feedlot |
|---|---|---|---|---|
| Total number of steers[1] | 283 | 428 | 288 | 204 |
| Number of years | 10 | 12 | 8 | 9 |
| Average number of days | 84 | 105 | 64 | 103 |
| Average gain per steer, lb. | 139 | 83 | 58 | 148 |
| Average daily gain, lb. | 1.65 | .80 | .92 | 1.44 |
| Average ration per steer, lb.: | | | | |
| Cottonseed meal, cake or cubes | | 147 | 101 | 155 |
| Alfalfa hay | | 28 | 18 | 103 |
| Sorghum bundles or silage (dry) | 156 | 56 | 67 | 824 |
| Cottonseed hulls | | | | 206 |
| Feed cost per head[2] | $1.40 | $6.21 | $4.51 | $16.22 |
| Pasture or feedlot charge | 6.72 | 2.76 | 1.86 | 6.00 |
| Cost per cwt. gain | 5.97 | 11.21 | 10.80 | 15.01 |

[1]Steers used early on stalk fields sometimes were used later on native grass or wheat pasture.

[2]Average prices of feeds and pasturage: cottonseed meal, $69 per ton; cottonseed cake, $71 per ton; alfalfa hay, $35 per ton; sorghum bundles, $18 per ton; sorgo silage, $7 per ton; cottonseed hulls, $16 per ton; wheat pasture $2.50 per head per month; native grass pasture and stalk fields, 88 cents per head per month; feedlot labor and rent, $1.75 per head per month.

## Flexibility of the Steer Calf Program

A reserve of native grass, silage or fodder is essential in a successful calf-wintering program. In most years, several sources of roughage usually are available on farms and ranches and may be utilized efficiently and economically for wintering calves. When supplies of feed are on hand, a flexible program can be used to take advantage of feeds when they are most valuable. Stalk fields should be grazed as early as possible to utilize the feed before it weathers and looses quality. Wheat pasture may be used alone or in combination with stalk fields or native grass. Lacking wheat and stalk fields, silage, fodder or native grass should be available.

## ACKNOWLEDGMENTS

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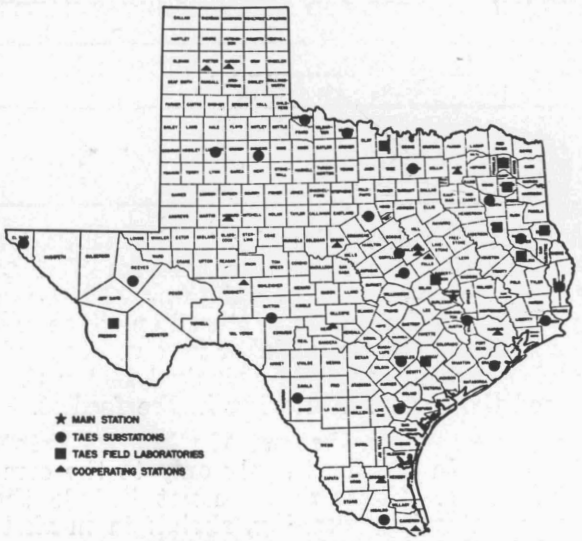


**Location of field research units in Texas maintained by the Texas Agricultural Experiment Station and cooperating agencies**

# State-wide Research

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