

# COWPEAS

## As A Protein Feed For Fattening Steer Calves

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The current shortage of protein supplements for fattening beef cattle has renewed interest in the use of home-grown sources of protein in Oklahoma. This is especially true of cowpea seed, which contains about half as much protein as common oil meal.<sup>2</sup>

There are a number of cowpea varieties which can be combined for seed. Cowpeas can be grown as a soil-building legume on rather poor soil or as a catch-crop after small grains. The crop also makes valuable hay and pasture.<sup>3</sup> Yields of 500 to 600 pounds of seed per acre are not uncommon.

In order to compare the feeding value of cowpeas with cottonseed cake, three feeding trials were conducted at the Oklahoma Agricultural Experiment Station using the two feeds as protein supplements. The study was made at Stillwater from 1950 through 1952. The cowpeas used in the tests were predominantly of the Chinese Red variety and were purchased from the mill as "cracks,"<sup>4</sup> although some whole seed was used.

Results of the three trials show that when fed on a protein basis equivalent to 1.5 pounds of cottonseed cake per steer daily, cowpeas approached the feeding value of cake for fattening steer calves.

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<sup>1</sup> Respectively: Animal Husbandman; former Animal Husbandman, now with the University of Kentucky; former Head, Department of Animal Husbandry, now Dean of Agriculture; and Head, Department of Agricultural Chemistry Research.

<sup>2</sup> Mungbeans, legume seeds similar to cowpeas in composition, have proved a valuable source of protein for fattening beef calves. In recent feeding tests, steers fed a corn-silage-alfalfa hay ration supplemented with 2.5 pounds of ground mungbeans per steer daily made slightly greater gains than steers fed the same ration supplemented with 1.5 pounds of cottonseed cake. (Sec. Okla. Agr. Exp. Sta. Bul. B-370. *The Value of Mungbeans for Fattening Calves*. 1951).

<sup>3</sup> Ligon, L. L., *Cowpeas for Oklahoma*. Okla. Agr. Exp. Sta. Bul. B-371. (1951).

<sup>4</sup> "Cracks" are those seeds sorted out as undesirable when the cowpeas are being processed for human food. They are often available at a favorable price as livestock feed.

These results, combined with the good growing qualities of cowpeas, indicate that the seeds can be a valuable source of protein, whether purchased from mills as cracks or grown on the farm.

### **Procedure**

Choice Hereford, weanling steer calves were used in the feeding tests. During the first two trials, the calves were purchased from the Mullendore Trust Company ranches in Osage county. For the last trial, the majority of the calves were produced in the Experiment Station herd. However, the last trial contained an equal number of calves in each lot from a load purchased in the Oklahoma City Feeder Calf sale. In each trial, the steers were divided equally into lots of 10 head each on the basis of weight and grade.

The feeding trials were conducted at the experimental feeding shed. The steers were confined to small paved exercise lots with an open shed to the north for protection. During the weaning period, and for approximately three weeks before the feeding trial started, the calves were fed sorghum silage, cottonseed meal, and a limited amount of alfalfa hay and corn.

The steers were started on their experimental rations about October 20 of each year, and the tests were completed by the second week in April. The average length of the feeding period was 171 days. The rations were hand-fed twice daily, with half the allowance given at each feeding. The steers were gradually worked up to a full-feed of corn. The amounts of protein supplement, alfalfa, and silage fed each lot were held constant during the feeding trial.

The amounts of cowpeas and cottonseed cake fed were equal in protein content. The steers of both lots had free access to salt and a mineral mixture composed of equal parts of salt, bonemeal, and ground limestone. Alfalfa hay was fed once daily in the morning.

The rations as fed by lots are shown in Table I.<sup>5</sup>

The steers were weighed every 28 days. The initial and final weights were an average of three consecutive weights taken during the afternoon. The initial cost price of the steer calves was either the price actually paid or the appraised value. The value of the cattle at the end of the feeding trial was determined by a committee composed of representatives from the Oklahoma City livestock market. In

<sup>5</sup> Complete data for the separate trials can be obtained in previous Feeders' Day Reports. See Okla. Agr. Exp. Sta. Misc. Pub. MP-17, pp. 73-79 (1950); MP-22, pp. 85-89. (1951), and MP-27, pp. 100-105. (1952).

computing profits, the appraised value placed on the steers of each lot was used as the value per hundredweight. A summary of the above information can be found in Table II.

Samples of feed were taken at intervals during the trials to determine their chemical composition. Table III shows the average chemical composition of the feeds.

### Results

The weight gains of the steers, feed consumption, and financial results are shown in Table II. Steers fed 1.5 pounds of cottonseed cake per head daily gained slightly more in the three trials than steers fed ground cowpeas. In the first trial, the steers fed cowpeas outgained those fed cake, but in the second and third trials, the reverse was true. However, the average difference in daily gain was only 0.04 pound.

Although the steers of both lots were full-fed corn, the steers fed cowpeas consumed about 0.8 pound less corn per head daily than those fed cake. Thus the cowpeas in the ration of Lot 2 steers replaced 1.5 pounds of cottonseed cake and 0.8 pound of corn per steer daily. This ratio is further reflected in the feed required to produce each 100 pounds of gain. In this phase of the test, each 100 pounds of cowpeas replaced (a) 58 pounds of cottonseed cake and (b) 25 pounds of ground corn in producing 100 pounds of beef gain. On the other hand, the cake-fed lot required slightly less alfalfa hay and silage per hundredweight gain.

The feed cost per hundredweight gain favored the cake-fed lot due principally to the high price of cowpeas during the third trial when it was necessary to obtain whole seeds to complete the experiment. The price of cowpeas was \$50.00 per ton in 1950, \$60.00 in 1951, and

Table I.—Rations Fed Experimental Calves  
(By Lot)

|                    | Lot 1          | Lot 2            |
|--------------------|----------------|------------------|
| Rations:           |                |                  |
| Ground yellow corn | Full-fed       | Full-fed         |
| Cottonseed cake    | 1.5 pounds     | -----            |
| Ground cowpeas     | -----          | About 2.6 pounds |
| Atlas sorgo silage | Limited amount | Limited amount   |
| Alfalfa hay        | 1.0 pound      | 1.0 pound        |

Table II.—A Comparison of Cowpeas and Cottonseed Cake for Fattening Steer Calves in Three Trials, 1950 through 1952\*  
(Average)

| Lot number                        | Lot 1           |  | Lot 2          |  |
|-----------------------------------|-----------------|--|----------------|--|
|                                   | Cottonseed Cake |  | Ground Cowpeas |  |
| Number of steers per lot          | 30**            |  | 30**           |  |
| Average weight per steer (lbs.)   |                 |  |                |  |
| Initial                           | 477             |  | 477            |  |
| Final                             | 853             |  | 843            |  |
| Av. daily gain                    | 2.19            |  | 2.15           |  |
| Average daily rations (lbs.)      |                 |  |                |  |
| Ground corn                       | 10.85           |  | 10.03          |  |
| Cottonseed cake                   | 1.50            |  | -----          |  |
| Ground cowpeas                    | -----           |  | 2.55           |  |
| Alfalfa hay                       | 1.00            |  | 1.00           |  |
| Sorghum silage                    | 6.98            |  | 6.98           |  |
| Salt                              | .04             |  | .04            |  |
| 1-1-1 mineral mixture             | .03             |  | .03            |  |
| Feed per cwt. gain (lbs.)         |                 |  |                |  |
| Ground corn                       | 497             |  | 467            |  |
| Cottonseed cake                   | 69              |  | -----          |  |
| Ground cowpeas                    | -----           |  | 119            |  |
| Alfalfa hay                       | 46              |  | 47             |  |
| Sorghum silage                    | 320             |  | 326            |  |
| Feed cost per cwt. gain (dollars) | 17.86           |  | 19.13          |  |
| Financial results (dollars)       |                 |  |                |  |
| Appraised value per cwt.          | 33.00           |  | 32.83          |  |
| Total value per steer (3% shrink) | 272.91          |  | 268.55         |  |
| Initial cost @ \$32.62 per cwt.   | 155.60          |  | 155.60         |  |
| Feed cost per steer†              | 67.19           |  | 69.86          |  |
| Total cost, steer plus feed       | 222.79          |  | 225.46         |  |
| Profit per steer                  | 50.12           |  | 43.09          |  |
| Carcass grades ††                 |                 |  |                |  |
| Prime                             | 3               |  | 6              |  |
| Choice                            | 16              |  | 13             |  |

\* The average length of the feeding trials was 171 days.

\*\* One steer was removed from Lot 1 in 1950 due to founder, one steer was lost in Lot 1 (1952) and one in Lot 2 (1952) due to accidental death. Data on these steers are not included.

† Average feed prices were: corn \$1.56 per bushel; cottonseed cake, \$75.17 per ton; cowpeas, \$76.67 per ton; alfalfa hay, \$20.83 per ton; sorghum silage, \$5.67 per ton; salt, \$13.00 per ton, and 1-1-1 mineral mixture, \$29.00 per ton.

†† Total of 1950-51 and 1951-52 trials.

Table III.—Average Chemical Composition of Feeds

|                    | Percent dry matter | Percent composition of dry matter |               |      |       |          |           |              |
|--------------------|--------------------|-----------------------------------|---------------|------|-------|----------|-----------|--------------|
|                    |                    | Ash                               | Crude protein | Fat  | Fiber | N. F. E. | Cal- cium | Phos- phorus |
| Cottonseed cake    | 93.12              | 6.86                              | 42.79         | 6.67 | 11.54 | 32.14    | .23       | .95          |
| Corn               | 88.51              | 1.60                              | 10.38         | 4.62 | 2.13  | 81.26    | .04       | .94          |
| Cowpeas            | 90.41              | 3.82                              | 24.61         | 1.37 | 4.46  | 65.42    | .10       | .28          |
| Alfalfa hay        | 91.10              | 8.61                              | 15.98         | 2.46 | 35.93 | 37.02    | .84       | .23          |
| Atlas sorgo silage | 30.20              | 8.22                              | 5.40          | 3.98 | 24.31 | 58.09    | .64       | .32          |

\$120.00 in 1952. Profits from the feeding operations varied with the feed costs. Therefore, the average profits from the three trials favored the steers fed cottonseed cake.

On the basis of the feed prices during the three trial years, 100 pounds of cowpeas fed as a protein supplement were equal in value to 76 pounds of cottonseed cake. As a partial replacement for corn in the ration, 100 pounds of cowpeas were worth 103 pounds of corn. Using relative values obtained in these feeding trials, if cake were selling for \$75.00 per ton and corn for \$1.50 per bushel, disregarding roughage, cowpeas would have a replacement value of \$57.00 per ton in fattening rations for beef calves.

There was only a slight difference in the appraised value of the steers at the end of the feeding trial. Carcass grades obtained during the last two trials indicate that the cowpea-fed steers were carrying slightly more finish.

### Summary

Calves fed cowpeas (2.6 pounds per steer daily) made average daily gains of 2.15 pounds. This compares with 2.19 pounds gained daily for steers receiving an equal quantity of protein in the form of cottonseed cake. It appears from these tests that when the price of cowpeas is less than 76 percent that of cottonseed cake, they can be used profitably in rations for fattening cattle.