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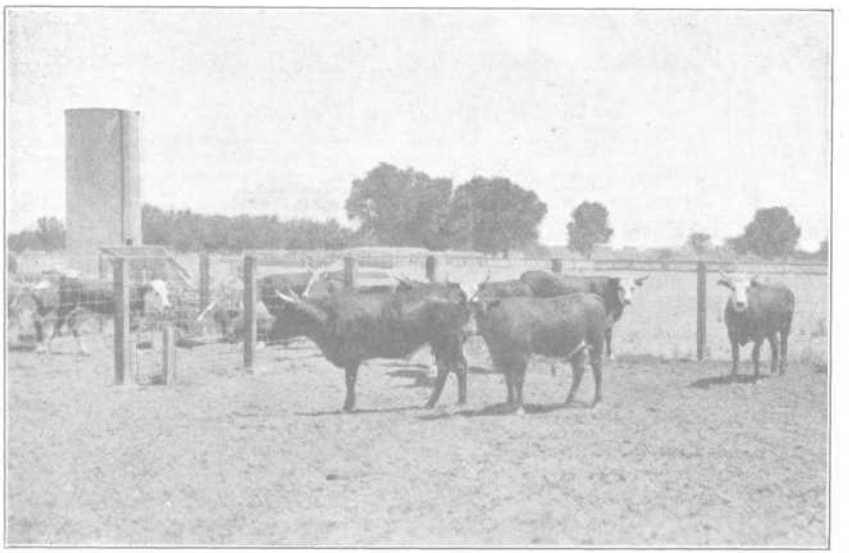

Steers in Lot IV—April 25, 1921.

FEEDING COTTON SEED AND COTTON SEED PRODUCTS TO RANGE STEERS

By E. B. Stanley

Tucson, Arizona, August, 1921

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By E. B. Stanley

INTRODUCTION

The rapid development of the farming industry in Arizona during the past ten years has been made possible by the outlet afforded for its products through feeding to livestock. A balanced agricultural policy demands a system of diversified farming in which livestock is an essential factor in maintaining soil fertility and the transformation of home grown feeds into a finished marketable product.

The advent of the cotton industry into Arizona and the consequent widening between the market prices of cotton seed and cottonseed meal, together with a lack of experimental information regarding the relative feeding values of these two feeds, prompted the Agricultural Experiment Station to conduct a steer feeding test at the Salt River Valley Experiment Farm during the winter and spring of 1921

The purpose of the experiment herein reported was to ascertain the relative values of whole cotton seed and cottonseed meal when fed with a basal ration of alfalfa hay and corn silage for fattening steers. It was further planned to make a comparison of corn silage and cottonseed hulls when fed as the sole roughage supplemented with cottonseed meal in fattening rations and also to test the results of feeding cotton seed in a crushed form.

METHOD AND PLAN

The feeds which constituted the basal ration of the different lots were the two staple crops grown in our farming sections and widely recognized as leading roughage feeds, namely alfalfa hay and silage. Cottonseed meal, whole cotton seed, crushed cotton seed, and cottonseed hulls were the supplementary feeds used. All the feeds were of

good quality with the exception of the cottonseed meal, which showed by direct analysis that it contained only 33.62 percent protein. The chemical composition of the feeds used was determined by the Department of Agricultural Chemistry as given in the following table:

PERCENTAGE COMPOSITION

Feed	Water	Ash	Protein	Carbohydrates		Fat
				Crude Fiber	Nitrogen Free Extract	
Cottonseed	6 50	4 06	18 50	23 26	31 98	15 70
Cottonseed meal	6 14	6 37	33 62	14 70	31 49	7 68
Cottonseed hulls	7 99	3 00	4 93	46 52	35 26	2 33
Corn silage .	71 21	1 70	3 49	7 48	15 38	0 74
Alfalfa hay	3 7	8 02	15 73	29 75	40 59	1 67

The complete rations fed to the cattle were as follows: Lot I, corn silage, alfalfa hay, and cottonseed meal; Lot II, corn silage, alfalfa hay, and whole cotton seed; Lot III, corn silage, alfalfa, and crushed cotton seed; Lot IV, corn silage and cottonseed meal; Lot V, same as Lot I; Lot VI, cotton seed hulls and cottonseed meal.

The comparisons are:

1. Cottonseed meal with whole cotton seed, Lots I and V with II.
2. Corn silage with cottonseed hulls, Lots IV and VI.
3. Whole cotton seed with crushed cotton seed, Lots II and III.

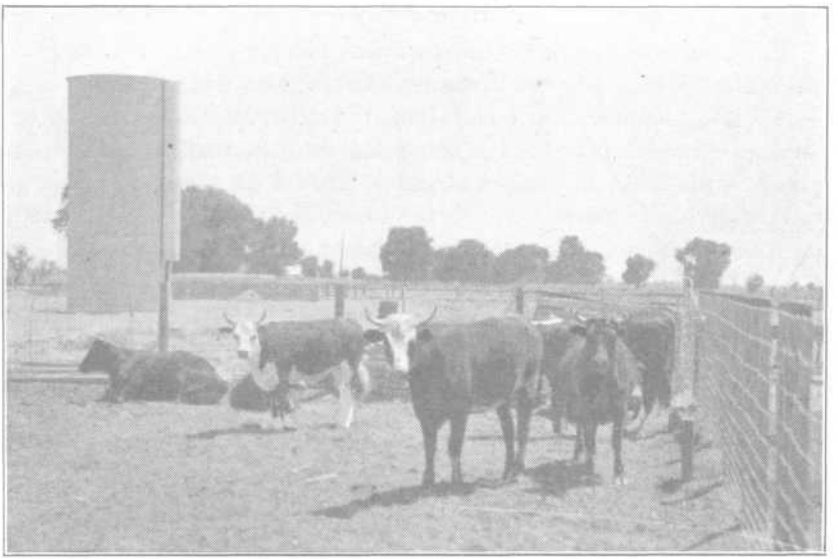
The cattle were divided into five lots of eight head each, care being taken to make each lot as nearly uniform as possible in quality, weight, and condition, and one lot of ten head in which were the smaller, more timid animals culled from the entire number. The feed lots in which the cattle were fed were alike in construction, each measuring 48x60 feet with a feed manger 3 feet wide and 36 feet long. No shed or covering was needed as there were no heavy rains, and the temperature during the test varied from 28° F. to 94° F.

The animals had free access to salt and water at all times.

Prior to the experiment proper, all the cattle were fed a liberal ration of alfalfa hay and silage for a period of ten days in order to get the animals to eating well before beginning the actual test.

The daily ration was given in two feeds, one at 8:00 a. m., and the other at 4:00 p. m. From the outset, the animals receiving hay, silage, and cottonseed hulls were given all of these feeds they would consume.

The first week, all the steers in Lot I received 1 pound cottonseed meal per head daily; those in Lots II and III, 4 pounds cotton seed; and Lots IV and VI, 2 pounds cottonseed meal. The cottonseed meal was increased to 2½ pounds per head daily the second week in Lot I; the cotton seed to 6 pounds in Lots II and III; and the



Steers in Lot I—April 25, 1921

cottonseed meal to 3½ pounds in Lots IV and VI. After the third week, the steers in Lot I were given 4 pounds of cottonseed meal and those in Lots IV and VI received 5 pounds cotton seed meal; while the steers in Lots II and III received 8 pounds cotton seed. Lot V received the same ration throughout the entire test as Lot I.

CHANGES IN FEEDS

From January 26 to February 16, the silage fed was from the Orange Cane sorghum. After this time the cattle were given corn

silage but did not relish it as well as the sweeter sorghum silage previousiy used, but after a few days they were eating heartily of the corn silage.

The animals in Lot II did not consume the 8-pound allowance of whole cotton seed per head, and on March 16 it was reduced to 6 pounds. Beginning February 18, 6 pounds of crushed cotton seed was fed to each steer in Lot III in place of the whole cotton seed. After April 1 until the close of the test, the allowance of cottonseed meal was increased 1 pound in Lots I, IV, V, and VI.

ANIMALS USED

Fifty head of common bred two year old range steers were purchased from L. L. Bates at Prescott, Arizona, and shipped to the Salt River Valley Experiment Farm January 15, 1921. In consequence of the poor condition of the ranges during the past season, the animals arrived at the farm in poor condition. They were a hardy, uniform lot showing a predominance of Hereford breeding, and immediately took to their liberal ration of alfalfa hay and silage.

COSTS

The animals cost $6.80 per hundred, which included shipping expense and cost of feed during the preliminary feeding period.

The prices charged for the feeds used in the experiment were as follows: cottonseed meal $30 per ton; whole cotton seed $10 per ton; alfalfa hay and corn silage at $24 and $8 per ton respectively; cotton seed (crushed) at $12 per ton, and cottonseed hulls at $12 per ton. In handling such a small number of steers as 50 head no charge was made for labor nor any credit given for the manure, it being considered that this by-product will pay for the labor of feeding.

The cattle in Lot I receiving a ration of alfalfa hay, silage and cottonseed meal made an average daily gain of 2.71 pounds per head, while it will be observed that Lot V receiving the same ration gained 3.35 pounds per head daily. The steers in Lot I were larger and in better condition than the animals in all the other lots, which accounts for the wide variation in the comparative results of Lots I and V. Two steers in Lot V which were under size, made the average initial weight per head of the animals in this lot less than the other

lots, but the condition of the animals in this lot was more nearly representative of the entire number than was that of Lot I.

The cattle in Lot II made an average daily gain of 2.58 pounds, or .77 pound less than the animals fed cottonseed meal in Lot V, and .13 pound less than those fed cottonseed meal in Lot I. The better condition of the steers in Lot I accounts for the small difference in gains compared with Lot II, because the cotton seed fed steers naturally took on a greater fill, due to their poorer condition.

Further comparisons of Lots II and V, receiving the cotton seed and cottonseed meal, respectively, indicate that less feed was required per 100 pounds in Lot V and at a cost difference of seven cents.

The steers receiving cottonseed meal in Lots I and V produced a better finish and made a better gain and a higher dressing percentage, averaging 56.85 per cent, as compared with Lot II with 53.6 per cent.

Lot II receiving alfalfa hay, silage and whole cotton seed made an average daily gain of 2.58 pounds per head. Lot III, receiving the same ration, except that the seed was crushed, gained 2.41 pounds per head daily. The cost and amount of feed required per 100 pounds were practically equal in both lots.

The steers in Lot IV, fed silage and cottonseed meal, made an average daily gain per head of 3.02 pounds as compared with Lot VI, receiving cottonseed hulls and cottonseed meal, which made a daily gain of 2.41 pounds per head. The silage fed steers gained .61 pound more per head daily at a feed cost of only sixty-three cents more per 100 pounds gain, and gave a much smoother finish with only a small difference in dressing percentage. The steers in Lot VI required 823.5 pounds cottonseed hulls to produce 100 pounds gain, which is one-half the weight of silage consumed per 100 pounds gain in Lot IV. This amount of silage and hulls cost $6.70 and $4.94 respectively at current prices. The hull fed steers consumed 192 pounds of cottonseed meal per 100 pounds gain, or 36 pounds more than the silage fed steers required per 100 pounds gain. Since the allowance of cottonseed meal was the same in Lots IV and VI, the difference in favor of Lot IV must be attributed to the silage. During the last ten days of the feeding period the hull fed steers became unthrifty and their normal rate of gain decreased.

SUMMARY OF STEER FEEDING EXPERIMENT COMPARING COTTONSEED MEAL AND WHOLE AND CRUSHED COTTON SEED BASED ON ONE AVERAGE STEER JANUARY 26, 1921, TO APRIL 26, 1921

Lot number	1	2	3	4	5	6
No. steers in lot	8	8	8	8	10	8
Fattening ration fed	Hay Silage Cotton seed meal	Hay Silage Whole seed	Hay Silage Crushed seed	Silage Cotton seed meal	Hay Silage Cotton seed meal	Cotton seed hulls Cotton seed meal
	Pounds	*Pounds*	*Pounds*	*Pounds*	*Pounds*	*Pounds*
Av. initial weight	718 8	705.0	636.8	697.5	553.0	643.8
Av. final weight	963 0	937.5	854 0	969.5	854.8	860 8
Av. total gain	244.2	232.5	217.2	272.0	301.8	217.0
Av. daily gain	2.71	2 58	2.41	3.02	3.35	2 41
Average Daily Ration:						
Alfalfa hay	2.41	2.28	2.28		2.31	0 24
Silage	47.77	32.99	30.93	50 63	39.83	2.82
Cotton seed whole		6.24				
Cotton seed crushed			5.54			
Cotton seed meal	3 85			4.72	3.90	4.64
Cotton seed hulls						19 86
Feed required for 100 pounds gain:						
Alfalfa hay	88 6	88.8	95.0		68.9	10.1
Silage	1760.6	1277.2	1280.8	1675.4	1187.6	117.0
Cotton seed whole		241.6	51.0			
Cotton seed crushed			178.5			
Cotton seed meal	141.3			156.2	116.2	192 0
Cotton seed hulls						823.5
Cost 100 pounds gain	$10.23	$ 7.39	$ 7.57	$ 9.04	$ 7 32	$ 8.41
Initial cost per head at $6.80 cwt.	$48.88	$47.94	$43.30	$47.43	$37.60	$43.78
Feed cost per head	24.99	17.16	16.62	24.60	22.09	18.27
Interest at 8%	.80	.80	.80	.80	.80	.80
Marketing expense	.60	.60	.60	.60	.60	.60
Total cost per head	75.27	66.50	61.32	73.43	61.09	63.45
Selling price per cwt.	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00	$ 7.00
Returns per steer	62.02	60.38	55.00	62.44	55.05	55.44
Loss per steer	13.25	6 12	6.32	10 99	6 04	8.01
Necessary selling price	8.50	7.71	7.80	8.23	7.77	8.01
Necessary margin	1.70	.91	1.00	1.43	.97	1.21
Dressing percentage	56.9	53.6	55.6	56.4	56.8	55.5

SUMMARY

Cottonseed meal compared with cotton seed gave uniformly better results as evidenced by the greater gain of the animals, their smoother finish, and their higher dressing percentage.

When fed with a basal ration of alfalfa and silage to two-year-old steers, 100 pounds of cottonseed meal are equal to 170 pounds of whole cotton seed. Cotton seed at $17 per ton is equal to cottonseed meal at $30 per ton. (The cottonseed meal was low grade, containing only 33.62 percent protein, although it was purchased as choice meal.)

It was found that the use of cotton seed in a crushed form was not warranted.

Corn silage when fed with cottonseed meal gave larger and more uniform daily gains than did the ration of cottonseed hulls and cottonseed meal. Cattle fed a ration of cottonseed meal and cottonseed hulls made good daily gains for the first 60 to 80 days, after which time the gains began to diminish rapidly. If the roughage is silage instead of hulls the meal may be fed for a longer period of time without ill effects.

The lack of finish of the steers receiving cottonseed meal indicated that it would have required a feeding period of 120 days to put them in good marketable condition, and 150 days for those receiving cotton seed, had they continued to make the same rate of gain.