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Steer-Feeding Experiment, VII. 1903-1904.

INTRODUCTION.

The feeding of cattle is becoming one of the leading industries of Kansas. In view of this fact, it would seem proper that steer-feeding experiments should be one of the leading subjects of investigation at the Experiment Station. Already a number of experiments have been conducted, but new phases of the subject are constantly coming up and new questions are arising, the solutions and answers to which are of great importance to the practical feeder. The relatively low price of cattle and high price of feeding stuffs renders it especially important that the most economical methods possible be employed in order to reap a profit from the business. Owing to the fact that quite extensive changes and improvements were being made in the feeding lots of the Experiment Station, it was impossible the past winter to conduct any very extensive experiments. One car-load of steers, however, was divided into two lots and fed through a feeding period of one hundred forty-four days, the details and results being given in this bulletin.

OBJECT AND PLAN OF EXPERIMENT.

The use of alfalfa as the sole roughage in full-feeding cattle is becoming quite general and seems to give the best of results. Some feeders, however, are of the opinion that where too much alfalfa of high quality is supplied to steers, they will not consume

enough grain to produce satisfactory results. It has been observed in the progress of previous feeding experiments at this Station that cattle receiving nothing but alfalfa as a roughage always seem to have a taste for course roughage of various kinds.

It was decided to make a comparative test of alfalfa alone, with alfalfa and several other kinds of cheaper roughage supplied, so the cattle could select and eat at will whatever they desired. It was thought that where a variety of roughage was supplied in this way the steers could choose at will, and, in a measure, balance their own rations. The relative cost of the two methods of feeding also entered into the question. If as good gains could be produced by the use of a variety of roughages, in which alfalfa hay was used as the chief, and cheaper fodders used with it, the cost of feeding would be reduced and more of the rough feed of the farm could be utilized.

MANNER OF FEEDING.

In order to make the conditions as nearly like those on the average farm where the cattle are fed, the steers were placed in lots with open sheds only for protection. The hay was fed in large, movable racks, into which a ton or more could be placed at a time. A manger extended along each side, and the cattle had free access to the roughage. The grain was fed separately in feed troughs. Lot No. 1, which received the variety of roughage, had alfalfa hay and prairie hay before them all the time. During part of the experiment they had also a small quantity of corn ensilage furnished them each day. The grain was the same for both lots, being corn-and-cob meal, and, toward the end of the experiment, corn-meal and cottonseed-meal.

STEERS USED.

The steers used in this experiment were purchased in Kansas City in the open market. They were high-grade Angus cattle, fairly uniform in quality. The average weight at the time of purchase was 918 pounds, and the average price per hundred weight was \$3.49.

GETTING THE STEERS ON FEED.

The experiment was started January 1, 1904. The steers were all placed in one lot and fed corn-stover and alfalfa hay, with a small amount of fodder corn from thick planting. They were fed in this way through the greater part of December. Toward the latter part of the month a small feed of ear corn was given in the troughs. In this way they were very slowly gotten on feed; and by the first of January all were eating well. On this date

the steers were divided into two lots often each. The lots were divided as equally as possible, taking into consideration the type, quality and size of the different animals. The weights were taken about 1:30 p.m., and, as there was no intention of doing any experimental work with individual steers, the total weight of the lot alone was taken and this one weight considered as the weight of the lot at the beginning of the experiment. In the case of getting the weights of individual steers, the daily fluctuations are such that it is necessary to get the average of several days' weight in order to have a correct weight of the steers. In getting the weight of a lot, the daily fluctuations of individual steers will tend to balance each other.

WEIGHTS AND GAINS.

In Table I is shown the weights and gains of the two lots by months. The gain for the first month is very large. It is probably due in part to the filling-up process which takes place when cattle are first put on feed. These steers, however, had been re-

TABLE I.—Weights and Gains by Months.

DATE.	Lot I. Alfalfa hay with other roughage.			Lot II. Alfalfa hay alone.		
	Weight, pounds.	Gain, pounds.	Average daily gain per steer, pounds.	Weight, pounds.	Gain, pounds.	Average daily gain per steer, pounds.
Jan. 1.....	9615			9555		
Feb. 1.....	10,730	1115	3.59	10,925	1370	4.41
Mar. 1.....	11,390	660	2.27	11,740	815	2.81
Apr. 1.....	12,100	710	2.29	12,600	860	2.77
May 2.....	12,695	595	1.92	13,380	780	2.51
May 23.....	12,945	250	1.25	13,615	235	1.17
Total gain.....			3830 lbs.			4060 lbs.
Average daily gain per steer.....			2.32 lbs.			2.83 lbs.

ceiving grain for a month, and on the day the experiment started received 118 pounds of ear corn per lot, or 11.8 pounds per head. There was a steady decrease in the average daily gains as the feeding period progressed, and it will be noticed that for the last twenty-two days the two lots gained at the rate of only 1.19 pounds daily. This phase of the fattening process in cattle had been pointed out by a number of investigators. The gains steadily decreased and the amount of grain consumed to produce a given gain steadily increased. It follows that the quicker cattle can be placed in condition for market after beginning to feed, the more economically beef can be produced. This is due to the fact that the body increase becomes proportionately greater than the digestive capacity of the animal. For illustration, an 800-pound

steer has, as a rule, the same digestive capacity as he will after he has gained a weight of 1200 pounds. Therefore, since the body increase is one-third more at 1200 pounds than at 800 pounds, it follows that a more concentrated and assimilative ration must be fed to obtain the same rate of gain at the end as produced in the early part of the feeding period. However, this can seldom be done with economy, consequently if the same food is fed throughout the feeding period the gain will necessarily decrease. One should not be led to believe from this that half-finished cattle are always the most profitable, for well-finished cattle always will command a higher price to make up for the loss of the rate of gain.

KIND AND AMOUNT OF FEED CONSUMED.

Table II gives in concise form the total amount of feed consumed by each lot. The first week of the experiment the steers received fourteen pounds of ear corn daily, or 14.5 pounds per thousand pounds live weight. The grain ration was changed to corn-and-cob meal, January 16. By the end of the month they

TABLE II.—Total Feed Consumed.

LOT.	Ear corn.	Corn-and-cob meal.	Corn-meal.	Cotton-seed-meal.	Alfalfa.	Kafir-corn stover.	Sorghum stover.	Prairie hay.	Ensilage.
I.....	2078	21,605	4000	530	15,480	3100	540	5045	1400
II.....	2078	21,605	4000	530	18,465				

were consuming 17 pounds a day per steer, or 15.7 pounds per thousand pounds live weight. By the end of February they were consuming 19 pounds of corn-and-cob meal daily per steer, or 16.4 pounds per thousand pounds live weight. In one month more the grain ration had increased to 20 pounds of corn-and-cob meal per steer daily, or 16.2 pounds per thousand pounds live weight.

By the end of April, 24 pounds of corn-and-cob meal was the daily grain ration per steer, or 18.4 pounds per thousand pounds live weight. At this point the grain ration was gradually changed to pure corn-meal. At the same time cottonseed-meal was introduced into the ration, fed at the rate of 1.15 pounds per thousand pounds live weight. Reference to the last two columns

TABLE III.—Weights and Gains with Pounds of Feed Consumed per 100 Pounds of Gain.

No. OF LOT.	No. of steers.	Weight Jan. 1, 1904.	No. of days fed.	Weight May 23, 1904.	Total gain, pounds	Average gain per steer pounds.	Grain eaten per 100 pounds gain.	Roughness eaten per 100 pounds gain.
I.....	10	9615	143	12,945	3330	2.32	715.01	742.50
II.....	10	9555	143	13,615	4060	2.83	578.25	454.80

of Table III shows that these steers consumed very small amounts of feed for the gains made. If this had not been the case they could hardly have been fed at a profit, considering the small "margin" between the buying and the selling price, the price paid in Kansas City being \$3.49 per hundred weight, and \$4.50 being the selling price. It is not generally considered safe to figure on feeding cattle for a smaller margin than \$1.00 per hundred weight between buying and selling price.

FINANCIAL RESULTS.

The results of this experiment from a financial standpoint appear in table IV. This table needs little explanation. It will be seen that the lot making the poorest gains was the least profitable. Not only was the total amount received for them less, but the cost of the various kinds of roughage fed was greater than the cost of the alfalfa hay fed to Lot II. The grain consumed by each lot was the same.

TABLE IV.—FINANCIAL STATEMENT.

LOT I.				
Cost of 10 steers in Kansas City.....		\$320	86	
Freight, Kansas City to Manhattan.....		8	02	
Commission.....		5	00	
Total cost of steers.....		\$333	88	
Corn, 409.7 bushels, at 35 cents per bushel.....	\$143	39		
Cottonseed-meal, 530 pounds, at \$25.00 per ton.....	6	62		
Alfalfa hay, 7.74 tons, at \$7.00 per ton.....	54	18		
Kafir-corn stover and sorghum fodder, 1.82 tons, at \$2.00 per ton.....	3	64		
Ensilage, 1400 pounds, at \$2.00 per ton.....	1	40		
Prairie hay, 2 52 tons, at \$5.50 per ton.....	13	86		
Total feed cost.....		223	09	
Cost of steers and feed.....		\$556	97	
By sale of steers, at \$4.50 per 100 pounds.....	\$578	14		
Balance profit.....		21	17	
Grand total.....	\$578	14	\$578	14
Feed cost, per 100 pounds of gain.....		\$6	69	
LOT II.				
Cost of 10 steers in Kansas City.....		\$320	86	
Freight, Kansas City to Manhattan.....		8	02	
Commission.....		5	00	
Total cost of steers.....		\$333	88	
Corn, 409.7 bushels, at 35 cents per bushel.....	\$143	39		
Cottonseed-meal, 530 pounds, at \$25.00 per ton.....	6	62		
Alfalfa hay, 9 23 tons, at \$7.00 per ton.....	64	61		
Total feed cost.....		214	62	
Total cost of steers and feed.....		\$548	50	
By sale of steers, at \$4.50 per 100 pounds.....	\$608	28		
Balance profit.....		59	78	
Grand total.....	\$608	28	\$608	28
Feed cost, per 100 pounds of gain.....		\$5	28	

CONCLUSIONS.

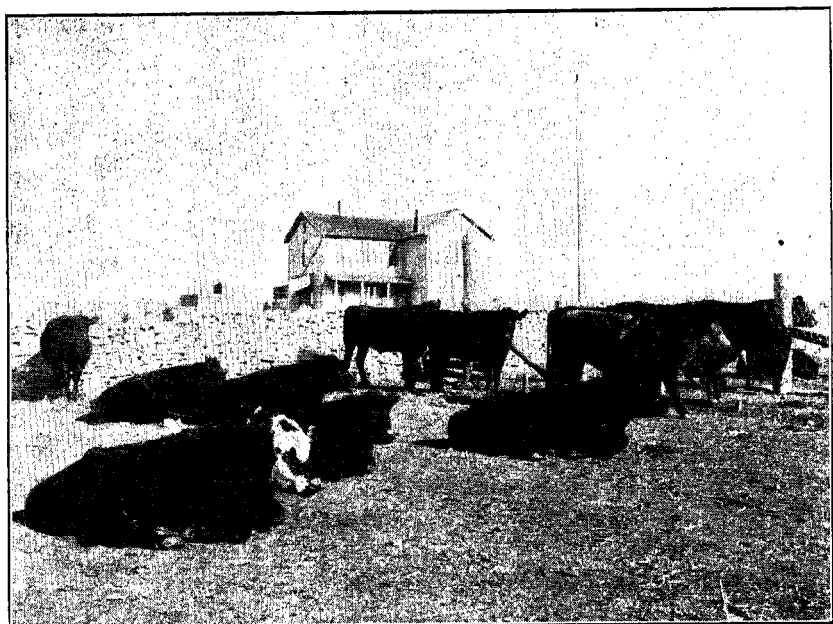
The results of this experiment would seem to indicate that the advantage lies with the feeding of alfalfa as the sole roughage in

comparison with the feeding of other kinds in connection with alfalfa.

The total gain made by Lot I in the 143 days of feeding was 3320 pounds; of Lot II, 4060 pounds, an increase of 22.2 per cent over Lot I. It took 126.76 pounds more grain, or 21.9 per cent, to produce 100 pounds of gain in Lot I than in Lot II.

The profit per steer in Lot I was \$2.12; in Lot II, \$5.85, or more than double. The profit in either case was very small; indeed, so small as to hardly warrant, steer-feeding except as a means of marketing the feed of the farm. Alfalfa hay and corn-and-cob meal form a most excellent ration for fattening, and unless future experiments change these results, we shall have to admit that this combination gives better results than the use of a greater variety of roughage.





LOT. I.



LOT. II.