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THE COMPARATIVE VALUES OF COTTONSEED CAKE AND GROUND YELLOW CORN FOR THE SUPPLEMENTAL FEEDING OF COWS AND WEANED CALVES ON THE RANGE

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THE COMPARATIVE VALUES OF COTTONSEED CAKE AND GROUND YELLOW CORN FOR THE SUPPLEMENTAL FEEDING OF COWS AND WEANED CALVES ON THE RANGE

INTRODUCTION.

When supplemental feeding is practiced on the range, cottonseed cake is generally the concentrate fed. The protein of cottonseed cake has always been stressed, and rightly so, but it contains, also, considerably more phosphorus than does corn. Cake also has a decided advantage in that it can, with very little waste, be fed on the turf in many sections; but a trough is almost necessary for the feeding of corn. Oftentimes, however, in some sections of New Mexico, corn is cheaper in price, and it is then that the ranchers want to know what are the comparative feeding values of cake and corn. In order that the Agricultural Experiment Station might furnish information on their relative values, an experiment was conducted in which cows and weaned calves were fed cake and ground yellow corn as a range supplement during two winters. The first year the length of the feeding period was 84 days; the second year, 56 days. Yellow corn was used because of any effect or advantage it might have over other corn, and it was ground so that a larger percentage of it would be digested. The cows in Lots 1 received one pound of cottonseed cake per head daily, while those in Lots 2 received one pound of ground corn. The calves in Lots 1 received one-half pound of cottonseed cake daily; those in Lots 2, one-half pound of ground corn per head daily. A table for each year follows, giving the data necessary for comparative gains of the different lots.

TABLE I.—AVERAGE GAIN PER HEAD OF COWS AND WEANED CALVES FOR THE 1929-1930 SUPPLEMENTAL FEEDING TRIAL.

Lot number	Number of animals finishing	Feed fed	Amount eaten per head daily	Average gain or loss			Average gain for the 84-day period	Difference per head in favor of cottonseed cake
				First 28-day period	Second 28-day period	Third 28-day period		
			Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
I, cows	17	Cottonseed cake	1.00	30.0	28.648	—1.765	56.89	48.015
II, cows	16	Ground corn	1.02	9.75	11.06	—11.935	8.875	
I, calves	17	Cottonseed cake	.50	15.833	19.889	—11.548	24.174	12.69
II, calves	18	Ground corn	.50	11.556	20.833	—20.905	11.484	

It will be noted that the average difference for the 84-day period was 48.015 pounds per head in favor of the cottonseed-cake fed cows and 12.69 pounds per head in favor of the cake-fed calves. Comparative price values of the two feeds, using the differences in gains and the given prices, are as follows:

When cows are 2½ cents a pound, calves, 5 cents a pound, and ground corn, $20.00 a ton } then cottonseed cake is worth { for cows, $47.84 a ton; for calves, $50.00 a ton.

TABLE II.—AVERAGE GAIN PER HEAD FOR COWS AND WEANED CALVES FOR THE 1930-1931 SUPPLEMENTAL FEEDING TRIAL.

Lot number	Number of animals finishing	Feed fed	Amount eaten per head daily	Average gain or loss		Average gain or loss for the 56-day period	Difference per head in favor of cottonseed cake
				First 28-day period	Second 28-day period		
			Pounds	Pounds	Pounds	Pounds	Pounds
I, cows	13	Cottonseed cake	1.0	9.1	2.7	6.4	42.57
II, cows	12	Ground corn	1.0	—11.07	—24.50	—36.17	
I, calves	17	Cottonseed cake	.50	27.87	—11.66	16.21	12.04
II, calves	16	Ground corn	.50	13.87	— 9.80	4.07	

Comparative price values of the two feeds, using the differences in weight shown in Table II and the following prices:

When cows are 2½ cents a pound, calves, 3 cents a pound, and ground corn, $20.00 a ton } then cottonseed cake is worth { for cows, $58.00 a ton; for calves, $63.00 a ton.

The comparative price values will vary, of course, with the price of cattle and the cost of the corn.

The manner of computing the comparative price one could pay for cottonseed cake when a given price is taken for ground yellow corn, was based on the following:

The difference in pounds of live weight due to cottonseed cake between the two lots at the end of the experiments was taken as the added weight attributable to the superiority of cottonseed cake over ground yellow corn. This extra weight due to cake was given a monetary value, to which the cost of the corn fed was added. In each instance, the number of pounds of corn fed was the same as that of the cake. Adding the total cost of corn fed to the value of the extra pounds of weight and dividing by the number of pounds of cottonseed cake fed, gave the comparative price value per pound for cottonseed cake; this then being computed to the price value per ton.

While it may be true that the difference in weight of the cottonseed cake lot may not be sold, nevertheless, the cows in a little higher condition will raise calves that will be heavier at weaning time. Even when feeding to prevent the death of cattle and not for gain in weight, the cake would be superior to corn.

Tables I and II, for both cows and weaned calves, show a difference in favor of the cottonseed cake. The data indicate that it is not necessarily the total digestible nutrients of the cake or corn that contribute the greatest amount of good, but possibly the protein and mineral matter. The forage eaten, especially the black grama, shows that the ratio of the protein to the fats* and carbohydrates is a trifle wider than 1:11, which for wintering beef cows with calf is not far from the theoretical ratio recommended in

*In computing the nutritive ratio, the fats are multiplied by 2.25.

the feeding standards. The above tables indicate that possibly the narrowing of the cake ration beyond that of the corn, also probably improving the quality of the protein for supplementing the grass, and the higher phosphorus content of the cottonseed cake, had a beneficial effect. It is not the purpose of this bulletin to discuss the importance of the minerals, other than to state that phosphorus and calcium were deficient, as shown by analyses (Table III), in the range grasses where these trials were run.

When it is necessary that more than one pound of a concentrate be fed to a cow, or more than one-half pound to a weaned calf, probably the additional concentrate could be corn without materially lessening the benefits that would be produced by feeding all cake. Bulletin No. 185 of this Station states that approximately one pound of cake for cows and one-half pound for weaned calves gave the greatest efficiency when compared with heavier feeding of cake, on the range.

By months the cattle gained or lost as the weather affected them, or as the quality of the forage, and possibly the amount of forage eaten, varied.

RANGE AND MANNER OF FEEDING.

The cows and yearlings had the run of an approximately 2,600-acre pasture. In the afternoon they were brought in, divided into their respective lots, and fed in troughs. Each day a record was made of animals that failed to eat.

The range was a mixed grass pasture consisting almost entirely of black grama grass (*Bouteloua eriopoda*), dropseed grasses (*Sporobolus* spp.), needle grass (*Aristida* spp.), and burro grass (*Scleropogon brevifolius*); and sections of the pasture had a good stand of palmilla (*Yucca elata*), sometimes called soapweed.

FORAGE ANALYSIS TABLE*

Table III shows what percentages of the different nutrients, together with ash, fiber, and in a few analyses, calcium and phosphorus, the different forage plants had, and how the percentages varied during the experiment.

MARKING.

Each animal was branded with an individul number and paint branded for lot only. The paint marking aided materially in the identification of the lots.

WEIGHING.

Weights were taken individually every twenty-eight days. Only one day's weights were taken at the beginning and at the end of the experiment.

*Analyses of the forage were made by W. E. Watkins, Nutrition Chemist.

TABLE III.—ANALYSES OF RANGE GRASSES AND PALMILLA COLLECTED DURING THE EXPERIMENT.

Sample letter	Species	Date collected	Moisture	Ash	Protein	Ether extract	Crude fiber	Nitrogen-free extract	Calcium	Phosphorus	Ash	Protein	Ether extract	Crude fiber	Nitrogen-free extract	Calcium	Phosphorus
			Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per cent	Per, cent
			As eaten by the cattle on the range								On a moisture-free basis						
A	Palmilla (**Yucca elata**), dry leaves	Jan. 1, 1930	12.28	5.45	3.778	3.586	37.451	37.455			6.21	4.307	4.088	42.694	42.701		
B	Black grama grass (**Bouteloua eriopoda**)	"	29.68	5.41	3.353	1.018	24.966	35.573	.203	.0469	7.69	4.768	1.448	35.591	50.591	.289	.0667
C	Dropseed grass (**Sporobolus flexuosus**)	"	16.68	3.86	3.182	.583	34.812	40.883			4.63	3.819	.700	41.781	49.070		
D	Needle grass (**Aristida sp.**)	"	16.34	5.82	3.670	.857	32.478	40.835	.229	.0845	6.96	4.387	1.024	38.821	48.808	.274	.1010
E	Tobosa grass (**Hilaria mutica**)	"	16.41	7.72	3.804	.623	34.367	37.076			9.24	4.551	.745	41.114	44.350		
F	Dropseed grass (**Sporobolus flexuosus**)	Feb. 11, 1930	8.50	3.17	1.902	.584	44.185	41.659			3.46	2.079	.638	48.290	45.533		
G	Tobosa grass (**Hilaria mutica**)	"	10.98	7.18	3.374	.566	36.157	41.743			8.07	3.790	.636	40.617	46.887		
H	Needle grass (**Aristida sp.**)	"	14.89	6.97	3.319	1.045	30.938	42.838			8.19	3.900	1.228	36.351	50.331		
I	Palmilla (**Yucca elata**), dry leaves	"	19.89	4.29	6.899	3.849	24.600	40.472			5.36	8.61	4.805	30.708	50.515		
J	Black grama grass (**Bouteloua eriopoda**)	"	24.13	5.80	3.007	.820	27.375	38.868	.167	.0841	7.64	3.963	1.081	36.081	51.235	.220	.1108
K	Dropseed grass (**Sporobolus flexuosus**)	Mar. 6, 1930	12.96	4.41	3.300	.548	37.562	41.220	.158	.0707	5.07	3.791	.630	43.155	47.354	.182	.0812
L	Needle grass (**Aristida sp.**)	"	31.01	5.23	2.567	.767	24.297	36.129			7.58	3.721	1.112	35.218	52.369		
M	Palmilla (**Yucca elata**), dry leaves	"	7.40	4.23	4.207	2.636	37.511	44.016			4.57	4.543	2.847	40.509	47.531		
N	Palmilla (**Yucca elata**), green leaves	"	40.99	2.44	5.309	2.021	20.270	28.970	.434	.1911	4.13	8.997	3.425	35.350	49.098	.7355	.3238
O	Tobosa grass (**Hilaria mutica**)	"	11.96	12.09	2.976	.700	34.626	38.548			13.73	2.558	.795	39.330	43.787		
P	Black grama grass (**Bouteloua eriopoda**)	Mar. 31, 1930	27.87	4.10	3.598	.881	26.492	37.059	.153	.0747	5.68	4.988	1.221	36.728	51.383	.212	.1036
Q	Tobosa grass (**Hilaria mutica**)	"	18.76	8.61	2.965	.835	30.716	38.114			10.60	3.650	1.038	36.809	46.913		
R	Palmilla (**Yucca elata**), green leaves	"	55.82	1.92	4.905	2.181	14.748	20.426			4.35	11.102	4.937	33.382	46.229		
S	Needle grass (**Aristida sp.**)	"	6.42	5.92	4.515	1.074	35.859	46.212			6.33	4.825	1.148	38.319	49.378		
T	Dropseed grass (**Sporobolus flexuosus**)	"	6.88	3.68	3.194	.691	39.150	46.405			3.95	3.430	.742	42.043	49.835		
	Tobosa grass, special sample of old dead grass	Aug. 8, 1928	4.12	8.81	2.330	.860	39.400	44.580			9.19	2.430	.897	41.093	46.390		

SUMMARY.

1. Cottonseed cake showed an advantage over ground yellow corn in each trial, the advantage, as expressed by the difference in weight, being as great or greater with cows as with weaned calves.

2. Cottonseed cake was more palatable for supplemental feeding than was ground corn.

3. When the cattle are fed in groups, cottonseed cake lends itself better than ground corn to fairly uniform individual consumption.