actually consumed 22 mgs. and the copper-cobalt lot 24 mgs. due to variation in salt consumption.

Cobalt sulfate was mixed with the salt to supply about one half the requirement, 0.3 mg. per steer daily, the cobalt lot actually consumed 0.38 mg., and the copper-cobalt lot 0.3 mg. per steer daily. It was planned to supply chlortetracycline at the rate of 70 mgs. per steer daily; they received 80 mgs.

Observations

Neither copper, cobalt nor the combination of copper and cobalt produced a significant difference in gain compared with the control lot. The group fed copper gained significantly more than those fed copper and cobalt. Aureomycin increased steer gains 0.16 pound per steer daily over the control lot, which was significant at the 5 percent level.

The Value of Chlortetracycline[1] for Steers on Winter Bluestem Pasture, 1961 (Project 5-663).

E. F. Smith and B. A. Koch[2]

Forty Hereford steers were divided into two groups of 20 each on the basis of weight. Each group was pastured in a 160-acre bluestem pasture on the Pringle Ranch near Rose, Kansas. Both groups were fed protein blocks and chlortetracycline was included in the blocks for one group, to supply about 70 mgs. per steer daily. The blocks were composed primarily of soybean meal with 10% salt to limit intake. They were kept before the animals continuously during the first half of the trial but during the latter half were rationed to keep consumption of both groups at about the same level.

As shown in Table 14, the steers receiving chlortetracycline gained significantly more than the control group. The protein blocks were readily consumed and those containing chlortetracycline seemed to be the more palatable.

Table 14

The value of chlortetracycline for steers on winter bluestem pasture. January 27 to April 7, 1961—70 days.

	Control	Chlortetracycline[1]
Number of steers	20	20
Initial weight, lbs.	493	493
Daily gain	0.07	0.36*
Daily feed consumption:		
Protein blocks[2]	2.36	2.48
Winter bluestem pasture	160 acres	160 acres

* Significantly higher at the 5% level.

1. Aureomycin supplied by American Cyanamid Co., Pearl River, N.Y.
2. Protein blocks supplied by Harvest Brand, Inc., Pittsburg, Kansas.

1. Chlortetracycline (Aureomycin) was supplied by the American Cyanamid Co., Pearl River, N.Y.

2. Pringle Ranch, Rose, Kansas; P. R. Zimmer, American Cyanamid Co., Pearl River, N.Y.; and M. A. Hoelscher, Harvest Brand, Inc., Pittsburg, Kansas, were cooperators in the experiment.

The Value of Diethylstilbestrol Implants[1] and Aureomycin[2] for Steer Calves on a Wintering, Grazing, and Fattening Program, 1959-60 (Project 253-6).

E. F. Smith, B. A. Koch, F. W. Boren, and C. L. Drake

This is the third trial in a series designed to study the use of stilbestrol implants combined with aureomycin for steers on growing and fattening rations. The others are reported in circulars 371 and 378 from this station.

The good-to-choice Hereford steer calves used in this test came from near Fort Davis, Texas, and were assigned to treatment on a random-weight basis.

The animals under all treatments received the same basic ration.

The experimental treatment was as follows:

Lot 19. Control group of steer calves implanted with 24 mgs. of stilbestrol August 10, 1960.

Lot 21. Ten steer calves implanted with 24 mgs. of stilbestrol May 10, 1960.

Lot 20. Twelve steer calves, all implanted with 24 mgs. of stilbestrol December 1, 1959; four reimplanted with 24 mgs. of stilbestrol May 10, 1960, and four others reimplanted August 10, 1960, leaving only four with the original fall implant. See Table 16 for gains of different implant groups.

Lot 22. Twelve steer calves received the same treatment as lot 20 plus 70 mgs. of aureomycin per head daily.

Observations

Results of this test are reported in Tables 15 and 16.

In Table 15, a 24-mg. stilbestrol implant increased steer gain 0.12 pound per steer daily for the winter period (compare the average gain of lots 19 and 21 with that of lot 20 which received the implant). Aureomycin fed in lot 22 increased gain 0.25 pound per head daily compared with lot 20 and also increased feed efficiency. A 24-mg. implant administered May 10 to steers in lot 21 increased pasture gain 0.25 pound as compared with nonimplanted steers in lot 19. However, aureomycin fed with salt in lot 22 reduced summer gain 0.25 pound per steer daily.

During the fattening period beginning in August, steers implanted in May gained at about the same rate as those implanted in August. However, steers implanted in August were slightly more efficient. Aureomycin fed to lot 22 during this period increased gains over lot 20 by 0.34 pound per steer daily.

In summary of the three phases, wintering, grazing, and fattening, the steers implanted in August gained about the same as those implanted in May. Their carcasses graded slightly higher but their dressing percentage tended to be lower. Aureomycin increased steer gains in lot 22 0.16 pound over the steers in lot 20 and also improved dressing percentages and carcass grades slightly.

From the results shown in Table 16, it appears desirable to reimplant fall-implanted steers when they are placed on a fattening ration in August rather than to implant only in the fall or in the fall and spring.

1. The diethylstilbestrol implants were supplied by Chas. Pfizer and Co., Inc., Terre Haute, Ind.

2. The aureomycin (chlortetracycline) was supplied by the American Cyanamid Company, Pearl River, N.Y.

Table 15

The value of diethylstilbestrol implants and aureomycin for steer calves on a wintering, grazing, and fattening program.

Wintering, December 1, 1959, to May 10, 1960—162 days.

Lot number	19	21	20	22
Treatment	Control—Stilbestrol implant Aug. 10, 1960	Stilbestrol implant May 10, 1960	Stilbestrol implant Dec. 1, 1959[1]	Stilbestrol implant Dec. 1, 1959[1] and Aureomycin
Number steers	10	10	12	12
Initial wt. per steer	520	520	524	523
Daily gain per steer, lbs.	1.44	1.38	1.53	1.78
Standard error of mean	0.06	0.07	0.06	0.07
Daily ration per steer, lbs.:				
Sorghum grain	4.97	4.97	4.97	4.97
Soybean meal	.99	.99	.99	.99
Sorghum silage	29.83	29.83	31.17	33.31
Salt	.08	.08	.14	.12
Bonemeal	.02	.02	.03	.02
Stilbestrol implants, 24 mgs.[1]	No	No	Yes	Yes
Aureomycin, 70 mgs. per head daily				Yes
Feed per cwt. gain, lbs.:				
Sorghum grain	345	359	325	279
Soybean meal	69	72	65	56
Sorghum silage	2074	2157	2036	1866
Feed costs per cwt. gain[2]	$19.31	$20.10	$18.66	$16.57
Phase II—Grazing, May 11 to August 2, 1960—83 days.				
Initial wt. per steer	753	744	772	812
Daily gain per steer, lb.	.63	.88	.78	.53
Standard error of mean	0.12	0.09	0.10	0.07
Stilbestrol implants, 24 mgs.	No	Yes	See Footnote No. 1	
Aureomycin, 70 mgs. per steer daily	No	No	No	Yes
Phase III—Fattening, August 2, 1960, to November 12, 1960—102 days.				
Initial wt. per steer	805	817	837	856
Daily gain per steer, lbs.	2.66	2.60	2.37	2.71
Standard error of mean	0.10	0.20	0.13	0.14
Daily ration per steer, lbs.:				
Ground corn, self-fed	13.42	14.27	14.08	15.43
Soybean meal	1.51	1.51	1.51	1.51
Ground limestone	.07	.07	.07	.07
Salt	.05	.06	.03	.05
Prairie hay	6.29	6.32	6.41	6.45
Alfalfa hay	2.05	1.56	2.04	2.04
Stilbestrol implants, 24 mgs.	Yes	Implanted May 10	See Footnote No. 1	
Aureomycin, 70 mgs. per head daily	No	No	No	Yes
Feed per cwt. gain:				
Ground corn	505	549	593	570
Soybean meal	57	58	64	56
Prairie hay	237	243	270	239
Alfalfa hay	77	60	86	76
Feed costs per cwt. gain[2]	$15.57	$16.51	$18.06	$16.95

1. All steers in lots 20 and 22 were implanted with 24 mgs. of diethylstilbestrol December 1, 1959; four from each lot were reimplanted May 10, 1960, with 24 mgs. and four other animals from each lot were reimplanted August 10, 1960. See Table 16 for gains by phases of each implanted group.

2. Feed prices may be found on inside back cover.

Table 15 (Continued)

Summary of Phases I, II, and III, December 1, 1959, to November 12, 1960—347 days.

Final wt. per steer	1076	1082	1079	1132
Daily gain per steer, all phases	1.60	1.62	1.60	1.76
Standard error of mean	0.03	0.07	0.05	0.05
Feed cost per steer	$ 102.08	$ 103.67	$ 105.79	$ 109.77
Feed cost per cwt. gain	$ 18.36	$ 18.45	$ 19.06	$ 18.02
Sale price per cwt., live wt., based on carcass value[3]	$ 21.94	$ 20.46	$ 21.60	$ 23.18
Return or loss per steer above feed cost and initial steer cost at 35¢ per lb.	$ — 46.70	$ — 54.09	$ — 56.82	$ — 42.81
Dressing %	61.73	59.58	60.95	61.92
Av. carcass grade, USDA[4]	16.10	17.00	15.75	16.50
Av. marbling score[5]	8.00	7.50	8.17	7.75

3. Sale price per cwt. was based on the following carcass values per cwt.: Choice, $39.50; good, $37; standard, $35.

4. The USDA grade, high standard, was assigned a numerical grade of 15; low good, 16; average good, 17.

5. Degree of marbling: a score of 7 indicates small amount; 8 indicates slight amount, and 9 indicates traces only. The higher the score, the less marbling.

Table 16

The effect of implanting steers with diethylstilbestrol at different times during a wintering, grazing, and fattening program.

	Number of steers per treatment	Winter gain, lbs., Dec. '59 to May '60, 162 days	Summer gain, lbs., May '60 to Aug. '60, 83 days	Fattening gain, lbs., Aug. '60 to Nov. '60, 102 days	Total gain, lbs., Dec. '59 to Nov. '60, 347 days	Average carcass grade[2]
Implanted in December, 1959, with 24 mgs.	8[1]	275	53	235	563	16.25
Implanted in December, 1959, and May, 1960, with 24 mgs. each time	8[1]	252	68	245	565	16.25
Implanted in December, 1959, and August, 1960, with 24 mgs. each time	8[1]	278	42	298	618	15.87

1. Half of the steers in each implant group were from lot 20 and half from lot 22 from Table 15.

2. The USDA grade high standard was assigned a numerical score of 15, low good, 16.

Improvement of Beef Cattle Through Breeding Methods (Project 286).

W. H. Smith and J. D. Wheat

The purebred Shorthorn cattle breeding project was continued during 1960 according to the breeding program adopted when the study was initiated in 1949. Two inbred lines were established and have been continued. The Wernacre Premier line is now in the fourth generation of inbreeding and the Mercury line, in the third generation. The bulls, Wernacre's Premier and Gregg Farm's Hoarfrost, were used as foundation sires to establish these two lines, respectively.

This experiment was initiated to study the inheritance of production traits in beef cattle, to evaluate the effects of inbreeding in cattle, and to explore the feasibility of using inbred lines of beef cattle for the breeding improvement of their production traits. No extensive line crossing has been attempted to date because of the limited number of breeding