6. It required 7 to 9 days for the control group to regain original average weight, whereas, the tranquilized group required 12 to 15 days to return to original weight.

The Effects of Shade and Hormone Implant on Fattening Yearling Heifers, 1959; and a Three-year Summary, 1957-1958-1959.

F. W. Boren, E. F. Smith, B. A. Koch, D. Richardson, and S. Wearden

This is the third year of an experiment designed to study the value of shade for beef cattle under Kansas conditions. The experiment was designed also to study the effects of Synovex heifer implant (20 mgs. estradiol benzoate and 100 mgs. of testosterone) on the performance of heifers in drylot with and without shade. One lot of heifers having no shade was implanted with Rapigain Implant Paste (20 mgs. estradiol, 60 mgs. testosterone, and 60 mgs. progesterone). Synovex and Rapigain implants were furnished by Squibb and Sons. Two previous tests are reported in Circulars 358 and 371.

Experimental Procedure

Fifty head of Hereford heifers averaging 607 pounds per head were used in 1959. They were placed in five lots, 10 head per lot, on the basis of live weight and previous treatment.

The heifers were on test from May 14, 1959, to October 1, 1959 (140 days). At the beginning of the experiment the heifers were consuming 8 pounds of sorghum grain, 1 pound of soybean meal, and 5 pounds of alfalfa per head daily. They were rapidly brought to a daily ration composed of all the sorghum grain they would consume, 1 pound of soybean meal, and 5 pounds of alfalfa hay. At the termination of the test, the heifers were sold on the central market at St. Joseph, Mo.

The shade structures used were the same as described in Circular 371, page 36.

One lot of heifers having access to shade, and one lot of heifers having no shade, were implanted at the beginning of the feeding trial with one Synovex hormone implant as described above. One lot having no shade was implanted at the beginning of the experiment with Rapigain Paste implant.

Results and Observations

Table 29 shows the results of this experiment.

1. Shade improved the average daily gain of nonimplanted heifers 0.23 pound more per head daily than those without shade; however, shade improved the average daily gain of implanted heifers only 0.04 pound per head daily. This is the reverse of 1958 when greatest response to shade (0.12 pound per day) was with the implanted heifers.
2. Synovex heifer implant increased average daily gain of the heifers without shade 0.15 pound per head daily; however, there was no increase in average daily gain of implanted heifers with shade.
3. The combined effects of shade and Synovex heifer implant resulted in a 0.19-pound increase in average daily gain.
4. Heifers with shade and not implanted were the most efficient in feed utilization. They required about 100 pounds less total feed per cwt. gain than the nonimplanted heifers without shade.
5. Synovex heifer implant improved feed efficiency in the no-shade lot, but the reverse occurred in the shaded, implanted lot, the shaded nonimplanted heifers requiring less feed per cwt. gain.
6. Shade did not increase the feed efficiency of implanted heifers.
7. The feed cost per cwt. gain followed the same trend as the feed required per cwt. gain. The shaded, nonimplanted heifers made least cost per cwt. gain. Shade and implant heifers produced 100 pounds of gain for about $1 per cwt. less than the nonimplanted heifers without shade.
8. The selling price per cwt. was the same for all lots.
9. The heifers in lot 3 had an average carcass grade of low good; whereas, average carcass grade of the other lots was average good. The increase in carcass grade of lot 4 over 3 indicates that shade compensated for the decrease in grade due to the implant.

10. In lots 3, 4, and 5 the average square inches of ribeye was greater, apparently because these heifers were implanted and also were heavier at market time.
11. There was no difference in average fat thickness at the 12th rib among various lots.

Three-year Summary, 1957-1959

Table 30 presents a three-year summary of the effects of shade and hormone implant on fattening yearling heifers. In each of the three years the test was conducted 140 days during June, July, August, September, and October.

Results and Discussion

1. Shade, irrespective of implant, produced an increase in average daily gain that was significant ($p<0.05$).
2. The increased total gain per head due to shade was 17.4 pounds.
3. Implant, irrespective of shade, produced a significant ($p<0.05$) increase in average daily gain. This increased average daily gain resulted in the implanted heifers being 25.5 pounds heavier at market time.
4. Both shade and implant were responsible for more efficiency of production, requiring less feed per cwt. gain.
5. Carcass grades of implanted heifers were significantly lower ($p<0.05$) than nonimplanted heifers; however, not enough to cause a price difference, since the carcass grade difference was between average and high good (within grade) and not between high good and low choice (between grade).
6. Shade had no influence on carcass grade.
7. Implant and/or shade had no influence on the average fat thickness at the 12th rib.
8. Shade did not significantly affect size of ribeye; however, implant heifers had a highly significant ($p<0.01$) greater area of ribeye muscle at the 12th rib.
9. If cattle of the grade produced in this study sell for $25 per cwt., the shade would result in a $4.35 per head increase in returns over nonshaded cattle. Using this same liveweight price, $25 per cwt., the implant would result in a $6.37 per head increase in returns over nonimplanted cattle. The combined increase in returns due to shade and implant would be $10.72 per head.
10. The between-year difference in average daily gains of the shaded and/or implanted heifers was highly significant. It is difficult to explain why there was a year-to-year difference in the implanted cattle. The difference in average daily gain between years due to shade was apparently due to the great difference in the severity of the summer heat during the test period. If heat is severe, there could be a marked advantage in providing shade for feedlot cattle; however, if the summer is mild, the advantage of shade would be slight.

Table 29

The effect of shade and hormone implant[1] on fattening yearling heifers. May 14, 1959, to October 1, 1959—140 days.

Lot number	1	2	3	4	5
Number heifers per lot	10	10	10	10	10
Management	No shade	Shade	No shade implant[1]	Shade implant[1]	No shade implant[2]
Av. initial wt. per heifer, lbs.	606	608	605	607	608
Av. final wt. per heifer, lbs.	863	898	883	891	867
Av. gain per heifer, lbs.	257	290	278	284	259

1. Synovex heifer implant—20 mgs. estradiol benzoate and 100 mgs. testosterone. Squibb & Sons.
2. Rapigain Implant Paste—20 mgs. estradiol, 60 mgs. testosterone, and 60 mgs. progesterone. Squibb & Sons.

Table 29 (Continued)

Av. daily gain per heifer, lbs.	1.84	2.07	1.99	2.03	1.85
Av. daily ration per heifer, lbs.:					
Ground sorghum grain	13.9	14.3	10.4	14.6	14.0
Soybean oil meal	1.0	1.0	1.0	1.0	1.0
Alfalfa hay	5.0	5.0	5.0	5.0	5.0
Lbs. feed per cwt. gain:					
Ground sorghum grain	758	689	705	719	754
Soybean oil meal	54	48	50	49	54
Alfalfa hay	272	241	252	246	270
Total feed per cwt. gain	1084	978	1007	1014	1078
Feed cost per cwt. gain[3]	$17.85	$16.13	$16.57	$16.75	$17.76
Selling price per cwt. at market	$25.25	$25.25	$25.25	$25.25	$25.25
Carcass data					
Carcass grades, USDA:					
High choice	1	1			
Av. choice	1	1	1	1	1
Low choice	1	1	1	1	
High good	1	1	2	1	
Av. good	4	3			7
Low good	3	3	6	7	2
Av. carcass grade[4]	17.7	17.4	16.2	17.1	17.1

3. Prices of feed per cwt. are listed on inside back cover.

4. Av. choice, 20; low choice, 19; high good, 18; av. good, 17; low good, 16.

Table 30

The effects of shade and hormone[1] implant on fattening yearling heifers; three-year summary, 1957-1959—140-day fattening period.

Lot number	1	2	3	4
Number heifers per lot	25	25	25	25
Management	No shade	Shade	No shade implant	Shade implant
Total gain per heifer, lbs.	260.2	281.4	289.0	303.6
Av. daily gain per heifer, lbs.	1.86	2.01	2.06	2.17
Lbs. feed per cwt. gain:				
Ground sorghum grain	734	715	669	667
Soybean oil meal	53	49	47	45
Alfalfa hay	270	251	242	233
Total feed required per cwt. gain	1057	1015	958	945
Carcass data:				
Av. USDA carcass grade[2]	17.52	18.08	17.48	17.08
Av. fat thickness at 12th rib	0.57	0.60	0.62	0.62
Av. size of ribeye muscle, sq. in.	10.01	10.24	10.62	10.72

1. Synovex implant—20 mgs. estradiol benzoate, 100 mgs. testosterone. Squibb & Sons.

2. Low choice, 19; high good, 18; av. good, 17; low good, 16.

Tranquilizers in Fattening Rations of Individually-fed Steers (with and without Added Diethylstilbestrol). Project 597.*

M. M. McCartor, B. A. Koch, D. Richardson, and E. F. Smith

A preliminary report of this tranquilizer study and a description of the cattle used appeared on page 34 of Kansas Circular 371, May 2, 1959. That report was based on the first 49 days of the study.

Experimental Procedure

Twenty-four steer calves weighing approximately 500 pounds each were randomly allotted into six treatment groups of four each. Animals were individually fed twice daily. The daily ration consisted of cracked corn, soybean oil meal, and chopped alfalfa hay. During the part of the day when they were not eating, the calves were penned in two groups of 12 each. One month was allowed to train the calves and accustom them to being tied twice daily for individual feeding. During the study each steer spent two different periods of time in a digestion stall for urine and fecal sample collections.

Animals were placed on their respective treatments February 3, 1959. The various additives were carried in the soybean oil meal. Treatment groups were as follows:

1. Control
2. 10 mgs. diethylstilbestrol[1]
3. 10 mgs. diethylstilbestrol plus trifluomeprazine[2]
4. 10 mgs. diethylstilbestrol plus Tran-Q[3]
5. 5.0 mgs. trifluomeprazine
6. 2.5 mgs. Tran-Q

The first digestion trial was started April 1 when six calves, one from each treatment group, were placed in digestion stalls. Over an eight-week period each calf spent two weeks in a digestion stall. After a one-week preliminary period to allow the calves to become accustomed to stalls, a complete collection of urine and feces was made over a seven-day period. A second collection period similar to the first was started September 22, 1959.

Representative samples of all feed, feces, and urine collections are currently being analyzed in the nutrition laboratory of the Department of Animal Husbandry.

Observations

Since confinement to the digestion stalls had a varied effect on the steers, the gain and feed data presented in Tables 31 and 32 cover only the 94 days between collection periods.

Data on only two steers are presented for group six receiving 2.5 mgs, of Tran-Q daily in addition to the basic ration. One of the steers was disposed of because of a broken leg, data on the second steer was eliminated because the animal suffered from severe arthritis, and performed very poorly.

Steers adjusted rather easily to the twice-per-day individual feeding regime.

Differences between treatment groups were small in all cases.

Steers receiving diethylstilbestrol plus Tran-Q showed the highest average daily gain and also gained most efficiently.

None of the additives had any significant effect on carcass grade.

Results of the digestion phase of the study are not yet completed.

*Partially supported by a grant from Chas. Pfizer & Co., Terre Haute, Ind.

1. Stilbosol furnished by Eli Lilly & Co., Indianapolis, Ind.

2. Trifluomeprazine furnished by Smith, Kline, & French Labs., Philadelphia, Pa.

3. Tran-Q (hydroxyzine) furnished by Chas. Pfizer & Co., Inc., Terre Haute, Ind.

Table 31

Tranquilizers in the fattening ration of individually-fed steers (with and without added diethylstilbestrol). Project 597.

Treatment	Control	Stil.	Stil. + T.F.M.	Stil. + T.Q.	T.F.M.	T.Q.[2]
Number steers per lot	4	4	4	4	4	2
Av. initial wt. per steer, lbs.	712.5	738.7	782.5	715.0	745.0	717.5
Av. final wt. per steer, lbs.	925.0	942.5	998.7	936.2	953.7	905.0
Av. total gain per steer, lbs.	212.5	203.8	216.2	221.2	208.7	187.5
Av. daily gain per steer, lbs.	2.26	2.16	2.30	2.36	2.22	1.99
Daily ration per steer, lbs.:						
Cracked corn	11.87	12.04	13.01	11.90	12.19	12.74
Soybean oil meal	.99	.95	1.01	1.02	.96	.95
Alfalfa hay (chopped)	2.81	2.85	3.35	3.21	3.34	3.42
Tran-Q, mgs.[1]				2.5		2.5
T.F.M.			5.0		5.0	
Stilbestrol, mgs.		10.0	10.0	10.0		
Feed per cwt. gain, lbs.:						
Cracked corn	541.8	573.2	583.6	521.8	566.7	659.2
Soybean oil meal	45.4	45.4	45.3	44.9	44.7	49.3
Chopped alfalfa hay	128.3	135.7	150.5	140.7	155.0	177.3
Feed cost per cwt. gain[3]	$15.04	$15.70	$16.14	$14.66	$15.78	$15.22
Carcass grades, USDA:						
High choice	1	1	1	1		
Av. choice	1		1		1	
Low choice		2		1	3	
High good	2		1	1		1
Av. good			1	1		1
Low good		1				
Av. USDA grade[4]	13.2	12.8	13.0	12.8	13.2	11.5

1. The above table presents only data from the 94-day period between collection periods.

2. Two steers from this group were removed: one because of a broken leg, the other because of a severe case of arthritis which adversely affected his performance.

3. Not including tranquilizer cost or mixing cost.

4. Average grade determined as follows: High choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10.

Table 32

Steers grouped according to over-all treatment (diethylstilbestrol vs. control) and (tranquilizer vs. control).

Treatment	Stilbestrol	No stilbestrol	T.F.M.	Tran-Q	No tranquilizer
Number steers per treatment	12	10	8	6	8
Av. initial wt., lbs.	745.4	724.5	763.7	716.2	725.6
Av. final wt., lbs.	959.1	927.9	976.2	920.6	933.7
Av. total gain, lbs.	213.7	203.4	212.5	204.4	208.1
Av. daily gain, lbs.	2.27	2.15	2.26	2.17	2.21
Carcass grades, USDA:					
High choice	3	1	1	1	2
Av. choice	1	2	2		1
Low choice	3	3	3	1	2
High good	2	3	1	2	2
Av. good	2	1	1	2	
Low good	1				1
Av. USDA grade[1]	12.8	12.9	13.1	12.3	13.0

1. Average grade determined as follows: High choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10.

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 1959 and thus far in 1960 according to the plans and breeding programs initiated in 1949. The only deviation encountered to date in the project occurred during 1957 when a bull representing the Wernacre Premier line was not available for breeding use in the experimental herd. All females were bred to Mercury Line bulls that year and a number of line-cross calves were produced in 1958. Wernacre Premier line bulls have been used during 1958 and 1959 so that line may be continued according to project plans. The Wernacre Premier line has reached the fourth generation of inbreeding, while the Mercury line is in the third generation of inbreeding.

This experiment was initiated to study the inheritance of beef cattle production traits and to evaluate the effects of inbreeding on the same. To date, no abnormalities, which could be attributed to inbreeding, have occurred in either of the inbred lines. Preliminary analyses of the data obtained on the study indicate that inbreeding has lowered the weaning weights of the calves; however, this breeding plan has had no apparent effects on rate of gain or efficiency of feed utilization on the calves so produced.

Extensive line-crossing has not been attempted to date because of the limited number of breeding animals in the project and the relatively low levels of inbreeding which still exist in the breeding herd. More extensive line-crossing will be initiated at some time in the future to evaluate the feasibility of using inbred lines of beef cattle for the breeding improvement of production traits.

The weight of each cow and the weight of each calf are taken at the time of calving. Summer pasture breeding is practiced and the calves are born in the spring of each year. The calves are not creep fed during the suckling period. Calves are weaned, weighed, and scored for type when approximately 6 months old. After a short preliminary adjustment period, they are placed on individual feeding trials or record-of-performance tests for a 182-day period. Weight gain and feed consumption records are maintained on each calf.

The full-feed ration for the bulls consists of 75% cracked corn and 25% chopped alfalfa hay; that for the heifers, 55% cracked corn and 45% chopped alfalfa hay.

Production data for the 1958 calves are summarized in Table 33.