Indications also showed that breeding stock should be tested and selected for performance under the conditions that its progeny are expected to be grown. If a confinement system of producing hogs is to be used, breeding stock should be grown and selected for performance under confinement conditions. More information is needed and additional experiments are being conducted to gain more information on this subject.

Summary

Sows raising litters on pasture weaned heavier pigs and heavier litters at 56 days than those raising litters on concrete floors in confinement. This difference was greatly reduced if adequate anemia preventative treatment by iron-dextran injections were used for the confinement pigs.

After weaning, confinement fed pigs gained faster and more efficiently, although there was a tendency for them to be slightly fatter and not as straight and sound on their feet and legs as the pasture fed pigs.

The best combination system in this experiment was the pasture-confinement system in which the litters were raised by their dams on pasture from 6 days of age until weaning at 56 days of age. Then the pigs were moved to confinement lots for feeding to a market weight of 210 pounds. Pigs on this pasture-confinement system gained 1.62 pounds per day with a feed requirement per pound of gain of 3.29 pounds. The poorest system was the confinement-pasture system in which the pigs gained 1.32 pounds per day and required 3.55 pounds of feed per pound of gain.

The Influence of Sire Upon Some Carcass Characteristics of Angus Steers and Heifers

Nat M. Kieffer, R. L. Henrickson, Doyle Chambers, and D. F. Stephens*

The variation in slaughter cattle prices is probably the most important factor influencing the success of the beef cattle producer. These prices fluctuate widely with the over-all supply of and demand for beef. Costs of production affect only indirectly the prices paid. On any given market, prices vary widely for cattle of different market classes and grades. The estimated yields and grades are used by the buyers and sellers in price negotiation.

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In a sound breeding program it would seem obvious that one should select breeding stock not only for factors leading to improved efficiency of production, but also for improved carcass merit. Because one cannot get direct carcass appraisals on prospective breeding animals, he must predict their genetic worth either by indirect appraisals or he must obtain his estimate from the carcasses of their relatives—half brothers or sisters, or in the case of bulls, from their progeny.

The dressing percentage of a beef animal is important because this determines how much each pound of the carcass cost. The grade is important because it is related to the price per pound which the distributor will be able to obtain for that carcass. It is assumed that grade reflects consumer preference.

Recent studies have shown that two of the characteristics most desired by large numbers of beef purchasers include leanness and tenderness. Considerable research to determine factors affecting carcass merit and to devise methods for predicting differences which may occur among animals is now in progress.

Experimental Animals

In the spring of 1956 a progeny testing program for Angus bulls produced in Line 1 at the Fort Reno Livestock Experiment Station was initiated in cooperation with the Federal Reformatory at El Reno. Approximately 175 high grade or purebred Angus cows were sorted into seven breeding groups each of which contained cows of the same average age and weight.

Seven bulls were selected for breeding use. Two of the bulls (114 and 264) were from the Fort Reno station. Two of the bulls (5 and 17) were related to these bulls, although not closely, and the other three bulls (2, 7, and 15) were unrelated to the above bulls and to each other.

The calves by the above sires were dropped during February, March, April, and May of 1957. They were allowed to run to creep-feed while they were nursing their dams until weaned in early October. At that time 45 steer calves and 15 heifer calves were selected for post-weaning feed-lot performance tests and for carcass studies. Steer calves were sired by each of the seven sires, but the heifers were by only three of them. The number of calves and the pre-weaning and post-weaning performance for the sire groups are presented in Table 1.

The heaviest calves were sired by Bull 264 and had an average adjusted 210-day weight of 504 pounds. The lightest calves were sired by Bull 15 and they had an adjusted 210-day weight of only 440 pounds.

The highest grading calves at weaning time were sired by Bulls 114 and 17. These calves graded average choice. The poorest grading calves were sired by Bull 5. They graded high good.

TABLE 1. Preweaning and postweaning performance of calves by seven Angus bulls.

Sire	No.	Adj. Wt. 210 days	Ave. Grade	Feed Lot Data					Carcass		
				Sex	No.	A.D.G.	Sl.Wt.	Sl.Age.	Wt.	Yield	Grade
114	23	482	11.2	F	5	1.98	813	404	491	60.4	10.0
				M	7	2.21	920	403	563	61.2	10.0
264	19	504	10.4	F	4	2.16	906	395	562	62.2	11.0
				M	10	2.38	970	392	593	61.4	11.2
5	17	448	9.1	F	6	2.13	787	366	477	60.7	9.5
				M	4	2.46	919	379	560	60.9	10.2
17	15	452	11.0	M	6	2.32	885	362	529	59.8	9.2
2	13	460	10.6	M	6	2.10	865	396	532	61.5	9.8
7	16	460	10.5	M	6	2.30	839	358	514	61.2	9.6
15	15	440	10.5	M	6	1.89	815	398	490	60.2	9.7

[1]Grades: High choice=12.0; Ave. Choice=11.0; Low choice=10.0; High good=9.0

The calves selected for the post-weaning feeding test and carcass studies were representative of each sire group. However, an effort was made to select calves as near the same average age as possible. They were self-fed for 159 days in sire groups of four to six calves per lot according to sex of calf. A complete mixed ration which contained the following was fed: 350 pounds ground whole ear corn; 200 pounds cottonseed hulls; 100 pounds chopped alfalfa hay; 100 pounds whole oats; 100 pounds wheat bran; 100 pounds cottonseed oil meal; and 50 pounds blackstrap molasses.

At the completion of the test, the final weights were obtained after a shrink of approximately 20 hours. Average daily gains and dressing percentages were computed from this weight. The most rapid gains were made by the calves by Sires 264, 5, 17 and 7 with these groups gaining about 2.3 pounds per day. The slowest gaining sire group was by Bull 15 and these calves gained only 1.9 pounds per day.

Carcass Studies

At the end of the 159-day feeding period, all of the calves were trucked from Fort Reno to Oklahoma City and sold to Armour and Company. The average age of the entire group of calves was 386 days, and the average shrunk weight obtained at Fort Reno three days prior to shipment was 876 pounds. The cattle were slaughtered and the carcasses were weighed, graded, measured, and separated into the various wholesale cuts 48 hours after slaughter.

The average yield for the entire group based upon the shrunk live weights at Fort Reno and upon the chilled carcass weights was 61 per cent and the average carcass grade, given by members of the OSU meats staff, was 10.1 which is slightly above low choice. The heaviest animals at slaughter and in the carcass were sired by Bull 264 and they were the highest yielding (61.8 per cent) and the highest grading (average choice) cattle in the group.

The lowest yields (59.8 per cent) and the lowest grades (high good) were obtained for the animals by Bull 17. The cattle by Bull 17 had been one of the higher grading groups at weaning and one of the faster gaining groups on feed, but they graded low on marbling score.

Weights of the wholesale cuts were obtained for both sides of each carcass following the grading of the carcasses and the obtaining of a number of carcass scores and measurements. The wholesale ribs from both sides of each carcass were purchased for further evaluation by the meats staff of the Animal Husbandry Department at Stillwater.

The composition of the carcasses by each of the sires is indicated in Table 2. The area of the rib eye muscle was obtained from tracings made at the posterior surface of the twelfth rib. The carcasses from calves by Bull 264 had 11.7 square inches of rib eye while those by Sire 15 had 10.4 square inches. When consideration was given to the variations in carcass weights among sire groups, the sire groups appeared to be much more uniform in this trait. The differences in rib eye area were due largely to differences in carcass weights among the sire groups in this study.

The average yields of loin, rib, round and chuck were 17.6, 9.4, 22.1, and 28.3 percent respectively. The ranges in percent yield among sire groups (adjusted for sex differences) were: loin, 17.4 to 18.0; rib, 9.1 to 9.7; round, 21.5 to 23.0 and chuck, 27.7 to 28.9. Physical separation of the lean, fat and bone was made for the 9, 10 and 11 rib cut from both sides of each carcass and the weights were converted to the percentages shown in Table 2 for each sire group.

The data show that the cattle by Sires 114 and 264 were somewhat fatter (42.7 percent) than those by Sires 5 and 15 (39.2 percent). The percent bone was lower in the animals by Sires 114 and 264 (12.4 percent) than for the rest of the sires (13.4 percent). The sires whose calves had the lowest percentage of fat obviously had the highest percentage of lean in this rib cut.

TABLE 2. Composition of carcasses from calves by seven Angus sires.

			Carc.	Rib Eye	% Cold Carcass Wt.				Comp. 9,10,11 Rib (%)		
Sire	Sex	No.	Wt.	Area	Loin	Rib	Round	Chuck	Lean	Fat	Bone
114	F	5	491	10.3	17.8	9.8	21.3	26.9	44.8	43.1	12.1
	M	7	563	11.5	17.8	9.4	22.0	28.2	44.6	42.5	12.8
264	F	4	562	11.8	17.8	9.8	21.5	26.8	44.3	43.7	12.0
	M	10	593	11.6	17.2	9.1	22.1	28.3	45.7	41.5	12.8
5	F	6	477	10.0	17.5	9.6	21.8	27.7	46.2	40.0	13.8
	M	4	560	10.9	17.4	9.2	22.2	28.6	47.4	38.7	14.0
17	M	6	529	11.0	18.0	9.6	22.3	27.7	46.0	40.9	13.2
2	M	6	532	10.6	17.0	8.9	21.5	27.3	44.8	42.0	13.1
7	M	6	514	10.7	17.8	9.8	23.0	28.6	45.7	41.1	13.2
15	M	6	490	10.4	17.5	9.4	21.6	28.9	47.8	39.0	13.3

The twelfth rib steaks from both sides of the carcasses were broiled and tenderness was estimated using the Warner-Bratzler shearing device. Each steak was approximately two inches thick. It was browned on one side until the interior temperature of the steak was 90°F. and then turned and cooked until the interior temperature reached 155°F. Three cores, which were one-inch in diameter, were obtained from each steak and three shears on each core were recorded. These eighteen shear force values were then averaged for each animal and the average values are shown for each sire group in Table 3.

This proved to be one of the most variable traits associated with differences among sires. Although these values were all considered to be highly acceptable due to the youth of the cattle, it was interesting that the range in values was from 11.5 pounds of pressure for steaks by Sire 15, to 15.8 pounds for those by Sire 114. It was also of interest that these differences in tenderness were not associated with marbling scores or carcass grades.

The differences among sire groups were highly significant ($P<.01$) for tenderness as estimated by the shear-force technique. The intra-class half-sib correlation of average shear force values was .23 which yields an heritability estimate of .92. Due to the small number of sires and large within sire variance, there was a wide 95 percent confidence interval of .40 to 1.44 on the above estimate.

The eighth rib steaks from both sides of each carcass were prepared as described above for evaluation by a taste panel. Samples scored by the judges were one-inch cubes taken from the rib eye area of the steak. They scored each sample for tenderness, flavor, and juiciness, using a score card with a series of numbers from 1, extremely undesirable appraisal, to 9, an extremely desirable appraisal. These average values for each sire group are given in Table 3.

TABLE 3. Some traits associated with carcass quality by sire groups.

			Fat	Marb.	Shear	Chem., Comp., Loin eye (%)				Taste Panel Scores		
Sire	Sex	No.	Depth[2]	Score	Force[1]	Protein	Fat	Water	Ash	Tend	Flav.	Juic.
114	F	5	.84	10.0	15.1	20.7	7.1	70.0	1.05	7.27	7.34	7.28
	M	7	.85	10.0	16.6	21.2	6.2	70.8	1.11	7.28	7.11	7.14
264	F	4	.80	11.2	12.8	20.6	7.6	70.0	1.09	7.68	7.31	7.50
	M	10	.90	11.2	12.5	20.1	8.1	69.4	1.05	7.81	7.41	7.68
5	F	6	.70	9.3	12.3	21.4	6.1	70.4	1.11	7.55	7.26	7.62
	M	4	.72	10.2	13.1	20.8	7.3	70.7	1.09	7.55	7.46	7.49
17	M	6	.75	9.0	13.5	21.2	5.3	71.7	1.03	7.64	8.20	7.17
2	M	6	.79	10.5	12.5	20.7	6.9	70.7	1.12	7.12	7.03	7.50
7	M	6	.80	9.5	13.4	21.2	5.4	71.3	1.07	7.18	7.06	7.18
15	M	6	.69	10.3	11.5	21.1	6.0	71.0	1.08	7.42	7.33	7.50

[1]Shear force is in pounds pressure required to cut a one-inch core of broiled steak by the Warner-Bratzler shear.
[2]Thickness of fat over the eye muscle.

Apparently, the judges were not able to detect, to the same degree, the differences in tenderness noted by the Warner-Bratzler shear force technique. Differences among sire groups for flavor and juiciness were likewise small.

The loin eyes from the 9, 10, and 11 rib cuts, which were separated from the fat and bone, were finely ground and four samples were taken from each animal for chemical determination of protein, fat, water and ash. These average values for each sire group are given in Table 3. Although the relationship is not perfect, one notes that the percent fat in the rib eye is associated with the marbling scores obtained by visual means.

Summary

Seven Angus bulls were progeny tested for preweaning growth rate and feeder grade in the Federal Reformatory herd at El Reno. Sixty calves by these bulls were selected for post-weaning feed lot performance tests at Fort Reno and for detailed carcass studies.

Important sire differences were found for preweaning growth rate and for average feeder grade of their calves. Large sire differences were also noted for rate of feed lot gain on standard rations and for dressing percentage and carcass grades. Sire differences for yield of wholesale cuts, expressed as a percentage of cold carcass weights, were rather small.

Small sire differences were also shown for percentage of separable fat, lean, and bone in the 9, 10, 11 rib cut. Large sire differences were found for tenderness of the broiled rib steaks as estimated by a mechanical shear force technique. Differences in size of rib eye were due largely to variations in the size of the animals studied.

Stilbestrol and an Antibotic (Erythromycin) For Suckling Beef Calves[1]

A. B. Nelson, L. S. Pope, E. J. Turman, and R. Totusek

In recent years there has been an increased use of stilbestrol implants in range beef cattle production. A widely accepted fact is that stilbestrol administration (oral or implant) will increase gains and improve feed efficiency of fattening cattle. When grazing animals are given

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