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Grading Up Hogs By the Use of Purebred Sires

By
J. C. GRIMES, W. E. SEWELL, and W. C. TAYLOR

AGRICULTURAL EXPERIMENT STATION
OF THE
ALABAMA POLYTECHNIC INSTITUTE

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AUBURN, ALABAMA

ALABAMA POLYTECHNIC INSTITUTE

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(Continued on inside back cover.)

Grading Up Hogs By the Use of Purebred Sires

By

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Contents

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INTRODUCTION

LOW-GRADE and scrub hogs of nondescript breeding are present on farms in almost all sections of the United States. These animals possess the desirable characteristics of being hardy and, as a rule, prolific, but are inferior in conformation and quality and are not efficient converters of feed crops into human food.

Numerous experiments have been reported showing that beef cattle, dairy cattle, sheep, and poultry can be improved rapidly if purebred sires are used on females from the native stock. Very little work of this kind appears to have been done with hogs.

Culbertson and Evvard* in showing the costly influence of an inferior sire reported an experiment in which the progeny of well-bred sows were graded downward by the use of a European wild boar. A litter of half-wild and a litter of three-quarter-wild pigs were produced for comparison with a litter of very high grade Poland Chinas. All litters were fed under dry-lot conditions and received the same feed mixture and treatment. The high grade Poland China pigs reached an average weight of 200 pounds in 210 days from weaning time at a cost of $6.88 per 100 pounds gain. The half-wild litter required 238 days to reach an average weight of 200 pounds and cost $8.02 per 100 pounds gain. The three-quarter-wild litter was fed 295 days before reaching 200 pounds weight and the feed cost was $10.70 per 100 pounds gain.

In order to secure definite data on the economic benefits derived from grading up native scrub sows with purebred boars, an experiment was started at the Alabama Experiment Station in 1924 and continued for five years.

PLAN OF PROCEDURE

Three litters of scrub pigs, three litters of 50 per cent purebred pigs, three litters of 75 per cent purebred pigs, and three litters of 87.5 per cent purebred pigs were raised. Immediately after weaning all pigs were placed on a fattening ration and fed until they reached a weight of approximately 200 pounds each. A record was made on the amount and cost of feed and the length of time required to produce a 200 pound hog from each of the different litters.

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*Culbertson, C. C., and Evvard, John M., 1925, The Costly Influence of an Inferior Sire, Iowa Agr. Exp. Sta., Leaflet 1.

Breeding Animals.—The scrub litters used in this experiment were the progeny of three different scrub sows and two different scrub boars. The 50 per cent purebred litters were out of two different sows and by the same boar. The 75 per cent purebred litters were from the same sow and boar, and the 87.5 per cent purebred litters were from the same sow and boar. All the female breeding animals used, with the exception of the three scrub sows, were raised on the Experiment Station Farm. Duroc, Poland China, and scrub boars were used in the experiment. Table 1 shows the breeding of animals used in this experiment.

TABLE 1.—Showing Matings which Were Made in Producing Pigs for the Experiment.

Boars used				Sow No.	Breeding of sow	Litter No.	Breeding of litter	Per cent purebreeding of offspring (experimental animals)
Scrub boar A	Scrub boar B	Purebred P. C. boar	Purebred D. J. boar					
		X		671	"Scrub"	1	P X S	50
			X	673	D (D X S)	2	D[D(D X S)]	87½
		X		575	P X S	3	P(P X S)	75
		X		575	P X S	4	P(P X S)	75
X				568	"Scrub"	5	S X S	0
		X		671	"Scrub"	6	P X S	50
			X	673	D (D X S)	7	D[D(D X S)]	87½
		X		575	P X S	8	P(P X S)	75
	X			B.S. 3	"Scrub"	9	S X S	0
	X			S.S. 1	"Scrub"	10	S X S	0
			X	673	D (D X S)	11	D[D(D X S)]	87½
		X		S.S. 1	"Scrub"	12	P X S	50

NOTE:
X indicates matings
S indicates scrubs
P indicates Poland China
D indicates Duroc Jersey

Lots.—Sows had the run of a permanent pasture composed of Bermuda grass and lespedeza during the gestation period. A few days before farrowing they were placed in individual lots where they remained during the suckling period. When weaned, each litter of pigs was placed in a separate lot where they remained during the feeding test. Each lot was approximately 12 x 40 feet and contained a covered concrete floor at one end which served as a feeding floor and as a shelter for the pigs during bad weather.

Feeds Used.—Sows received a grain mixture during the gestation and suckling period composed of 8 parts white corn, 4 parts wheat shorts, and 1 part tankage. Immediately after

weaning, pigs were placed on a fattening ration consisting of 8 parts yellow corn, 4 parts wheat shorts, and 1 part tankage, plus a mineral mixture of equal parts by weight of charcoal, marble dust, and salt. The grain mixture and the mineral mixture were supplied separately in open troughs and kept before the animals at all times.

Price of Feeds.—Feeds were charged at market price which was two cents per pound for the concentrate mixture. No charge was made for the mineral which was home-mixed.

Weights.—Pigs were weighed individually at the beginning and at the close of the experiment and each 28 days during the experiment.

TABLE 2.—Summary of Results Obtained in Fattening Scrub Pigs.

Season litter was produced		Fall 1927	Spring 1928	Spring 1928
Number of pigs farrowed		7	6	6
Number of pigs raised and fed		5	6	5
Age weaned and placed on experiment	days	56	56	56
Length of feeding period	"	184	186	193
Average initial weight per pig	pounds	21.00	20.00	26.00
Average final weight per pig	"	201.00	200.00	200.00
Average daily gain per pig	"	.98	.97	.90
Total feed consumed by pigs during fattening period	"	4438.50	5186.50	3637.50
Feed required per 100 lbs. gain during fattening period	"	493.20	480.20	418.10
Feed consumed by sow in 6 mos.	"	973.00	972.00	1048.00
Total feed required by sow and litter	"	5411.50	6158.50	4685.50
Feed required by sow and litter to produce 100 lbs. live weight	"	538.40	513.20	468.55
Feed cost per 100 lbs. gain during fattening period	dollars	9.86	9.60	8.36
Total feed cost per 100 lbs. live weight (including 6 mos. feed for sow)	"	10.77	10.26	9.37

RESULTS OBTAINED IN FATTENING SCRUB PIGS

Three litters of scrub pigs were produced and fattened. Two of these were farrowed in the spring and one in the fall. Six pigs were farrowed in each of the spring litters and seven from the fall litter.

Table 2 shows that fairly uniform results were obtained when these three groups of pigs were fattened, especially since they were from three different sows and by two different boars. The length of the fattening period ranged from 184 to 193 days, and the age at which an average weight of 200 pounds was reached in the different groups varied from 240 to 249 days. The average daily gains during the fattening period ranged from .90 to .98 of a pound, and the feed required to produce 100 pounds of gain ranged from 418.1 to 492.2 pounds.

TABLE 3.—Summary of Results Obtained in Fattening First-Cross (50 Per Cent Purebred) Pigs.

Season litter was produced		Spring 1927	Spring 1928	Fall 1928
Number pigs farrowed		6	7	7
Number pigs weaned and fed		5	4	6
Age weaned and placed on experiment	days	56	56	56
Length of feeding period	"	145	135	156
Average initial weight per pig	pounds	33.00	33.12	22.00
Average final weight per pig	"	201.00	200.60	200.00
Average daily gain per pig	"	1.16	1.24	1.14
Total feed consumed by pigs during fattening period	"	3087.50	2694.50	4617.00
Feed required per 100 lbs. gain during fattening period	"	367.50	402.20	432.30
Feed consumed by sow in 6 mos.	"	1044.50	914.00	1014.00
Total feed required by sow and litter	"	4132.00	3608.50	5631.00
Feed required by sow and litter to produce 100 lbs. live weight	"	411.10	449.60	469.25
Feed cost per 100 lbs. gain during fattening period	dollars	7.35	8.04	8.65
Total feed cost per 100 lbs. live weight (including 6 mos. feed for sow)	"	8.22	8.99	9.38

RESULTS OBTAINED IN FATTENING FIRST-CROSS (50 PER CENT PUREBRED) PIGS

Three first-cross litters, with a total of 15 pigs, were weaned and fattened. These pigs were sired by the same boar but were out of two sows. The smallest group which contained 4 pigs averaged 33.12 pounds each at 8 weeks of age and the largest group of 6 pigs averaged only 22 pounds each.

Table 3 shows that fairly uniform results were obtained when these three litters of pigs were fattened. The length of the fattening period ranged from 135 to 156 days. The rate of daily gains ranged from 1.14 to 1.24 pounds, and the amount of feed required for each 100 pounds of gain during the fattening period ranged from 367.5 to 432.3 pounds. The age at which

TABLE 4.—Summary of Results Obtained in Fattening Second-Cross (75 Per Cent Purebred) Pigs.

Season litter was produced		Spring 1927	Fall 1927	Spring 1928
Number pigs farrowed		9	8	7
Number pigs weaned and fed		9	7	6
Age weaned and placed on experiment	days	56	56	56
Length of feeding period	"	143	142	150
Average initial weight per pig	pounds	28.89	27.14	29.17
Average final weight per pig	"	200.00	210.43	201.00
Average daily gain per pig	"	1.20	1.23	1.15
Total feed consumed by pigs during fattening period	"	5290.00	5416.00	3989.00
Feed required per 100 lbs. gain during fattening period	"	343.50	443.93	386.91
Feed consumed by sow in 6 mos.	"	1152.00	1157.00	1006.50
Total feed required by sow and litter	"	6442.00	6573.00	4995.50
Feed required by sow and litter to produce 100 lbs. live weight	"	357.90	466.17	414.20
Feed cost per 100 lbs. gain during fattening period	dollars	6.87	8.88	7.74
Total feed cost per 100 lbs. live weight (including 6 mos. feed for sow)	"	7.16	9.32	8.28

an average weight of 200 pounds was reached in the different groups varied from 191 to 212 days.

RESULTS OBTAINED IN FATTENING SECOND-CROSS (75 PER CENT PUREBRED) PIGS

The three second-cross litters contained a total of 24 pigs farrowed and 22 raised. All three litters were out of the same sow and by the same boar. This sow was prolific and a good mother; she farrowed large litters and raised most of her pigs. The smallest litter contained 6 pigs which averaged 29.17 pounds each at weaning age, and the largest litter contained 9 pigs which averaged 28.89 pounds each at weaning age.

TABLE 5.—Summary of Results Obtained in Fattening Third-Cross (87½ Per Cent Purebred) Pigs.

Season litter was produced		Spring 1927	Spring 1928	Fall 1928
Number pigs farrowed		7	4	6
Number pigs weaned and fed		7	4	6
Age weaned and placed on experiment	days	56	56	56
Length of feeding period	"	122	131	140
Average initial weight per pig	pounds	37.50	40.00	30.00
Average final weight per pig	"	200.36	201.25	200.00
Average daily gain per pig	"	1.33	1.23	1.21
Total feed consumed by pigs during fattening period	"	3665.00	2448.50	4588.00
Feed required per 100 lbs. gain during fattening period	"	321.50	379.60	449.80
Feed consumed by sow in 6 mos.	"	1142.50	998.50	1200.50
Total feed required by sow and litter	"	4807.50	3447.00	5788.50
Feed required by sow and litter to produce 100 lbs. live weight	"	342.80	428.20	482.37
Feed cost per 100 lbs. gain during fattening period	dollars	6.43	7.59	9.00
Total feed cost per 100 lbs. live weight (including 6 mos. feed for sow)	"	6.86	8.56	9.65

Table 4 shows that uniform results were obtained when these three litters of pigs were fattened. The length of the fattening period ranged from 142 to 150 days. The rate of daily gain ranged from 1.15 to 1.23 pounds and the amount of feed required to produce 100 pounds of gain during the fattening period ranged from 343.50 to 443.93 pounds. The feed cost per 100 pounds gain during the fattening period varied from $6.87 to $8.88.

RESULTS OBTAINED IN FATTENING THIRD-CROSS (87½ PER CENT PUREBRED) PIGS

Three litters of third-cross pigs were raised and fattened. They were all out of the same sow and by the same boar. This sow was not as prolific as some of the other sows but her pigs were all good. The smallest litter contained 4 pigs that averaged 40 pounds each at weaning time. The largest litter contained 7 pigs that weighed 37.50 pounds each when weaned. The other litter of 6 pigs averaged only 30 pounds each when weaned.

Table 5 shows that the daily gains and feed requirement of these three litters were fairly uniform when the pigs were fattened. The length of the fattening period ranged from 122 to 140 days. The rate of daily gain in the different groups ranged from 1.21 to 1.33 pounds and the amount of feed required to produce 100 pounds gain during the fattening period ranged from 321.50 to 449.80 pounds. The cost of feed per 100 pounds gain during the fattening period varied from $6.43 to $9.00.

AVERAGE RESULTS OF TWELVE LITTERS ACCORDING TO BREEDING

Table 6 shows the average results obtained when three litters of each kind of breeding were fattened. It will be noted that the average number of pigs farrowed and raised was fairly uniform in the different groups, with the exception of the 75 per cent purebred pigs. The mother of these pigs seemed to be more prolific than the other sows used in this experiment. This was probably an individual characteristic of the sow and has no important bearing on the experiment.

Better breeding resulted in heavier pigs at weaning time as indicated by the fact that at 8 weeks of age the average weight in pounds was: scrubs 22.20; first-cross 28.63; second-cross 28.42; and third-cross 35.42. The weight increased as the per cent of pure breeding increased except in the case of the second-cross which were slightly lighter than the first-cross. This can probably be explained by the fact that there were fewer pigs in the first-cross litter than in the second-cross litters. Records which have been kept on the breeding herd at Auburn indicate that pigs from large litters usually weigh less at weaning age than pigs from small litters.

TABLE 6.—Summary Showing Average Results of Twelve Litters According to Breeding.

		Scrub	50% Pure-bred	75% Pure-bred	87½% Pure-bred
Number of litters		3	3	3	3
Average number of pigs farrowed per litter		6.33	6.66	8.00	5.67
Average number of pigs weaned and fed per litter		5.33	5.00	7.33	5.67
Age weaned and placed on experiment	days	56.00	56.00	56.00	56.00
Average length of fattening period	"	187.67	145.33	145.00	131.00
Average initial weight per pig	pounds	22.20	28.63	28.42	35.42
Average final weight per pig	"	200.44	200.50	200.82	200.32
Average daily gain per pig	"	.95	1.18	1.19	1.26
Average feed consumed per litter during fattening period	"	4420.83	3466.33	4898.33	3567.17
Average feed required per 100 lbs. gain during fattening period	"	465.35	403.37	387.63	381.52
Average feed consumed per sow in 6 mos.	"	997.67	990.83	1105.16	1113.83
Average feed required by sow and litter	"	5418.50	4457.16	6003.49	4681.00
Average feed required by sow and litter to produce 100 lbs. live weight	"	507.19	444.60	407.85	412.12
Feed cost per 100 lbs. gain during fattening period	dollars	9.31	8.07	7.75	7.63
Average feed cost per 100 lbs. of live weight (feed of sow included)	"	10.14	8.89	8.16	8.24

All pigs were weaned at 8 weeks of age and fed on concentrates until they reached an average weight of approximately 200 pounds. The average daily gains in pounds in the different groups were: scrubs 0.95; first-cross 1.18; second-cross 1.19; and third-cross 1.26. The number of days required for the hogs in the different groups to reach an average weight of 200 pounds after weaning was: scrubs 187.67; first-cross 145.33; second-cross 145; and third-cross 131. It will therefore be seen that the average daily gains increased as the per cent of pure breed-

ing increased; likewise, the length of time required to produce a hog weighing 200 pounds decreased as the per cent of pure breeding increased.

The average amount of feed required to produce 100 pounds gain during the fattening period decreased as the per cent of pure breeding increased. For each 100 pounds of gain produced the scrub hogs required 465.35 pounds of concentrates; the first-cross 403.37 pounds; the second-cross 387.63 pounds; and the third-cross 381.52 pounds.

The cost of producing 100 pounds of gain during the fattening period decreased as the per cent of pure breeding increased. In the scrub group the cost was $9.31; in the first-cross group $8.07; in the second-cross group $7.75; and in the third-cross group $7.63.

The sows used in this experiment were bred to farrow two litters of pigs annually. In order to arrive at the actual feed required to produce pork, it was necessary to charge each litter of pigs with a six-month feed bill for the sow. When the feed eaten by the sows was added to the feed eaten by the pigs during the fattening period, it was found that the number of pounds feed actually required to produce 100 pounds of gain in each group was: scrubs 507.19; first-cross 444.60; second-cross 407.85; and third-cross 412.12. The feed requirement per unit of gain again decreased as the per cent of pure breeding increased with one exception. The feed required for 100 pounds of gain was slightly greater with the third-cross than with the second-cross. This was probably due, as previously stated, to the fact that the mother of the second-cross pigs was more prolific than the mother of the third-cross pigs. She raised more pigs to weaning age and did not consume any more feed. This lowered the feed requirement per unit of gain in this group. There was a marked improvement in the quality of the first-cross pigs over the scrubs and in their ability to make rapid and cheap gains. This improvement was continuous through the second and third-cross, but was greater in the case of the first cross than any succeeding cross. The third-cross pigs were uniform in quality and resembled purebreds in many respects. They made fairly rapid gains at a reasonable cost, topped the market when sold, and, for all practical purposes, were considered as good meat hogs as purebreds.

SUMMARY

(1) The use of purebred boars through three generations resulted in marked improvement of pigs in type, quality, and ability to make rapid and cheap gains.

(2) The length of time required to produce a 200-pound hog decreased as the percentage of pure breeding increased.

(3) The age at which the different groups of hogs reached 200 pounds in weight was: scrubs, 243.67 days; 50 per cent

grades, 201.33 days; 75 per cent grades, 201 days; and 87.5 per cent grades, 187 days.

(4) The average daily gain in the different groups was: scrubs, 0.95 pounds; 50 per cent grades, 1.18 pounds; 75 per cent grades, 1.19 pounds; and 87.5 per cent grades, 1.26.

(5) The amount of feed required to produce a unit of gain decreased as the percentage of pure breeding increased.

(6) For each 100 pounds of gain produced the scrub hogs required 465.35 pounds of feed; the 50 per cent grades, 403.37 pounds; the 75 per cent grades, 387.63 pounds; and the 87.5 per cent grades, 381.52 pounds.

(7) The average feed cost of producing 100 pounds of gain was: scrubs, $9.31; 50 per cent grades $8.07; 75 per cent grades, $7.75; and 87.5 per cent grades, $7.63.

Agricultural Substations:

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R. C. Christopher, B. S. — Superintendent, Sand Mountain Substation, Crossville, Ala.
J. P. Wilson, B. S. — Superintendent, Wiregrass Substation, Headland, Ala.

CHANGES IN STATION STAFF DURING 1928-1929.

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J. L. Seal, Ph. D. — Associate Plant Pathologist
S. J. Schilling, D. V. M. — Research Associate Professor of Animal Nutrition
O. C. Medlock, M. S. — Assistant Horticulturist
G. D. Scarseth, M. S. — Assistant Soil Chemist
W. C. Taylor, B. S. — Assistant in Animal Industry
Ellis Diseker, B. S. — Assistant in Agricultural Engineering
W. D. Lucas, B. S. — Assistant in Agronomy
E. L. Mayton, B. S. — Assistant in Agronomy
Fred Stewart, B. S. — Superintendent, Tennessee Valley Substation
R. C. Christopher, B. S. — Superintendent, Sand Mountain Substation
J. P. Wilson, B. S. — Superintendent, Wiregrass Substation

Resignations:

W. H. Pierre, Ph. D. — Associate Soil Chemist
F. E. Bertram, B. S. — Assistant in Agronomy
Clarence Savage, B. S. — Assistant in Agronomy