

# Reproductive Performance of Purebred Gilts with 2-Breed Cross Litters Compared to Crossbred Gilts with 3-Breed Cross Litters

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## Story in Brief

The productivity of 379 purebred and 2-breed cross gilts of Duroc, Hampshire and Yorkshire breeding was evaluated in this study. Purebred gilts with 2-breed cross litters were compared to crossbred gilts with 3-breed cross litters to determine the relative advantage of using crossbred sows and to compare the performance of 2-breed and 3-breed cross pigs. One month after breeding, 193 gilts (87 purebred and 106 crossbred) were slaughtered and evaluated for ovulation rate and early embryo development. The other 186 gilts (90 purebred and 96 crossbred) produced litters during the 1972 spring and fall farrowing seasons at Ft. Reno.

Although differences were not large, the ovulation rates tended to favor the purebred gilts. However, crossbred gilts had 7 percent more of their corpora lutea represented as viable embryos at the end of the first month of pregnancy. The crossbred gilts had 0.55 more embryos and farrowed 0.4 more pigs per litter than purebred gilts, although these differences were not significant. The embryo size and pig birth weights for 2-breed and 3-breed crosses were similar.

The survival rate from birth to weaning of 3-breed cross pigs raised by crossbred dams was 84.5 percent as compared to 78.7 percent for 2-breed cross pigs raised by purebred dams. This resulted in the 3-breed cross litters being significantly larger (8.3 vs. 7.4 pigs per litter) and heavier (193 vs. 174 lbs.) at weaning even though there was virtually no difference between the weights of 2-breed and 3-breed cross pigs at weaning.

## Introduction

Crossbreeding studies with swine have shown increases in litter size at birth and greater survival rate for crossbred pigs from birth to weaning. Crossbred females are recommended in most commercial breeding programs in order to combine the desirable qualities of different breeds and to take advantage of the heterosis exhibited by utilizing a crossbred sow in addition to that obtained in the crossbred pig. However, information on the relative advantage of crossbred females over straight bred

remains, and which specific crossing sequences should be made to obtain maximum performance from crossing is unavailable.

The results presented in this paper deal with the second phase of the Oklahoma swine crossbreeding study initiated in 1969. Purebred and 2-breed cross gilts of Duroc, Hampshire and Yorkshire breeding were mated to boars of each of the other breeds to produce 2-breed and 3-breed cross litters. Data are presented for early embryo development and for productivity at farrowing and weaning.

## Experimental Procedure

The 379 gilts for this study were selected at random from the purebred and 2-breed cross litters produced in the 1971 spring and fall farrowing seasons at Ft. Reno. Approximately six purebred boars of each breed that were produced in the Stillwater seedstock herds were used to produce the 2-breed and 3-breed cross litters each season. This study includes the data from 193 gilts slaughtered 30-days postbreeding and the litter records for 186 gilts farrowing in the 1972 spring and fall seasons.

The basic mating scheme used each season was to mate each boar to approximately 12 gilts (3 each of each breed type not represented in the boar). At the time of breeding, two gilts from each mating type for each boar were randomly selected to be carried full term to farrowing and the remaining gilts were designated for slaughter 30-days postbreeding to evaluate ovulation rates and early embryo development. This system resulted in 78 gilts slaughtered and 98 farrowed in 1972 spring and 115 gilts slaughtered and 88 farrowed in 1972 fall.

This study includes ovulation rates and early embryo development for 87 purebred gilts with 2-breed cross litters and 106 crossbred gilts with 3-breed cross litters. The litter records from farrowing to weaning include 90 two-breed and 96 three-breed cross litters. The number of gilts slaughtered and farrowed for each mating type are shown in Table 1. All gilts were farrowed in confinement and each sow and litter was penned separately until the pigs were weaned at 42 days of age. Individual pig weights were obtained at birth, 21 and 42 days, and the pigs were given free access to creep feed after the 21 day weights were obtained.

## Results

Data for ovulation rate, early embryo development and sow productivity at farrowing and weaning are presented in Table 1.

These results suggest that crossbreeding does not increase ovulation rate. Overall, the purebred gilts had an average of 0.5 more corpora lutea per gilt than the crossbred gilts; however, none of the differences in ovulation rates were significant. In all cases the ovulation rates for the

Table 1. Reproductive Performance of Purebred Gilts with 2-Breed Cross Litters Compared to Crossbred Gilts with 3-Breed Cross Litters

	Breed of Dam Producing 2-Breed Litters			Breed of Dam Producing 3-Breed Litters			Overall		% Improvement of Crossbred Dams Over Purebred Dams
	Duroc (D)	Hamp (H)	York (Y)	D-H	D-Y	H-Y	Purebred Dams	Crossbred Dams	
<i>Early Embryo Development:</i>									
No. gilts slaughtered	31	31	25	33	38	35	87	106	
No. corpora lutea per gilt	13.4	13.3	13.9	13.1	13.5	12.5	13.5	13.0	-3.7
No. embryos per gilt	10.5	8.8	10.8	10.8	10.6	10.4	10.0	10.6	6.0
% embryos of corpora lutea	78.9	66.3	77.9	82.6	78.6	83.1	74.4	81.4	9.4
Embryo size, mm.	28.0	27.6	27.9	28.2	27.8	28.1	27.8	28.0	0.7
<i>Litter Records:</i>									
No. litters	34	27	29	32	32	32	90	96	
No. pigs farrowed per litter	8.9	9.6	10.1	9.7	10.3	9.7	9.5	9.9	4.2
Avg. pig birth wt., lbs.	2.8	2.6	2.4	2.8	2.6	2.4	2.6	2.6	0.0
Avg. pig 42-day wt., lbs.	23.3	23.8	23.1	24.1	23.2	22.9	23.4	23.4	0.0
No. pigs weaned per litter*	6.9	7.7	7.7	8.1	8.0	8.6	7.4	8.2	10.8
Litter 42-day wt., lbs.	161.4	183.4	177.5	195.4	185.4	197.7	174.1	193.0	10.9
Survival rate, %	77.5	79.4	79.1	85.4	79.8	88.4	78.7	84.5	7.5

\*Indicates that differences observed between 2-breed and 3-breed crosses were significant ( $P < .05$ ).

2-breed cross gilts were lower than that for the average of the purebred gilts making up the cross. The Hamp-York crossbred gilts had 1.0 fewer corpora lutea per gilt than the average of purebred Hamp and Yorks.

With the exception of purebred Hampshire gilts, there was very little difference between purebred and crossbred gilts in the number of developing embryos per gilt after one month pregnancy. Purebred Hampshire gilts had significantly fewer embryos per gilt than all other types of gilts and as a result crossbred gilts had 5.5 percent more embryos 30-days after breeding than did purebred gilts, although this difference was not significant. The largest numbers of developing embryos were observed for purebred Yorkshires and Duroc-Hamp crossbred gilts. The Duroc-Hamp crossbred gilts averaged 1.2 more embryos than the average for the two parent breeds making up the cross.

There was a tendency for the crossbred gilts to have a higher percentage of the ova shed to be represented as viable embryos at the end of the first month of pregnancy. There was no marked difference in embryo size between 2-breed and 3-breed cross litters.

Crossbred gilts apparently provide a more desirable uterine environment than purebred gilts, or the 2-breed cross embryos are more viable than the 2-breed cross embryos, since a higher percentage of the ovulations for crossbred gilts with 3-breed cross litters are represented as live pigs at farrowing. Crossbred dams with 3-breed cross litters averaged 0.4 more pigs per litter at farrowing than purebred dams with 2-breed cross litters, but the differences in litter size at birth were not significant. Litter size at weaning was about 11 percent larger for crossbred dams compared to purebred dams and the increase in survival rate to weaning for 3-breed cross litters was 7.5 percent larger than for 2-breed cross litters.

Although none of the individual comparisons of the means for a crossbred dam and the average of the two purebreds which made up the cross were significant for number of pigs per litter at weaning, in all cases the crossbred gilts weaned larger litters. Overall, crossbred dams raised 0.8 more pigs per litter and their litters weighed 19 lbs. more than purebred dams at weaning.

Two-breed and 3-breed cross pigs weighed nearly the same at birth. However, 2-breed cross pigs from Duroc dams were significantly heavier (0.4 lbs.) at birth than those from Yorkshire dams and 3-breed cross pigs from Duroc-Hampshire dams were significantly heavier at birth than those from the other crossbred sows. At weaning there was no difference in the average pig weight of 3-breed and 2-breed cross pigs nor were any of the comparisons among individual means significant.

These data indicate that purebred and 2-breed cross gilts have similar ovulation rates, but the 3-breed cross embryos from crossbred gilts

have a greater early embryonic survival rate than 2-breed cross embryos. Although crossbred dams tended to farrow somewhat larger litters than purebred dams, the largest increase in performance from using a crossbred dam came from increased survival rate from birth to weaning. The 3-breed cross litters were approximately 11 percent larger and heavier than the 2-breed cross litters in this study. No marked differences in pig weights at birth and weaning between 2-breed and 3-breed cross litters were observed.

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## **Influence of the Litter in which a Gilt is Raised and Her Own Performance on Her Subsequent Reproductive Performance**

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### **Story in Brief**

This study was initiated to determine what possible influence the size and weight of the litter in which the gilt is raised and her own size, growth rate and fatness will have on the size of her first litter. The records from a total of 176 first-litter gilts from the Fort Reno Experiment station were studied.

Although most traits studied were not closely associated with the size of the gilt's first litter, some interesting trends were noted. Gilts with heavier birth weights farrowed larger litters and an increase of 1 lb. in birth weight resulted in an increase in litter size of 0.75 pigs. In Duroc and Beltsville No. 1 gilts, there was a tendency for gilts from larger litters to farrow fewer pigs, but this trend was not noticed among the crossbred gilts. Overall, the number of pigs raised in the litter from which the gilt came was not closely associated with the number of pigs she farrowed.