Average daily gains were identical, 1.56 pounds per day, for the gilts on Treatments 1 and 3. However, pigs on Treatment 3 (micronized-reground ration) required significantly less ($P<.05$) feed per pound of gain than those on Treatment 1 (ground ration). This is an improvement of approximately 6 percent. Average daily feed intakes tended to be less ($P<.10$) for the pigs on Treatment 3 as compared to those on Treatment 1. No significant differences were noted in probed backfat thickness.

These results suggest that more research needs to be conducted on the feeding of micronized grain sorghum to growing-finishing swine. The problems encountered in feeding the micronized grain sorghum ration is not understood. The improvement observed in feed efficiency for the pigs fed the micronized-reground ration as compared to those fed the ground ration may not be economically feasible when the cost of processing is considered.

The Relationship of Various Factors with Ovulation Rate and the Number of Embryos 30-Days Postbreeding in Gilts

L. D. Young, R. K. Johnson, I. T. Omtvedt, S. D. Welty and E. Ferrell

Story in Brief

Size of litter born and weaned, birth and weaning weights, postweaning average daily gain, age at 220 lbs. and age and weight at breeding were collected on 241 purebred Duroc, Hampshire and Yorkshire gilts and 103 two-breed cross gilts resulting from all possible crosses among the purebreds. Gilts were slaughtered 30-days postbreeding and their reproductive tracts were removed to evaluate ovulation rate and early embryo development.

Although no traits were highly correlated with ovulation rate, there were some significant relationships. The purebred gilts that grew fastest, were younger at 220 lbs, were heavier at breeding and had more days from 220 lbs. to breeding had higher ovulation rates. Among crossbred gilts, those gilts that were heavier at birth, weaning and breeding ovulated more eggs. There was also a tendency for crossbred gilts that grew faster and were younger at 220 lbs. to ovulate more eggs.

No performance measures were consistently related to the number of embryos for purebred, two-bred cross and three-bred cross embryos. In gilts carrying two-breed or three-breed cross embryos, those gilts that were heavier at breeding had more embryos.

Introduction

The number of pigs raised per sow in the herd is of great economic importance and is a function of the number of pigs farrowed which in turn is limited by the number of eggs ovulated. Ovulation rate and litter size are both estimated to be lowly heritable. If a portion of the variability in ovulation rate and litter size can be accounted for in terms of factors measured before breeding, selection of more productive replacement gilts would be more effective.

This study was intiated to evaluate (1) the relationship of measures of performance with the ovulation rate of purebred Duroc, Hampshire and Yorkshire gilts and two-breed cross gilts resulting from all possible crosses among the purebreds and (2) the relationship of measures of performance with number of embryos in purebred and crossbred gilts.

Materials and Methods

This study involved the records on 241 Duroc, Hampshire and Yorkshire gilts and 103 two-breed cross gilts from crosses involving the three pure breeds. The data came from five breeding seasons starting in the fall of 1970 through the fall of 1972. The fall breeding season started on December 1 and the spring breeding season started on June 1.

In the fall of 1970, spring of 1971 and fall of 1972 purebred gilts were bred to carry either purebred or two-breed cross embryos. In the fall of 1971 and spring of 1972 purebred gilts were bred to carry two-breed cross embryos and two-breed cross gilts were bred to carry three-breed cross embryos.

During the breeding season, the gilts were checked for estrus daily by the use of a teaser boar and were hand mated. Whenever possible, repeat matings were made between 12 and 24 hours after the first ser-

vice. If a gilt exhibited heat at the next cycle, she was rebred; otherwise, she was assumed pregnant. The gilts were slaughtered on a weekly basis at approximately 30-days postbreeding. The reproductive tracts were collected and dissected and all embryos were removed and counted. Ovulation rate was measured by the number of corpora lutea on the ovaries.

The correlations for each type of gilt were pooled from a within breed, year and season analysis.

Results

Relationship of Various Factors with Ovulation Rate.

The means and standard deviations of all traits studied are reported in Table 1. The correlations between ovulation rate and the various traits are reported in Table 2 for purebred and two-breed cross gilts.

Neither the size of litter a gilt was born in or raised in was correlated with her ovulation rate in purebred or two-breed cross gilts. This indicates that selecting gilts from large litters should not result in an increase in ovulation rate under the management conditions used in this study.

Ovulation rate was significantly correlated with birth weight, weaning weight, age at 220 lbs. and breeding weight in two-breed cross gilts.

Table 1. Means and Standard Deviations for All Traits Studied by Group of Gilt

	Purebred Gilts with Purebred Embryos		Purebred Gilts with 2-breed Cross Embryos		2-breed Gilts with 3-breed Embryos	
	Means	S.D.	Means	S.D.	Means	S.D.
Number of gilts	56		185		103	
Size of litter born in	10.57	2.40	10.69	2.62	10.33	2.25
Size of litter weaned in	7.59	2.12	7.72	2.22	7.77	1.92
Birth weight, lb.	2.97	0.61	2.94	0.56	2.72	0.52
Weaning weight, lb.	23.58	4.51	24.27	5.25	23.77	4.96
Avg. daily gain, lb.	1.37	0.14	1.35	0.12	1.37	0.13
Age at 220 lbs.	177.27	12.85	181.22	14.32	184.59	12.85
Backfat thickness, in.	1.13	0.12	1.17	0.15	1.24	0.15
Breeding age, days	279.93	16.49	275.94	21.02	256.38	22.01
Breeding weight, lb.	254.11	25.02	262.90	26.18	262.49	26.51
Slaughter weight, lb.	267.93	21.29	281.17	26.80	288.70	29.77
Days from 220 lbs. to breeding	102.66	21.29	94.86	25.81	71.79	24.97
Number of corpora lutea	12.89	2.11	13.38	2.32	13.13	2.31
Number of embryos	10.12	2.24	10.34	2.89	10.73	2.98

Table 2. Correlations Between Measures of Performance and Ovulation Rate of Purebred and Two-Breed Cross Gilts

	Purebred Gilts	Two-breed Cross Gilts
Size of litter born in	.03	—.06
Size of litter weaned in	.03	—.01
Birth weight	.03	.25
Weaning weight	.11	.25
Avg. daily gain	.15[1]	.15
Age at 220 lbs.	—.17[1]	—.25
Probe at 225 lbs.	—.06	—.05
Breeding age	.12[1]	—.04
Breeding weight	.23[1]	.46
Days from 220 lbs. to breeding	.20[1]	.01
No. of normal embryos	.26[1]	.46

[1] Different from zero at 0.05 level.

An increase of 1 lb. in birth weight, 10 lbs. in weaning weight and 10 lbs. in breeding weight was associated with an increase of 1.12 ± .45 eggs, 1.31 ± .17 eggs and 0.40 ± .08 eggs, respectively. There was a strong tendency for faster gaining gilts to ovulate more eggs than slower gaining gilts with an increase of 0.10 lb. in average daily gain increasing ovulation rate by 0.35 ± .18 eggs. A decrease of 10 days in age at 220 lbs. increased ovulation rate by 0.36 ± .19 eggs. Breeding age, backfat probe and days from 220 lbs. to breeding were not significantly related to the ovulation rate of two-breed cross gilts in the ranges studied in this experiment.

There was no significant relationship between the ovulation rate of purebred gilts and their birth weight, weaning weight and backfat probe. The ovulation rate of purebred gilts was significantly correlated with average daily gain, age at 220 lbs. breeding weight and days from 220 lbs. to breeding. An increase of 0.10 lb. in average daily gain, 10 lbs. in breeding weight and 10 days from 220 lbs. to breeding accounted for an increase in ovulation rate of 0.28 ± .12 eggs, 0.20 ± .08 eggs and 0.18 ± .06 eggs, respectively. A decrease of 10 days in age at 220 lbs. increased ovulation rate by 0.27 ± .10 eggs. The correlation of 0.12 between breeding age and ovulation rate was significant but when breeding weight was held constant this correlation became 0.04 and nonsignificant. The correlation of 0.23 between breeding weight and ovulation rate was significant and was virtually unchanged when breeding age was held constant. This indicates breeding weight has more effect on number of embyros than does breeding age.

In both types of gilts, those gilts that grew faster, were younger at 220 lbs. and heavier at breeding ovulated more eggs.

Relationship of Various Factors with the Number of Embryos.

The correlations between the number of embryos and the performance measures are reported by breeding of embryo in Table 3. None of the performance measures were consistently related to the number of embryos for the three types of embryos. Birth weight, age at 220 lbs., average daily gain and backfat probe were not significantly correlated to the number of embryos regardless of the breeding of the embryo. However, in all breed groups there was a positive relationship between average daily gain and number of embryos. Breeding age and days from 220 lbs. to breeding were significantly correlated with the number of two-breed cross embryos carried by purebred gilts. An increase of 10 days in breeding age was associated with an increase of 0.23 ± .10 embryos. Weaning weight was significantly correlated with the number of three-breed cross embryos in two-breed cross gilts and an increase of 10 lbs. in weaning weight was associated with an increase in litter size of 2.12 ± .59 embryos. In gilts carrying two-bred or three-breed cross embryos, those gilts that were heavier at breeding had more embryos. Increasing breeding weight by 10 lbs. resulted in an increase of 0.16 ± .08 embryos and 0.45 ± .11 embryos in two-breed and three-breed cross litters, respectively.

Although the correlations were not significantly different from zero, it is interesting to note that the correlation between size of litter the gilt was born in and the number of embryos was negative and the correlation

Table 3. Correlations Between Measures of Performance and Number of Embryos for Gilts with Purebred, Two-Breed Cross and Three-Breed Cross Embryos

	Purebred Embryos	Two-Breed Cross Embryos	Three-Breed Cross Embryos
Size of litter born in	—.19	—.10	—.09
Size of litter weaned in	.05	.00	.08
Birth weight	—.04	—.07	.12
Weaning weight	.02	.11	.35[1]
Avg. daily gain	.16	.02	.12
Age at 220 lbs.	—.07	—.01	—.18
Probe at 220 lbs.	—.16	.04	—.07
Breeding age	—.13	.17[1]	.05
Breeding weight	—.03	.15[1]	.41[1]
Days from 220 lbs. to breeding	—.05	.15[1]	.14
No. of corpora lutea	.37[1]	.24[1]	.48[1]

[1] Different from zero at 0.05 level.

between the size of litter she was weaned in was zero or positive regardless of the breeding of the embryo. The size of litter born in was associated with less than 25 percent of the variation in size of litter weaned in. This may indicate that the competition in large litters while the pigs are highly dependent on the sow for nutrition may adversely affect later reproductive efficiency. However by 42 days, the pigs consume enough creep feed so that the competition in large litters has little or no effect on subsequent reproductive efficiency.

Although all correlations reported are small, some consistent patterns are evident. It appears that gilts that are heavier than average at weaning and that grow faster from weaning to 220 lbs. can be expected to have somewhat higher ovulation rates and more embryos than smaller, slower growing gilts. The size of litter which a gilt is born in or raised in appears to have little relationship to her future productivity. These data also suggest that on the average gilts that are heavier at breeding can be expected to have higher ovulation rates and more embryos than lighter gilts at breeding.

The Influence of Prostaglandin $F_{2\alpha}$ on Estrous Cycle Length and the Induction of Parturition in Swine

D. M. Hallford, R. P. Wettemann, E. J. Turman, I. T. Omtvedt, D. L. Kreider and S. D. Welty

Story in Brief

Twenty 9-month-old crossbred gilts were randomly allotted to one of four treatment groups to determine the effects of prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) on estrous cycle length. Two groups were injected four times intramuscularly at 12 hour intervals starting on day 4 of the estrous cycle with either a total of 80 mg $PGF_{2\alpha}$ or sterile saline. The other two