

Age and Weight at Puberty for Purebred and Crossbred Gilts of Four Breeds

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Story in Brief

The data were collected from 463 purebred and crossbred gilts of Duroc, Yorkshire, Landrace and Spot breeding farrowed during fall 1976 and spring 1977. All gilts were fed *ad libitum* either on pasture or in confinement. When gilts reached 200 lb, they were weighed off test and placed in dirt lots. After the gilts were taken off test they were limit fed (approximately 5 lb/day) and checked daily for expression of first estrus. First estrus was considered to have occurred when a gilt would first stand to be mounted by a teaser boar. For the purpose of the study, first estrus was used to define puberty.

The breed of sire had no significant effect upon age at first estrus. However, breed of sire did significantly affect weight at first estrus. Landrace sired gilts were the lightest and Duroc sired gilts the heaviest at first estrus (206.6 and 218.8 lb, respectively). Breed of dam significantly affected both age at first estrus and the number of days from when gilts were removed from test until expression of estrus. Age at first estrus was lowest for gilts from Spot and Duroc dams (188.8 and 189.8 days, respectively), followed closely by Landrace (191.9 days) and then gilts from Yorkshire dams (197.6 days).

Landrace and Yorkshire sired gilts which were fed in confinement expressed estrus earlier than the Landrace and Yorkshire sired gilts which were fed on pasture. However, Duroc sired gilts reached puberty earlier if fed on pasture than if fed in confinement. Spot sired gilts expressed estrus at similar ages on either system.

Crossbred gilts were 6.3 days younger and were 2.2 lb heavier at first estrus than purebred gilts. Spring farrowed gilts expressed estrus 5.8 days earlier and weighed 7.3 lb more at first estrus than fall born pigs. Gilts fed in confinement were penned next to boars of a similar age and gilts on pasture were fed together with barrows. Gilts in confinement were 4.3 days younger and 4.6 lb lighter at first estrus than those fed on pasture.

Seven percent of the gilts farrowed in the fall of 1976 were not detected in estrus compared to 11.6 percent of the gilts farrowed in the spring of 1977. Estrus was observed in 92.9 percent of the crossbred gilts compared to 84.7 percent of the purebreds. Management systems did not affect the percentage of gilts exhibiting estrus.

Introduction

as swine production became more intense, there was increased interest in maximizing productivity. Reducing the age at when gilts are bred, without any significant reduction in their performance, can result in savings of both feed and labor. Some environmental factors which have been found to reduce age at puberty include fence-line contact between gilts and boars, daily exposure of gilts to a teaser boar, moving gilts and mixing gilts together.

It is also important to understand the genetic factors associated with age at puberty. Accurate estimates of heritability will determine the opportunities to reduce age at puberty by selection. Previous research has shown large genetic differences between breeds for some factors associated with reproductive performance. However, there is little information currently available regarding breed differences for age and weight at puberty. Since crossbred females have proven to be superior to purebreds for reproductive performance, a comparison of the different two-breed crosses is necessary for these traits.

Therefore, the purpose of this paper is to provide a preliminary comparison of purebreds and crossbreds of Duroc, Yorkshire, Landrace and Spot breeding for age and weight at puberty. This information may be valuable when analyzing mating systems which will maximize overall efficiency of production.

Experimental Procedure

The data were obtained from 463 gilts which were purebred and two-breed crosses of Duroc, Spot, Yorkshire and Landrace breeding. The gilts were raised at the Stillwater Experimental Swine Farm during the fall of 1976 and spring 1977. They were produced by randomly mating boars of each breed to at least one female of each of the four breeds. Information on the mating structure, management of sows and litters and growth characteristics of the gilts can be found in the two preceding papers in this report.

The pigs were all farrowed in a central farrowing unit and weaned at six weeks of age. Creep was provided at approximately 21 days of age. Two weeks after weaning, gilts were randomly allotted within litters to either of two management schemes, pasture or confinement finishing. All gilts were fed *ad libitum* until they reached 200 lb, at which time they were weighed off test and probed for backfat. The gilts were then grouped and placed in pasture lots. After placement in pasture lots, gilts were checked daily for estrus activity with the aid of a teaser boar. For the purpose of the study, puberty was defined as a gilt's first detectable estrus (indicated by a standing response when mounted by a teaser boar). Age and weight were recorded when gilts expressed their first estrus. Each season gilts were checked daily until the youngest gilts were approximately 7½ months of age. (The youngest gilts were 219 days of age in

each of the seasons). The number of days and weight gain from the time the gilts were removed from test until they expressed estrus was also noted. Gilts which displayed obvious signs of disease, lameness or died before reaching 219 days of age were omitted from the analyses.

Results and Discussion

Breed group means and comparisons among purebreds and crossbreds are presented in Table 1. Crossbreds exhibited estrus at an earlier age than purebreds (190.4 *vs* 196.7 days). Crossbreds were 2.2 lb heavier than purebreds at first observed estrus which was due to a slightly greater gain from when they were removed from test to when they were first observed in estrus. In addition, a higher percentage of purebred gilts than crossbred gilts were never observed in estrus (15.3 percent *vs* 7.1 percent).

The range in age for the 43 gilts which were not observed in estrus was 219 to 285 days with a mean of 242.7 days. The range in age for gilts that did exhibit estrus was 147 to 274 days with a mean of 192.0 days. Eighty-seven percent of the gilts which were detected in estrus were less than 219 days old at first observed estrus. It appears that adequate time was allowed for most gilts to express estrus.

Breed of sire did not significantly affect age at first estrus, however, breed of sire did significantly affect weight at first estrus (Table 2). Weight at puberty for Landrace sired gilts was 12.2 lb less than for Duroc sired gilts (206.6 and 218.8 lb, respectively). Although not significant, the number of days from when removed from test until expressions of estrus was shorter for gilts sired by Landrace (22.4 days) and Spot (21.5 days) than for those sired by Duroc or Yorkshires (26.1 and 25.9 days, respectively). The reduction of time from removal from test to expression of estrus coincided with a reduction in weight gain for the same period.

Breed of dam significantly affected both age at puberty and the number of days from when gilts were removed from test to expression of estrus (Table 3). Generally, gilts from the breed of dam requiring fewer days from when removed from test to expression of estrus also were younger at first estrus. The mean age at first estrus was lowest for gilts from Spot (188.8 days) and Duroc dams (189.7 days) which were followed closely by gilts from Landrace dams (191.9 days) and then gilts from Yorkshire dams (197.6 days).

A significant interaction existed between breed of sire and management system (pasture or confinement). Both Yorkshire (185.7 *vs* 199.2 days) and Landrace (188.0 *vs* 195.6 days) sired gilts expressed estrus at a younger age when fed in confinement than when fed on pasture. Gilts sired by Spots responded similarly in either pasture or confinement (189.2 and 189.3, respectively). On the other hand, Duroc sired gilts that were fed on pasture were somewhat younger at first estrus than those which were fed in confinement (192.3 *vs* 195.7 days). No interaction was evident for weight at first estrus.

Table 1. Average performance for gilts of each breed group

Breed Group	No.	Age at Puberty (days)	Weight at Puberty (lb)	Days ^b	Gain, lb ^b	Number of undected ^c
Duroc	36	197.0	220.2	27.0	15.5	10
Yorkshire	26	200.7	204.9	29.8	4.7	6
Landrace	34	195.4	205.3	20.2	4.7	1
Spot	28	195.1	210.8	20.7	11.8	2
DxY	62	197.9	223.0	33.0	22.8	6
DxL	55	186.2	204.6	19.5	6.6	6
DxS	51	185.2	215.7	21.0	12.0	0
YxL	54	196.5	213.1	27.3	12.2	4
YxS	60	187.1	209.9	20.6	9.0	7
LxS	57	188.7	207.6	21.2	5.6	1
Purebreds	124	196.7*	210.2	23.8	9.1	19
Crossbreds	339	190.4	212.4	23.9	11.4	24

^aReciprocals combined (D-Y = DxY and YxD).

^bDays and gain from when gilts were removed from test to expression of estrus.

^cNumber of gilts which were not observed in estrus. Youngest gilts were 219 days of age when estrus detection was terminated.

*Difference between purebreds and crossbreds significant ($P < .05$).

Table 2. Average performance of gilts by each breed of sire

Sire breed	No.	Age at Puberty	Weight at Puberty**	Days ^a	Gain ^{a*}
Duroc	100	194.0	218.8	26.1	16.8
Yorkshire	101	192.9	211.9	25.9	10.9
Landrace	107	192.0	206.6	22.4	6.2
Spot	112	189.3	210.8	21.5	9.9

**Significant ($P < .01$).

^aDays and gain are the number of days and weight gain, respectively, from when gilts were removed from test to puberty.

Table 3. Average performance for gilts by each breed of dam

Sire breed	No.	Age at Puberty**	Weight at Puberty	Days ^{a**}	Gain ^a
Duroc	108	189.7	213.7	24.8	12.3
Yorkshire	98	197.6	214.9	29.5	14.7
Landrace	114	191.9	208.3	21.4	7.8
Spot	100	188.8	211.0	20.2	9.0

**Significant ($P < .01$).

^aDays and gain are the number of days and weight gain, respectively, from when gilts were removed from test to puberty.

Spring farrowed gilts were significantly younger at first estrus than fall farrowed gilts (189.0 and 194.8 days, respectively) (Table 4). The spring born gilts were also significantly heavier at first estrus than fall born gilts (215.6 and 208.3 lb, respectively). The heavier weight at first estrus for spring farrowed gilts appeared to be the result of a significant difference in amount of gain from when they were removed from test to expression of estrus.

Table 4. Average performance for gilts born during Fall 1976 and Spring 1977 farrowing seasons

	Fall 1976	Spring 1977
Number	214	206
Age at Puberty Days**	194.8	189.0
Weight at Puberty, lb**	208.3	215.6
Days Off Test	22.8	24.9
Gain, lb*	9.0	12.8
% Undected	7.0	11.6

* Significant difference between seasons ($P < .05$).

**Significant difference between seasons ($P < .01$).

Table 5. Average performance for gilts fed on pasture or in confinement

	Pasture	Confinement
Number	218	202
Age at Puberty, Days*	194.0	189.7
Weight at Puberty, lb*	214.1	209.5
Days Off Test	23.0	24.8
Gain, lb	10.9	11.8
% Undected	9.2	9.4

*Significant difference between management systems ($P < .05$).

In the comparison among management schemes, confinement reared gilts were significantly lighter (4.6 lb) and younger (4.3 days) at first estrus than gilts raised on pasture (Table 5). The validity of the comparison among management schemes should be weighed carefully because gilts in confinement were penned adjacent to boars of similar age; while those on pasture were fed together with barrows. Research has indicated that penning boars adjacent to gilts will reduce age at puberty. Therefore, the results need to be limited to the particular circumstances in which the data were obtained.

This should be considered as a preliminary comparison among these breed groups. Additional replications of this mating structure are being made and will provide more precise comparisons.