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The effects on boar reproductive efficiency of exposure to females during rearing

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The Effects on Boar Reproductive Efficiency of Exposure to Females During Rearing¹

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Summary

Thirty-two boars (16 littermates) were reared from 3½ to 5½ months in either an all-male group or with fence-line exposure to cycling sows and gilts. Exposure to females did not significantly increase testicle or accessory gland weights, sperm production, or libido score. Boars that displayed more sexual activity (mounts and sheath sniffs) from 3½ to 5½ months of age performed superiorly in mating tests at 5½ and 7½ months of age. Libido scores of littermate boars were very similar.

Introduction

Since reproductive performance of boars is poor in many swine herds, we hope to identify environmental effects on boar reproduction and develop boar rearing and management procedures that improve boar reproductive performance. This project was to determine whether exposing young boars (from 3½ to 5½ months of age) to estrous females affected: (a) sexual activity among boars from 3½ to 5½ months; (b) libido, mating ability, and semen production from 5½ to 7½ months; and (c) testicle and sex accessory gland weights at 5½ and 7½ months.

Procedures

To accomplish those objectives, we reared 32 boars (16 littermate pairs) from 3½ to 5½ months of age in two groups. Controls were penned in an area removed from other pigs on the farm, while female-exposed boars had fence-line contact with mature gilts and sows who were randomly exhibiting estrus.

Sexual activity from 3½ to 5½ months. Activities of boars were recorded for one-hour periods, early in the morning, by three observers who rotated so each observer recorded events in each pen an equal number of times.

Libido and mating ability at 5½ and 7½ months. Twelve boars (from each group) were slaughtered at 5½ months to compare development of the reproductive organs immediately after female exposure. The remaining 20 boars were tested twice (at 6½ and 7½ months) for libido and mating ability by exposing each boar, individually, to fence-line contact with a group of estrous gilts for 5 minutes. The boar and one receptive gilt were then moved to another pen for a 15-minute test. Boars were scored

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from one to five on their response to the estrous gilt: (1) no interest; (2) interest but no mount; (3) mount; (4) mount with thrusting and extended penis; and (5) semen collected.

Testicle and sex accessory gland weights at 5½ and 7½ months. The 22 boars slaughtered at 5½ and 7½ months were used to estimate the development of reproductive organs by weighing testicles, epididymides, and accessory glands. Elongated spermatids per testicle and sperm per cauda epididymis also were determined.

Results and Discussion

Sexual activity from 3½ to 5½ months. More mounting was observed in the female-exposed pen early in the exposure period. Number of mounts and sheath sniffs observed during this period were closely related to performance in mating tests at 6½ and 7½ months (Table 11). Boars displaying more sexual behaviors during rearing received higher mating scores after puberty when exposed to an estrous gilt, which suggests that a behavior pattern beneficial to future mating performance is either developing, or has already been determined by this period. We have other mating behavior studies in progress.

Table 11. Correlations Between Sexual Acts and Libido Score

Sexual acts	Libido score 6½ month	Libido score 7½ month
Sheath sniffs	.67*	.56 ^t
Mounts	.55 ^t	.60 ^t
Nosing side	.42	.48
Anal sniffs	.28	.29
Total sexual acts	.69*	.68*

^t_P<.10

*_P<.05

Libido and mating ability at 5½ and 7½ months. No differences, due to treatment, were detected in the mating tests. But litter was a significant source of variation, either genetic or from the litter's early environment, possibly even during the dam's pregnancy.

Testicle and sex accessory gland weights at 5½ and 7½ months. No statistically significant differences due to female exposure were detected

(Tables 12, 13, and 14); however, at 5½ months, female-exposed boars had lighter testicles with more elongated spermatids/gram and slightly more total sperm/testis than controls. Accessory sex gland weights also were heavier at 5½ months for female-exposed boars. But the differences were not apparent for boars slaughtered at 7½ months, so any possible increase in organ weights had dissipated by the recommended breeding age for young boars.

Conclusions

These data fail to conclusively demonstrate any effect on boar reproductive development due to female exposure. More boars per treatment might have shown statistically significant effects at 5½ months, but not at 7½ months. Therefore, young boars' only long term response to exposure to mature females was to reduce growth rate.

Potentially, the relationship between sexual activity during rearing and post-puberal performance in mating tests may be useful to select young boars based on their behavior from 4 to 5 months of age. Because events before or during the period from 4 to 5 months seem to be important in establishing behavior patterns, we are continuing our investigations.

Table 12. Sex Accessory Gland Weights

Slaughter age	Treatment	Bulb of prostate gland	Seminal vesicle gland	Bulbourethral gland
		Mean ± S.E.	Mean ± S.E.	Mean ± S.E.
5½ ^a	Control	5.7 ± 1.2	44.5 ± 15.6	79.7 ± 13.8
	Exposed	6.6 ± 1.2	49.1 ± 15.6	92.1 ± 13.8
7½ ^b	Control	14.3 ± 1.1	105.2 ± 14.3	183.5 ± 12.6
	Exposed	11.3 ± 1.1	101.0 ± 14.3	158.2 ± 12.6

^aLeast square means of 5 observations.

^bLeast square means of 6 observations.

Table 13. Effects of Exposure to Mature Females on Testicle and Epididymal Weights of Young Boars

Slaughter age	Treatment	Testicle weight (gm)		Epididymal weight (gm)			
		Right Mean $\pm$ S.E.	Left Mean $\pm$ S.E.	Right tail Mean $\pm$ S.E.	Right head & body Mean $\pm$ S.E.	Left tail Mean $\pm$ S.E.	Left head & body Mean $\pm$ S.E.
5½ ^a	Control	190.3 $\pm$ 16.9	192.1 $\pm$ 17.6	14.9 $\pm$ 2.1	19.3 $\pm$ 2.8	14.8 $\pm$ 1.7	20.4 $\pm$ 2.3
	Exposed	160.0 $\pm$ 16.9	169.4 $\pm$ 17.6	17.2 $\pm$ 2.1	20.4 $\pm$ 2.8	17.2 $\pm$ 1.7	20.4 $\pm$ 2.3
7½ ^b	Control	349.0 $\pm$ 15.4	364.9 $\pm$ 16.0	26.9 $\pm$ 1.9	33.7 $\pm$ 2.6	29.1 $\pm$ 1.5	34.3 $\pm$ 2.1
	Exposed	318.6 $\pm$ 15.4	341.4 $\pm$ 16.0	24.4 $\pm$ 1.9	29.7 $\pm$ 2.6	26.5 $\pm$ 1.5	29.8 $\pm$ 2.1

^aLeast square means of 5 observations.^bLeast square means of 6 observations.

Table 14. Sperm Production and Sperm Reserves

Slaughter age	Treatment	Left testicle		Left tail epididymis	
		Sperm/gram Mean $\pm$ S.E. (X10 ⁶)	Total sperm Mean $\pm$ S.E. (X10 ⁹)	Sperm/gram Mean $\pm$ S. E. (X10 ⁶)	Total sperm Mean $\pm$ S. E. (10 ⁹)
5½ ^a	Control	49.3 $\pm$ 8.1	9.1 $\pm$ 3.1	347.6 $\pm$ 184.0	6.4 $\pm$ 3.6
	Exposed	69.2 $\pm$ 8.1	11.1 $\pm$ 3.1	606.4 $\pm$ 184.0	11.3 $\pm$ 3.6
7½ ^b	Control	93.9 $\pm$ 7.4	32.8 $\pm$ 2.9	1,061.8 $\pm$ 102.1	30.9 $\pm$ 3.1
	Exposed	89.7 $\pm$ 7.4	29.9 $\pm$ 2.9	832.0 $\pm$ 102.1	22.9 $\pm$ 3.1

^aLeast square means of 5 observations.^bLeast square means of 6 observations.