

ENVIRONMENTAL EFFECTS ON PUBERTY IN GILTS

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Story in Brief

The effects of season, breed and confinement on the initiation of puberty in gilts was determined. Season did not significantly influence the onset of estrous cycles. More Hampshire gilts were cycling at 7 months of age than Yorkshire gilts. At 7 months of age, body weight was similar for cyclic and prepuberal gilts and in most breed-management groups, backfat was similar for cyclic and prepuberal gilts. We conclude that season, body weight, and backfat are not major regulators of the onset of puberty in gilts.

(Key Words: Environment, Gilt, Puberty.)

Introduction

Puberty is often defined as the time that gilts exhibit their first estrus followed by ovulation and development of corpora lutea. A major reproductive problem in gilts is associated with inactive ovaries and the absence of estrus. Puberty is a result of secretion of gonadotropin releasing hormone from the hypothalamus at the base of the brain. This hormone stimulates the anterior pituitary to secrete follicle stimulating hormone and luteinizing hormone which stimulate growth of follicles resulting in estrus and ovulation.

Many external and internal factors stimulate the brain and the hypothalamus to cause the onset of puberty. Some of the external factors that may regulate puberty are season, ambient temperature, confinement and boar exposure. The purpose of this experiment was to determine the effects of season, breed and confinement on the percentage of gilts that had initiated puberty by seven months of age.

Materials and Methods

A total of 79 Hampshire and 138 Yorkshire gilts that were born during all months between October 1991 and May 1993 were studied. Each season consisted of three consecutive months with winter commencing in January of each year. Gilts were maintained in confinement until seven months of age or were removed from confinement to outside pens at 4 months of age and exposed to boars. At 7 months of age, two blood samples were obtained at a 7 day interval and progesterone was quantified. If concentrations of progesterone

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in either of the blood samples was greater than 1 ng/ml it was considered that the gilt had ovulated and had corpora lutea; thus the gilt was classified as post puberal. Body weight and backfat at the last rib were determined when gilts were 7 months of age. Analyses of variance were used to determine the main effects and interactions of breed, season and management.

Results and Discussion

The management system used to grow gilts had a major effect on the onset of puberty. Only 24% of the Hampshire gilts raised in confinement had started cycles by 7 months, whereas, 55% of the Hampshire gilts raised outside had ovulated (Table 1). Similarly, only 13% of Yorkshire gilts raised in confinement were cycling by 7 months of age and 49% of the gilts raised outside had initiated cycles.

Breed influenced the percentage of gilts that were cycling at 7 months of age ($P < .04$); 45% of the Hampshire gilts were cycling and 23% of the Yorkshire gilts. However, breed was partially confounded with management of the gilts. Seventy-four percent of the Yorkshire gilts were raised in confinement and 32% of the Hampshire gilts were confined. Confinement of gilts usually delays the onset of puberty. Season did not significantly influence the onset of estrous cycles. Fifteen percent or less of the Yorkshire gilts in confinement during any of the four seasons had started estrous cycles by 7 months. Over 50% of the Hampshire gilts that were outside had ovulated by 7 months during the spring, summer and fall.

Table 1. Effects of season, breed and management on the percentage of gilts that attained puberty by 7 months of age.

Season at 7 months	Breed							
	Hampshire				Yorkshire			
	Confinement		Outside		Confinement		Outside	
Winter	100	(1) ^a	20	(5)	14	(14)	--	--
Spring	17	(12)	50	(8)	0	(10)	--	--
Summer	27	(11)	64	(14)	13	(38)	43	(28)
Fall	0	(1)	59	(27)	15	(39)	67	(9)
Total	24	(25)	55	(54)	13	(101)	49	(37)

^a Number of gilts in parentheses.

Analyses were conducted within breed and management system to determine if body weight and backfat at 7 months of age were similar for prepuberal gilts and gilts that had started estrous cycles. Body weights, within a breed-management group, were similar for cyclic and puberal gilts at seven months of age (Table 2). Backfat thickness was also similar for prepuberal and cyclic gilts at 7 months of age, except for Hampshire gilts raised outside. There was a tendency ($P < .08$) for backfat to be greater for cyclic than prepuberal Hampshire gilts raised outside. Taken in total, these results indicate that body weight and backfat are not major regulators of the onset of puberty in gilts.

Season of the year did not have a major influence on the onset of puberty in this study, although heat stress may delay puberty in gilts (Flowers et al., 1989). Body weight and backfat are not major regulators of the onset of

Table 2. Body weight and backfat of gilts at 7 months of age that were prepuberal or cyclic.

Characteristic	Management	
	Confinement	Outside
Hampshire		
Prepuberal gilts		
Number	15	15
Body weight, lbs	292 ± 8	277 ± 8
Backfat, in	.60 ± .03	.59 ± .03 ^a
Cyclic gilts		
Number	4	16
Body weight, lbs	274 ± 16	290 ± 8
Backfat, in	.62 ± .06	.65 ± .03 ^b
Yorkshire		
Prepuberal gilts		
Number	73	18
Body weight, lbs	289 ± 4	271 ± 9
Backfat, in	.69 ± .02	.61 ± .03
Cyclic gilts		
Number	11	16
Body weight, lbs	292 ± 10	278 ± 10
Backfat, in	.68 ± .06	.65 ± .04

a,b $P < .08$.

puberty in gilts. In the present study, the percentage of gilts that were puberal at 7 months was slightly greater for Hampshire than for Yorkshire gilts. Management of gilts during growth is a major regulator of puberty. The effects of confinement on puberty in gilts has been described by Christenson (1981). In both Hampshire and Yorkshire gilts, those managed in confinement without exposure to boars had delayed puberty compared to gilts raised outside and exposed to boars and a different environment.

Exposure of gilts to novel stimuli and boar exposure may be useful methods to increase the percentage of gilts cycling at 7 months of age.

Literature Cited

- Christenson, R.K. 1981. *J. Anim. Sci.* 52:821.
Flowers, B. et al., 1989. *J. Anim. Sci.* 67:779.