

Increasing Reproductive Efficiency of Gilts Managed in Confinement

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Story in Brief

Sixty-two Yorkshire gilts were used to determine if the absence of estrus in gilts reared in confinement is caused by decreased ovarian response to gonadotropins. Gilts were reared in confinement on concrete floors until 130 days of age then confined in concrete slotted floor pens (8 x 12 ft, eight gilts per pen) or outside lots (60 x 100 ft) until 240 days of age. Gilts were observed daily for estrus starting at 160 days of age. Twenty-four percent of the outside gilts and 18 percent of the confinement gilts exhibited estrus by 210 days of age.

Thirty-two confinement gilts that had not exhibited estrus or ovarian activity by 210 days of age were randomly allotted to treatments: I-Control, II-750 IU PMSG, III-750 IU PMSG and 100 μ g GnRH four days later or IV-250 μ g estradiol. Percentages of confinement gilts in estrus within six days after treatment were 25.0, 75.0, 87.5 and 0 percent for treatments I thru IV, respectively. Days from treatment to estrus for gilts that responded to treatment were 4.0 ± 1.0 , 3.3 ± 0.3 and 4.1 ± 0.3 days for treatments I, II and III, respectively. These data indicate that anestrus gilts in confinement lack cyclic ovarian function but can respond to PMSG treatment with estrus and ovulation.

Introduction

Intensification of swine production has increased the total efficiency of pork production. Confinement, either partial or complete, is an integral part of intensification. The breeding herd is the last phase of modern production systems to move into confinement. With the construction of total cycle confinement systems, reports of reduced reproductive efficiency of gilts and sows have been widespread. Symptoms reported have included delayed puberty, unwillingness to mate and shortened or lengthened expression of estrus. The net result of these problems has been decreased conception rates, reduced reproductive performance and increased production costs.

This experiment was conducted to determine if delayed puberty associated with total confinement of gilts is caused by altered ovarian response to gonadotropic hormones and to develop hormonal therapy that could be used to initiate puberty in anestrus gilts in confinement.

Experimental Procedure

All gilts were reared in confinement on concrete floors until 130 days of age at the South Swine Barn in Stillwater. Gilts were then confined in concrete slotted floor pens (8 x 12 ft, eight gilts per pen) or outside lots (60 x 100 ft) until 240 days of age. Starting

at 160 days of age, gilts were checked for estrus daily using a boar. The boars used for estrus detection were alternated between confinement housing and outside lots every two weeks.

Inside anestrous gilts were randomly allotted to one of four treatments at 210 days of age: I-Control, II-750 IU PMSG, III-750 IU PMSG and 100 μ g GnRH four days later or IV-250 μ g estradiol. Anestrous gilts were treated during a 10-week period starting in July.

Blood samples were obtained via puncture of the vena cava one week prior to treatment and on the day of treatment. Plasma progesterone was quantified in these samples by radioimmunoassay. The blood progesterone concentrations were used to select anestrous gilts that lacked ovarian activity as well as behavioral estrus. Gilts that exhibited estrus after treatment were inseminated each day of estrus. At 40 days after treatment, the gilts were slaughtered and the numbers of embryos and corpora lutea were determined.

Results and Discussion

Twenty-four percent of the outside gilts and 18 percent of the confined gilts exhibited estrus by 210 days of age. Gilts born during November and December (fall) and maintained outside had a higher incidence of estrus before 210 days of age than gilts born during February and March (spring) (62 percent vs 0 percent respectively, Table 1). The fall born gilts maintained outside were also lighter at 210 days of age than the spring born gilts. Confinement gilts born during the fall and spring had similar body weights and few had exhibited estrus by 210 days of age (Table 1). Perhaps elevated ambient temperature during the summer months delayed the attainment of puberty of the spring born gilts maintained outside.

Anestrous confinement gilts averaged 236.1 ± 4.4 lb and 212.0 ± 1 days of age at treatment. More gilts treated with PMSG and PMSG plus GnRH exhibited estrus within six days after treatment than the controls or estradiol treated gilts (Table 2). Conception rates were similar for the gilts on the three treatments that exhibited estrus, and the numbers of embryos and corpora lutea at day 30 of pregnancy were not influenced by treatment.

Ovarian follicular growth and maturation were stimulated by PMSG treatment. The matured follicles secreted estrogen and caused the onset of standing heat. Ovulation occurred either with or without GnRH treatment after PMSG. Since most anestrous gilts responded to PMSG treatment, it appears that the ovaries were capable of normal function.

These data suggest that confinement gilts not exhibiting estrus by 210 days of age can respond to injections of PMSG and a fertile estrus will be induced. Season of the year when a gilt is born and/or reaches puberty may have an effect on the response to PMSG. Future studies at this station will investigate seasonal effects on puberty in gilts.

Table 1. Influence of confinement on body weight and estrous activity of Yorkshire gilts.

Birth month	Treatment	Number of gilts	Estrus before 210 days		Weight at 210 days (kg)
			(no)	(%)	
November and December	Confinement	15	3	20	242
	Outside	8	5	62	213
February and March	Confinement	25	4	16	230
	Outside	13	0	0	240

Table 2. Reproductive characteristics of anestrus gilts after hormone treatments.

Criteria	Control	PMSG	PMSG & GnRH	Estradiol
No. of gilts	8	8	8	8
No. of gilts in estrus after treatment	2	6	7	0
No. of gilts pregnant to first estrus	2	5	5	0
No. of embryos	14.0	10.8	9.8	---
No. of corpora lutea	17.5	15.6	16.4	---