Influence of Cooling Methods on Boar Fertility with Summer Breeding

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Story in Brief

Eighteen boars were used to evaluate the effectiveness of different boar cooling methods on fertility with summer breeding. When boars received only shade, 44.1 percent of the gilts bred were pregnant at 30 days after breeding. However, if boars were sprinkled in addition to shade or maintained in a cool chamber at 70 F, 63.9 percent and 67.8 percent, respectively, of the gilts became pregnant. Litter size of pregnant gilts was not influenced by treatment. It appears that under Oklahoma conditions, evaporative cooling from the body surface of boars is sufficient to maintain acceptable fertility during summer months and air conditioning is not necessary.

Introduction

Exposure of boars to elevated temperatures during July and August can influence their fertility through September. Thus, the number of open sows and the number of sows farrowing small litters during November, December and January could be related to the effectiveness of summer cooling methods.

We have previously determined that heat stress of boars in temperature controlled chambers results in reduced semen quality and reduced fertility (Wettemann *et al.*, 1974; Wettemann *et al.*, 1977). Eight-two percent of the gilts bred to control boars conceived, but only 59 percent of the gilts bred to heat stress boars were pregnant. When heat stressed boars were exposed to cool temperatures, semen quality improved. However, it was not until five weeks after the end of heat stress that the percentage of motile sperm was similar for stressed and control boars. Therefore, if sperm are affected in the formation stages by increased body temperature due to heat stress, the detrimental influence on semen quality is present for up to five weeks later.

During the summer of 1976, we observed that if boars were provided with only shade, respiratory rates increased and semen quality decreased. If sprinklers were available for boars in addition to shade, respiratory rates and semen quality were similar to those for boars maintained in cool chambers.

The purpose of this study was to determine the effectiveness of sprinkling boars or confinement in an air conditioned room on the maintenance of optimal fertility with summer breeding.

Materials and Methods

Eighteen boars were used in this experiment during May through October, 1977. Two Duroc, two Hampshire and two Yorkshire boars were allotted to each treatment. Six boars were housed in a temperature controlled chamber at approximately 70 F. A second group of six boars was kept in outside lots with a shade provided and a third group of six boars was kept in outside lots provided with shade and a water sprinkler from June 1 until September 15. During a three-week breeding period which started on August 11, each boar was hand mated to 5 or 6 gilts. Gilts were maintained together in a dirt lot with shade and sprinklers and were bred in the morning on the first and subsequent days of an estrus. Gilts were slaughtered at approximately 30 days after breeding and numbers of embryos and corpora lutea were determined.

Results and Discussion

The influence of the different cooling systems on boar fertility is shown in Table 1. All gilts were provided with shade and sprinklers during the study. Thus any differences in fertility are due to the effects of heat stress on the boars. When boars received only shade, 44.1 percent of the gilts bred were pregnant 30 days after breeding. If boars were sprinkled in addition to shade, 63.9 percent of the gilts became pregnant. Maintaining boars in a cool chamber during the hot summer resulted in no significant improvement in fertility compared to boars with both shade and sprinklers. Litter size for the pregnant gilts at 30 days after breeding was not significantly influenced by treatment.

The fertility of the boars provided with both shade and sprinklers and the cool chamber boars was about 10 to 15 percent less than we normally observe when breeding during cooler months of the year. This reduction in fertility could be related to heat stress of the gilts or to sexual rest of the boars. The boars were not used for breeding nor was semen collected during the six weeks preceding the breeding season. Semen quality in most males is reduced after a period of sexual rest.

All boars are not affected the same by heat stress. Heat stress may completely inhibit sperm production in some boars but only cause slight reductions in semen quality in others. In Table 2, boars are ranked into fertility groups. Five of the six boars receiving only shade settled 50 percent or less of the gilts bred. Whereas, only two of the boars with shade and sprinklers and one boar maintained in a cool chamber settled 50 percent or less of the gilts that they were mated with. None of the shade treatment boars settled as many as 75 percent of the gilts with which they were mated. However, two of the boars with shade and sprinklers and three of the boars in a cool chamber settled more than 75 percent of the gilts that they were mated with.

Table 1. Fertility of gilts bred during August 1977 to boars maintained with shade, shade and sprinklers or in a cool chamber during the summer

Treatment	No of boars	No of gilts bred	Gilts pregnant at 30 days		
			No	Percent	No of embryos
Shade	6	34	15	44.1	11.8±.6
Shade and sprinkler	6	36	23	63.9	10.6±.5
Cool chamber	6	31	21	67.8	10.4±.7

Table 2. Fertility rank of individual boars maintained with shade, shade and sprinklers or in a cool chamber during the summer of 1977

Treatment	Number of boars that settled the following percentage of the gilts bred		
	≤50%	51-74%	≥75%
Shade	5	1	0
Shade and sprinklers	2	2	2
Cool chamber	1	2	3

Based on the trials conducted during 1976 and 1977, it appears that under Oklahoma conditions, evaporative cooling from the body surface of boars is sufficient to maintain acceptable fertility during summer months and air conditioning is not necessary. When air temperature gets above 80 F, if boars are provided with sprinklers along with shade, this should be sufficient to prevent heat stress.

Literature Cited

Wettemann, R. P., M. E. Wells, I. T. Omtvedt, C. E. Pope, E. J. Turman, G.W.A. Mahoney and T.W. Williams. 1974. Oklahoma Agr. Exp. Stat. MP-92:204.

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