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ESTRUS SYNCHRONIZATION IN GILTS

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The idea of controlling the heat period of female farm animals is not new, but intensive research in this area had not started until just a few years ago. As interest in artificial insemination increased, the desirability of controlling (synchronizing) the estrous cycle of swine became evident. It was soon discovered that boar sperms could not be frozen and still retain their fertilizing capacity in a similar manner as used for dairy cattle or beef cattle sperm. While research in this country on freezing boar spermatozoa is making progress and scientists are optimistic, there has been no major breakthrough in keeping the sperm viable beyond two to four days after collection. Controlling the estrous cycle would greatly enhance the artificial insemination program, especially if fresh semen must be used. Knowledge of the time of heat would permit the scheduling of semen collection, delivery of the semen to the farm, and insemination of the gilts. Several sows and gilts could be bred on one day by the technician rather than one or two animals at a time which would require several trips to breed the herd.

In addition to aiding the artificial insemination program, synchronization offers more advantages to the swine producer. He can set the time of breeding and farrowing and have all the sows and gilts farrow within a relatively short time, or he can "space" the farrowings if he wishes. Litters of pigs farrowed at the same time would be more uniform in size, which would be advantageous in management and marketing of these pigs. Synchronization should virtually eliminate the management problem of keeping a multiple farrowing program on schedule.

Research on estrous synchronization started at this station in 1960. Five experiments have been completed and two more are in progress. The purpose of the experiments has been to determine the proper level of hormones and the sequence of administering these hormones for satisfactory estrus control.

Experimental Procedure

Two hormone-like compounds, 6 chloro-6-dehydro-alpha-17-acetoxy progesterone (CAP) and 17 ethynyl estradiol, have been administered at various levels and for varying lengths of time. CAP exhibits progesterone activity, while ethynyl estradiol has estrogen activity.

Six to eight month old gilts were grouped and checked for heat by vasectomized boars. After their estrous cycles were known, the gilts were allotted on the basis of the stage of the estrous cycle. It was desirable that each treatment lot have gilts at different stages of the estrous cycle. The hormones were fed by thoroughly mixing them into the feed. While on treatment all gilts were given six pounds of feed per head per day in two feedings (a.m. and p.m.). During the period of hormone feeding, gilts were checked for heat with vasectomized boars. After treatment, fertile boars were used for breeding in experiments I, II, III and IV. All gilts on experiment were eventually slaughtered. Some were slaughtered during treatment, some at the end of treatment and others after a post treatment heat period or after 25 days of pregnancy. The reproductive tracts were recovered and

evaluated for condition of the uterus, size and number of follicles and corpora lutea. Embryos were counted and measured from those gilts that had been bred.

Experiment I and II. In experiment I, CAP was fed at levels of 120, 240, or 540 milligrams (mg.) per head per day, whereas in experiment II CAP was fed at levels of 3.25, 16.25, 32.5 or 97.5 mg./head/day. Ten gilts were fed each level for 18 days. Reproductive tracts in experiment I indicated that the levels used were too high.

In experiment II, five of the remaining six gilts (four were slaughtered during treatment) in the lots given 32.5 mg. daily were in heat within seven days post treatment. The 97.5 mg. level appeared to be too high, while the 3.25 and 16.25 mg. levels did not inhibit heat.

Experiment III. CAP was fed at levels of 25 or 50 mg./day or injected at 12.5, 25, 50 or 75 mg. per gilt daily. Six of 10 gilts fed 25 mg./gilt/day were in heat five to seven days after the termination of treatment and 4 of these conceived. Two of the remaining four gilts were in heat and conceived one cycle later. These gilts were synchronized, but failed to exhibit heat on the first cycle post treatment. Two gilts did not return to heat and they were slaughtered 42 days after treatment. Their reproductive tracts appeared normal. The bred gilts were slaughtered at 25 days of pregnancy. The average number of embryos was 12 (range of 7-22).

Only three of 10 gilts fed 50 mg. CAP were in heat within seven days post treatment. Six were in heat within a range of 14 to 27 days after treatment. The reproductive tract of one of the remaining gilts appeared normal, but three others had cystic ovaries.

Injection of the compound was not effective in controlling estrus.

Experiment IV. CAP was fed at the rate of 25 mg./gilt/day simultaneously with one of five levels of 17 ethynyl estradiol (1, 4, 8, 10 or 15 mg./gilt/day) for 18 days to 48 gilts. At least one gilt on each treatment combination exhibited cystic follicles at slaughter. Only 18 gilts returned to heat following hormone withdrawal, with a range of 3 to 28 days elapsing between end of treatment and occurrence of heat. The lowest proportion of gilts returning to heat was observed at the 10 and 15 mg. levels of 17 ethynyl estradiol. Of 15 gilts from which information on fertility was obtained, 14 were pregnant when slaughtered. The small number of gilts mated on any single treatment combination prevents any conclusions on treatment effects on fertility, although overall conception rate appeared normal. Embryonic survival did not appear to be adversely affected by treatment. Of 20 gilts not exhibiting estrus after hormone withdrawal, 14 had morphologically normal uteri and ovaries and the remaining six exhibited cystic ovaries at slaughter. Reproductive tracts were not recovered at slaughter from five gilts.

When compared to earlier trials synchronization of estrus was not improved by the inclusion of 17 ethynyl estradiol in the hormonal treatment.

Experiment V. The estrogen, 17 ethynyl estradiol, was fed at either 14 or 20 mg. per head daily for 10 days to 48 gilts, followed by CAP at 25 or 50 mg. per head daily for an additional 10 days. Twenty-nine gilts were expected to be in heat during the 10 day estrogen feeding period, assuming the hormone treatment did

not block physical manifestation of estrus. Of these 29, 19 came in heat during this period. The estrous cycle intervals of these animals were 17-22 days, with the exception of two gilts with cycles of 14 and 15 days. No animals exhibited heat during CAP treatment. Fifteen of 22 gilts (68%) retained for observation on post-treatment response exhibited estrus 4 to 7 days after hormone withdrawal. A sixteenth animal came in heat 11 days after end of treatment. The remaining six gilts had no grossly detectable ovarian defects at slaughter. The incidence of cystic ovaries was greatly reduced from previous trials, as only four of the 48 gilts were cystic at slaughter. No substantial differences in response between treatment combinations were noted.

In conclusion, this series of experiments have provided the following information:

1. Early experiments showed that 25 to 50 mg./head/day of CAP inhibited the estrous cycle in gilts. When CAP was fed alone, especially at high levels, a high incidence of cystic ovaries occurred. Also, an apparent silent heat period after treatment (failure to accept a boar at the first expected heat period, yet showing visual symptoms of heat and followed by a normal second expected heat) was frequent among the gilts.

2. Feeding ethynyl estradiol simultaneously with CAP was not beneficial in eliminating cystic ovaries nor improving synchronization.

3. The sequence of feeding ethynyl estradiol followed by CAP appeared more effective for control of ovarian function than CAP alone.

4. In the small number of gilts bred, conception rates and embryonic survival among the gilts returning to heat appeared to be normal under the regimes tested.

The experiments in progress are designed to provide more evidence on the value of feeding the estrogen hormone first, followed by the progestogen. After more evidence of satisfactory heat control is obtained, subsequent experiments designed to critically evaluate fertility will be conducted.

Although the use of a hormone treatment to control estrus and conception in swine is not available to the producer on a practical basis, experimental results at this and other stations appear promising and warrant further investigations in this area.