1968

Estrus Synchronization and Artificial Insemination of Swine

D.R. Shelby
South Dakota State University

South Dakota State University
Brookings, South Dakota
Department of Animal Science
Agricultural Experiment Station

A.S. Series 68-33

Estrus Synchronization and Artificial Insemination of Swine

D. R. Shelby

For years scientists have been trying to find drugs or hormones that will control the reproductive cycle and bring gilts into estrus together to be bred at the same time. The only compound tested to date which has been successful in achieving this goal without also producing undesirable side effects is one called by the tradename Aimax. During a normal estrous cycle, gonadotropic hormones are released from the pituitary gland and are carried by the blood to the ovary where these hormones stimulate the production of estrogen by the ovary and cause ovulation. When Aimax is fed to female swine, it prevents the release of gonadotropic hormones from the pituitary gland. Without stimulation from gonadotropic hormones, ovulation does not occur and the ovary does not produce the estrogen needed to bring sows and gilts into estrus. Thus, Aimax fed to sows or gilts prevents them from ovulating or coming into estrus. Most females will then exhibit estrus accompanied by ovulation five to seven days following withdrawal of Aimax from the feed.

With the increasing interest among South Dakota Swine Producers in estrus synchronization and artificial insemination, this study was made to compare these techniques with unsynchronization and natural service under practical farm conditions in South Dakota.

Experimental Procedure

During February 1968, 88 10-month old Duroc-Yorkshire crossbred gilts were randomly allotted into four treatment groups of 22 gilts each: (1) natural service, estrus unsynchronized, (2) natural service, estrus synchronized with Aimax, (3) artificial insemination, estrus unsynchronized and (4) artificial insemination, estrus synchronized with Aimax. All gilts were fed 4.5 lb. daily of a 16% protein corn-soybean meal ration for the 25-day period prior to the beginning of breeding, during breeding and for the 30-day period following breeding. The estrus synchronized gilts were fed 100 mg. of Aimax per head per day during the 20-day period which ended 5 days prior to the beginning of breeding. During gestation from 30 days after breeding to farrowing, the gilts were fed a 13% protein corn-soybean meal ration, the daily amount of which varied from gilt to gilt in order to keep the weight gains of the gilts during gestation at a minimum.

The gilts were either inseminated artificially or bred by natural service 12 hr. after they were first detected in standing estrus following withdrawal of Aimax from the feed. Each gilt received only one insemination or natural service

from one of nine Yorkshire boars and none of those failing to conceive at first service were rebred. The gilts inseminated artificially each received 50 ml. of fresh, whole semen within 2 hr. after it had been collected.

Due to a lack of facilities to farrow all the gilts, only 47 gilts were allowed to farrow. Since the gilts chosen to farrow had all been bred within an 8-day period, there were many more synchronized than unsynchronized gilts that farrowed. All gilts not allowed to farrow were slaughtered 30 days after breeding and their reproductive tracts were recovered and examined for number of corpora lutea present on the ovaries and number of live embryos present in the uterus.

Results and Discussion

Table 1 shows the number of gilts first showing estrus on each of the 20 days immediately following withdrawal of Aimax from the feed. Thirty-eight of the synchronized gilts (86%) exhibited their first day of standing estrus within a 3-day period and all exhibited estrus within an 8-day period. On the other hand, only 10 unsynchronized gilts (23%) exhibited estrus within a 3-day period and 20 days had elapsed before all 44 unsynchronized gilts came into estrus. The two synchronized gilts first showing estrus on days 10 and 12 following withdrawal of the drug were observed in estrus during the period the drug was being fed. This may be due to the fact that during severe cold weather (-20°F.) at the beginning of the drug feeding period these gilts were returning to shelter before they had consumed their fair share of feed. Therefore, they did not receive sufficient amounts of Aimax on those days to inhibit the release of gonadotropic hormones. This resulted in these gilts coming into estrus while the other gilts receiving sufficient feed were suppressed from exhibiting estrus.

Because of variation between gilts in length of gestation (range from 111 to 118 days), the gilts did not farrow as close together as they were bred. Of the 33 synchronized gilts which were allowed to farrow, 30 were bred within a 2-day period and all 33 were bred within a 4-day period. However, only 19 gilts farrowed within a 2-day period and 7 days were required before all 33 gilts had farrowed. Since treatment had no effect on length of gestation as shown in table 2, the variation in length of gestation which exists between gilts is independent of estrus synchronization, and gilts bred on the same day will not necessarily farrow on the same day.

The results of this experiment are in agreement with results reported by other workers in that most gilts exhibited estrus within a 3-day period 5 to 7 days after withdrawal of Aimax from the feed and that conception rate at first service of the synchronized gilts was equal to that of the unsynchronized controls. Table 2 also shows that type of mating and synchronization had no significant effect on conception rate, litter size, eggs ovulated, 30-day embryos present, pigs farrowed dead or degenerate pigs farrowed.

The results of this study show that estrus synchronization and artificial insemination of swine can be used together in a practical and effective manner to decrease time spent on breeding and farrowing, to farrow litters closer

together resulting in a more uniform group of pigs and to make more efficient use of a superior sire resulting in a conception rate and litter size equal to that obtained from natural service of unsynchronized gilts.

Table 1. Number of Gilts Exhibiting Estrus Following Withdrawal of Aimax From the Feed[1]

	Days Following Withdrawal of Aimax																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Unsynchronized Gilts																				
Number in Estrus Each Day[2]	1	6	0	2	2	0	4	1	4	1	2	1	3	2	3	3	4	1	2	2
Total in Estrus to Date	1	7	7	9	11	11	15	16	20	21	23	24	27	29	32	35	39	40	42	44
Synchronized Gilts																				
Number in Estrus Each Day	0	0	0	0	5	20	13	1	3	1	0	1	0	0	0	0	0	0	0	0
Total in Estrus to Date	0	0	0	0	5	25	38	39	42	43	43	44	44	44	44	44	44	44	44	44

[1] Although the duration of estrus of a gilt usually lasts 2 to 3 days, the gilts are counted in the table only on the day they first exhibited standing estrus.

[2] The maximum number of unsynchronized gilts in estrus in any consecutive 3-day period was 10 (23% of all unsynchronized gilts) while the maximum number of synchronized gilts in estrus in any consecutive 3-day period was 38 (86% of all synchronized gilts). These differences between treatments were highly significant ($P < .01$).

Table 2. Influence of Estrus Synchronization and Artificial Insemination on the Reproductive Performance of Gilts[1]

	Treatment Group				
	1 N.S. Un.	2 N.S. Syn.	3 A.I. Un.	4 A.I. Syn.	All Gilts
Gilts per Treatment	22	22	22	22	88
Gilts Conceiving at First Service	18	19	16	19	72
Percent Conception	82	86	73	86	82
Pregnant Gilts Slaughtered	9	2	11	3	25
Eggs Ovulated per Gilt	17.1	17.5	17.2	17.0	17.2
Embryos per Gilt	14.0	12.5	13.3	9.7	13.0
Gilts Farrowing	9	17	5	16	47
Length of Gestation Period	113.4	113.4	113.8	113.4	113.5
Pigs Farrowed per Gilt	10.9	10.9	11.0	10.1	10.6
Pigs Farrowed Alive per Gilt	10.8	10.6	10.4	9.9	10.4
Pigs Farrowed Dead per Gilt	0.1	0.3	0.6	0.2	0.2
Degenerate Pigs per Gilt	0.2	0.5	0.0	0.7	0.4

[1] There were no significant differences between treatment groups for any of the characteristics measured.