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The Use of PMSG/hCG Following Altrenogest in Estrus Synchronized Gilts

Srinoy Chumkam[1], Chanvit Vajrabukka[1,4], Krit Mongkonpunya[2] and You-ming Su[3]

ABSTRACT

Twenty crossbred gilts (Landrace X Large White) were allocated, randomly to altrenogest+PMSG/hCG treated (n=1 0) and altrenogest (control; n=10) groups. Altrenogest+PMSG/hCG treated groups were fed with altrenogest at 20 mg./day for 18 consecutive days. Then they were injected with 1000 IU of PMSG and 500 IU of hCG at 24 h and 96 h post altrenogest withdrawal. Seventy eight percent of the control group and 100% treated group exhibited signs of estrus within 6 days post altrenogest withdrawal. The interval of estrus was reduced ($P<0.05$) by altrenogest. Total born and born alive in control group was higher ($P<0.05$ and $P<0.05$, respectively) than the treated group. Percent of death at birth in term of still born, mummification and other cause of death at birth and the control were 1.2, 0, and 0.5 percent, respectively, and of the treated group were 0, 0.5 and 0.8 percent, respectively. These results indicated that the use of PMSG/hCG following administration of altrenogest has induced estrus in gilts within 6 day.

Key words: pig, synchronization

INTRODUCTION

The possibility of synchronizing estrus and ovulation in groups of gilts offers an opportunity to increase the efficiency of pig production and advantage of using superior genetic boars both in artificial insemination and planned mating. Altrenogest (17-β allyl-estratiene-4-9-11. 17-α-ol-3-one) is a synthetic steroid with progestagenic activity. This compound was previously identified as allyltrenbolone. Altrenogest has been found, when fed to gilts, to prevent ovulatory follicles following luteolysis and could maintain a population of medium follicles until feeding of altrenogest was stopped (Guthrie and Bolt, 1985). Pregnant mare serum gonadotropin (PMSG) and human chrorionic gonadotropin (hCG) have predominantly FSH and LH activity respectively. The hormones can stimulate follicular growth and ovulation. Follicular growth has been stimulated with PMSG, it may be necessary to administer LH or hCG about 48 to 90 hours later in order to induce ovulation. The ability of PMSG to stimulate follicular development and hCG to control precisely the time of ovulation has been utilized to synchronize ovulation and to allow insemination at a fixed time. The reports of Baker *et al.* (1970) and Christenson *et al.* (1973) showed that administration of 1000 to 1500 IU of PMSG and 500 IU of hCG after methallibure withdrawal significantly improves the synchronization of estrus, induces superovulation, increases embryo numbers at 30 days of gestation and increases litter size at farrowing.

The objective of this experiment was to determine reproductive performance of artificial inseminated gilts following synchronization of estrus and ovulation using altrenogest and PMSG/hCG.

MATERIALS AND METHODS

Twenty crossbred gilts (Landrace X Large white) approximately 8 months of age and had exhibited at least one estrus cycle, were randomly allocated to 2 groups. That were alternogest treated (control group, n=10) and altrenogest with PMSG and hCG treated (treated group, n=10). All gilts were fed 2.0 kg./head of a complete feed once daily throughout the

1 Department of Animal Science, Faculty of Agriculture, Kasetsart University, Bangkok.
2 Department of General Science, Faculty of Science, Kasetsart University, Bangkok.
3 Chareonpokhan Groups of Companies, Bangkok.
4 NSRTC, Kampeangsean Campus, Nakohn Pathom.

Table 1 Effects of PMSG/hCG on estrus in gilts that were synchronized with altrenogest.

	Control	Treated
Number of gilts	9	10
Interval of altrenogest withdrawal to onset of estrus	8.75 ± 4.10a	5.00 ± 1.00b

Means within row with different superscripts differ significantly (P< 0.05).

experiment. In both groups, altrenogest (Regumate®, Roussel-Uclaf, France, containing 20 mg. in 5 ml oil solution) was dressed on top of the feed at the level of 20 mg./gilt/day (5ml.) for 18 consecutive days. In treated group, 24 h (day 19) after altrenogest withdrawal, each gilt was injected, intramuscularly, with 1000 IU of PMSG and with 500 IU of hCG at 96 h after the PMSG injection. Gilts were tested for estrus twice daily by observation for the sign of estrus together with back pressure technique through out the experimental period. When they were on heat, all of the gilts were artificially inseminated 4 times, consecutively, from the standing heat, with fresh semen of 1 X 10^{10} sperms/dose.

The results obtained were analysed by the used of Student's t-test (Snedecor and Cochran, 1971)

RESULTS

One gilt in the treated group was sick, therefore, its data were not included in the final results (Table 1). The data were collected from 9 gilts. The occurrence of estrus through the trial is shown in Figure 1. All gilts that exhibited signs of estrus (7 gilts from the control and 10 gilts from the treated group) were inseminated within 6 days after the last feeding of altrenogest. Two gilts from control exhibited sign of estrus and were inseminated on days 10 and 14 after altrenogest withdrawal.

Table 2 showed that the average interval between last feeding of altrenogest and the onset of estrus was reduce (P<0.05) by gonadotropin treatment (5 vs. 8.75 days).

Reproductive performance of all gilts in the experiment are shown in Table 2. In control and treated group, 88.89% and 70.0% of gilts are farrowed, respectively. One gilts in control and three gilts in treated groups were remated. The mean number of total born per litter and born alive per litter in control was significantly higher (P<0.05 and P<0.05, respectively) than the treated group (8.6+4.2 vs. 7.6+3.3 and 7.4+4.9 vs. 6.9+2.7). Still born, mummification and other cause of death at birth in control were 1.2%, 0% and 0.5%, respectively. While in treated group were 0%, 0.5% and 0.8%, respectively.

DISCUSSION

Pituitary gonadotrophin preparation, pregnant mare serum gonadotrophin (PMSG) and human

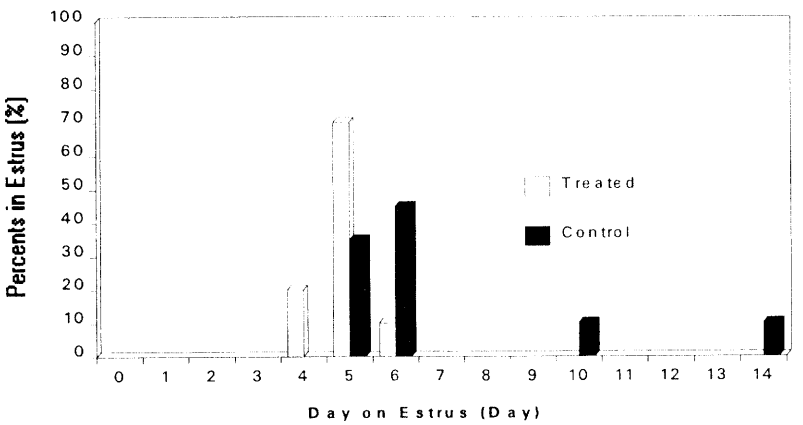

Figure 1 Estrus synchronization using altrenogest (control) and PMSG/hCG following altrenogest withdrawal.

Table 2 Effects of PMSG/hCG on reproductive performance of gilts that were synchronized with altrenogest.

	Control	Treated
Percent of farrowing (%)	88.89	70.00
Percent of return to service (%)	11.11	30.00
Total born per litter (piglets)	8.60 ± 4.20^a	7.60 ± 3.30^b
Born alive per litter (piglets)	7.40 ± 4.90^a	6.90 ± 2.70^b
Percent of death at birth per litter:		
- Still born (%)	1.20	0.00
- Mummification (%)	0.00	0.50
- Others[1] (%)	0.50	0.80

1 Death of piglets caused by laid on, weakness, deformity etc.
Means within row with different superscripts were statistically difference ($P<0.05$).

chorionic gonadotrophin (hCG) have been used to induce follicular growth or ovulation. The administration of PMSG and hCG following the suppression of estrus with methallibure, ICI 33,828 or progestagen provides an improved method of estrus synchronization and controlling the time of ovulation (Polge *et al.*, 1968; Webel *et al.*, 1970; Christenson *et al.*, 1973). The results in this experiment in altrenogest-fed gilts have indicated that the injection of 1000 IU of PMSG on 1st day and 500 IU of hCG on 4th day after withdrawal altrenogest has shortened the average interval between altrenogest withdrawal to onset of estrus. All gilts (100%) in PMSG/hCG treated group exhibited sign of estrus within 6 days while control group exhibited sign of estrus distributively starting from days 5 to 14 from the last feeding of altrenogest.

Mean total born in control were higher than that reported by Chantaraprateep *et al.* (1986, 1987) (8.6 vs. 8.2 and 7.4) but born alive per litter was simillar. While in treated group , both performance were lower than that of the control group. In contrast of other reports which founded that ovulation rate, embryo at 25 days of pregnancy of gilts and litter size at birth were significantly increased by the administration of 1000 and 1500 IU of PMSG and 500 IU of hCG (Baker *et al.*, 1970; Webel *et al.*,1970 and Christenson *et al.*,1973). However, Schilling and Cerne (1972) reported that litter size at farrowing has not been increased consistently by superovulation.

Result from this study indicated that administration of PMSG/hCG after altrenoges withdrawal could decrease the duration to onset of estrus but does not increase litter size, however. This finding would enhance estrus synchronization and AI since the treated animals will come in heat at a shorter period of time. Hence, genetic improvement by AI technique would then be accelerated.

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LETERATURE CITED

Baker, R.D., G.A. Shaw and J.S. Dodds. 1970. Control of estrus and litter size in gilts with animax (ICI 33,828) and pregnant mare's serum. Can. J. Anim. Sci. 50:25-29.

Chantaraprateep P, C. Lohachit, P. Poomsuwan and A. Kunavongkrit. 1986. Estrus synchronization of gilts with altrenogest. Songklanakarin. J. Sci. Technol. 8:161-165.

Chantaraprateep, P., P. Prateep, P. Poomsuwan and A. Kunarongkrit. 1987. Altrenogest for control of estrus in gilts. Thai J. Hlth. Resch. 1:1-7.

Christenson, R.K., C.E. Pope, V.A. Zimmerman-Pope and B.N. Day. 1973. Synchronization of estrus and ovulation in superovulated gilts. J.Anim. Sci. 36:914- 918.

Guthrie H.D., D.J. Bolt. 1985. Pituitary and ovarian hormone secretion and ovulation in gilts injected with gonadotropin during and after oral administration of progesterone agonist (altrenogest). Biol. Reprod. 33:679-684.

Polge, C.B., N. Day and T.W. Grover. 1968.

Synchronization of ovulation and artificial insemination in pigs. Vet. Rec. 83:136-140.

Schilling E. and F. Cerne. 1972. Induction and synchronization of estrus in prepubertal gilts and anoestrus sow by PMSG/hCG-compound. Vet. Rec. 91:471-474.

Snedecor, G.W. and W.G. Cochran. 1971. Statistical Methods. The Iowa State Univ. Press, Ames, Iowa.

Webel, S.K., J.B. Peter and L.L. Anderson. 1970. Control of estrus and ovulation in the pig by I.C.I. 33,828 and gonadotropins. J. Anim. Sci. 30:791-796.