RESEARCH ON USING THE PG 600 IN GILTS

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Abstract

Hormonotherapy is frequently used in swine to induce fertile oestrus in both sows and gilts. The research was conducted over a year on a total of 953 Camborough sows, at least 210 days old at the beginning of the observations, divided into two groups: a control group (642 sows) and an experimental group (311 sows). In the control group were monitored the dynamics of oestrus for 27 days after transfer to the pre-breeding barn, the fertility, and the prolificacy. The appearance of oestrus was analysed in the experimental group for 21 days after transfer. 106 gilts that did not show oestrus during this period were treated with a 5 ml dose of PG 600, administered intramuscularly behind the ear. The oestrus dynamic was analysed for 6 days, along with fertility and prolificacy. After gonadotropin administration, 75.47% of the swine came into heat, compared to 38.73% in the control group. The best response to treatment was in spring (81.81%) and winter (82.60%), and the largest difference between the groups was recorded in summer (45.62%). The average fecundity rate of the gilts in the experimental group was 82.50%, being 1.22% lower compared to those in the control group. The average litter size was 10.32±0.11 piglets/litter in the control group and larger in the experimental group (10.83±0.12 piglets/litter). The results obtained demonstrated the effectiveness of gonadotropin treatment for optimising reproduction in gilts, particularly in those with seasonal anoestrus, oestrus synchronisation, and increased prolificacy.

Key words: *gilts, PG 600, oestrus, fecundity, prolificacy*

INTRODUCTION

In practice, there are methods for inducing oestrus in both sows and gilts, based on knowledge of the hormone's action way in the genital sphere [1]. The hormones PMSG and HCG contribute to follicle growth and ovulation, being used in the induction of oestrus [2,3]. A common method uses the combination of chorionic and serum gonadotropin (PG 600) in both sows [4,5] and gilts [6] to conduct the sexual cycles.

Hormone administration may be done to gilts that have a delay in first oestrus manifestation but also, in prepubertal ones, to introduce them earlier for reproduction. Puberty in gilts is signalled by the appearance of the first oestrus and represents the onset of reproductive capacity (usually between 200 and 220 days of age). The age at puberty is determined by the interaction between genetic and management factors [7], and its delay must be withstanded.

The use of PG 600 in prepubertal crossbred gilts may induce fertile oestrus in a significant proportion (85.2%) within 6 days of treatment, followed by normal embryonic development after insemination [8]. Some studies conducted on Camborough gilts have demonstrated that the use of PG 600 in gilts that were treated for oestrus induction did not negatively influence reproductive performance in the following 3-4 farrowings [9].

MATERIAL AND METHOD

The research was conducted on 953 Camborough hybrid gilts, aged between

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210 and 220 days to the beginning of the observations. The gilts were grouped into two batches: control group (642 gilts) and experimental one (311 gilts) (table 1).

Table 1 The studied gilts

Seson	Control batch (CB)	Experimental batch (EB)
Spring	160	78
Summer	166	77
Autumn	148	76
Winter	168	80
Total	642	311

Housing until the moment of heat beginning was done in collective boxes, 12 – 13 animals/box. On the third day after the transfer to the insemination preparation boxes (considered day 1 of the research), began the identification of animals in heat, with the test boars' help, twice/day.

The control batch was formed by gilts to which was monitored the spontaneous entry into heat for 27 days. The experimental batch was formed by gilts of the same age as those in the control batch; it was monitored the oestrus beginning for 21 days. Those that did not manifest oestrus during this period were inoculated with a dose of PG 600 (5ml), intramuscularly, behind the ear. The preparation contains 400 IU serum gonadotropin and 200 IU chorionic gonadotropin. The physiological effect of the gonadotropin's combination is represented by the growth of ovarian follicles followed by ovulation. The day after the treatment, was monitored the occurrence of oestrus for 6 days, with test boars, 2 times/day. There were 27 observation days in total (21 before treatment and 6 days after). Sows discovered in oestrus were artificially inseminated with doses of semen preserved by refrigeration for a maximum of 3 days. Cervical insemination was performed with 2 doses of 80 ml of semen (at 12-hour intervals), with 4 billion spermatozoa/dose. After insemination, the gilts were maintained in individual pens for 30 days to achieve nidation. In both batches, the fecundity and prolificacy of the inseminated gilts were calculated between 22 and 27 days after transfer from the hybridization farm.

Fertility was calculated with the formula:

F(%) =G/IA, in which,

G= gilts number that did not repeated the oestrus for 42 days following insemination

IA= number of gilts that were inseminated

To farrowing, the gilts prolificacy from both batches was assessed.

RESULTS AND DISCUSSION

Results and discussions on heat onset

In the first 10 days from the experiment beginning, there was registered in heat an average of 42.99% gilts from the control batch (CB) and a similar proportion – 45.65% of those in the experimental one (EB) (table 2). The heat occurrence in the mentioned interval to almost half of the females may be due to the effect of the stress caused by the accommodation changes, lotting, vaccination, on the onset of heat.

Table 2 The appearance of oestrus throughout the year

Interval (days)	Control batch (n=642)		Experimental batch (n=311)	
	No.	(%)	No.	(%)
1-10	276	42.99	142	45.65
11-21	144	22.42	63	20.25
1-21	420	65.42	205	65.91
22-27	86	13.39	80	25.72
1-27	506	78.81	285	91.63

Noteworthy are the differences recorded between seasons during this period, in terms of the sows that exhibited oestrus proportion: 30.72% in summer and 48.80% in winter for CB, and 28.57% in summer and 53.75% in winter for EB (tables 3–6).

During the 11–21-day interval, similar proportions of gilts displayed heat in the two batches: 22.42% of those in CB and 20.25% of those in EB (table 2), with narrow seasonal variations: 19.37% in spring and 25.30% in summer in CB, and 17.50% in winter and 23.37% in summer in EB (tables 3–6).

In the first three weeks from the beginning of observations, an average of 65.42% of the animals in CB and 65.91% of those in EB were inseminated (table 2).

Values markedly lower than the mean were characteristic of the summer season, when only 56.02% of CB and 51.94% of EB animals came into heat. In contrast, during winter, the proportions were 70.23% in CB and 71.25% in EB.

Table 3 The oestrus' appearance during the spring

Interval (days)	Control batch (CB) (n=160)		Experimental batch (EB) (n=78)	
	No.	(%)	No.	(%)
1-10	76	47.50	40	51.28
11-21	31	19.37	16	20.51
1-21	107	66.87	56	71.79
22-27	24	15.00	18	23.07
1-27	131	81.87	74	94.87

Table 4 The oestrus' appearance during the summer

Interval (days)	Control batch (CB) (n=166)		Experimental batch (EB) (n=77)	
	No.	(%)	No.	(%)
1-10	51	30.72	22	28.57
11-21	42	24.30	18	23.37
1-21	93	56.02	40	51.94
22-27	18	10.80	26	33.76
1-27	111	66.86	66	85.71

Table 5 The oestrus' appearance during the autumn

Interval (days)	Control batch (CB) (n=148)		Experimental batch (EB) (n=76)	
	No.	(%)	No.	(%)
1-10	67	45.27	37	48.68
11-21	35	23.64	15	19.73
1-21	102	68.91	52	68.48
22-27	18	12.16	17	22.36
1-27	120	81.08	69	90.78

Table 6 The appearance of oestrus during the winter

Interval (days)	Control batch (CB) (n=168)		Experimental batch (EB) (n=80)	
	No.	(%)	No.	(%)
1-10	82	48.80	43	53.75
11-21	36	21.42	14	17.50
1-21	118	70.23	57	71.25
22-27	26	15.47	19	23.75
1-27	144	85.71	76	95.00

On day 21 from the beginning of the observations, 106 females from experimental batch that had not exhibited oestrus were treated with PG 600. Over the following six days, 80 gilts from EB (75.47%) came into oestrus, whereas only 38.73% of those in CB exhibited this behaviour (table 7).

The greatest difference between CB and EB recorded during the 22–27-day interval was observed during the summer season. In this period, 24.65% of the CB gilts were identified in heat, compared with 70.27% in EB (table 7). The proportion of gilts in heat was calculated from those that had remained not-inseminated up to day 21.

Table 7. The percentage of gilts that came into oestrus between 22 and 27 days

Period	Control batch			Experimental batch		
	Observed gilts	In oestru		Treated gilts	In oestru	
		Nr.	%		Nr.	%
Spring	53	24	45.28	22	18	81.81
Summer	73	18	24.65	37	26	70.27
Autumn	46	18	39.13	24	17	70.83
Winter	50	26	52.00	23	19	82.60
Total	222	86	38.73	106	80	75.47

The mean difference between CB and EB during the 22–27-day interval was 36.74 percentage points, with seasonal variations as follows: 36.53% in spring, 45.62% in summer, 31.70% in autumn, and 30.60% in winter.

According to these results, the maximum effectiveness of the treatment is obtained in the summer, during which a delay in the onset of sexual maturity reflected by the occurrence of oestrus is observed.

Up to the moment of treatment, the proportion of gilts identified in heat was similar in both groups. The difference recorded by the end of the 27-day observation period was determined by the effect of administering the hormonal preparation.

Over the entire duration of the observations, 78.81% of the gilts in CB and 91.63% of those in EB came into oestrus (table 2).

With regard to the dynamics of oestrus onset following hormonal treatment, there was observed a peak on the fourth day, when one quarter of the treated gilts (25.47%) showed oestrus. A similar level was recorded on the third day (23.58%). Lower proportions were observed on the first and sixth days after treatment (1.88% and 2.83%, respectively), while intermediate values were recorded on the second and fifth days (12.26% and 9.43%, respectively) (Table 8). In similar studies, the clustering of oestrus on days 3, 4, and 5 was only 36.08% [10].

Table 8. The dynamic of oestrus appearance at gilts after treatment

The day oestrus onset following hormonal treatment		Spring N=22	Summer N=37	Autumn N=24	Winter N=23	Total N=106
1	No.	-	1	1	-	2
	%	-	2,70	4.16	-	1.88
2	No.	3	5	2	3	13
	%	3.63	13.51	8.33	13.04	12.26
3	No.	5	7	7	6	25
	%	22.72	18.91	29.16	26.08	23.58
4	No.	6	7	5	9	27
	%	27.27	18.91	20.83	39.13	25.47
5	No.	3	4	2	1	10
	%	13,63	10.89	8.33	4.34	9.43
6	No.	1	2	-	-	3
	%	4.54	5.40	-	-	2.83
1-6	No.	18	26	17	19	80
	%	81.81	70.27	70.83	82.60	75.47

Results regarding the fecundity

Fecundity was calculated as the ratio between the number of gilts that did not return to oestrus after insemination and the number of gilts inseminated.

In control batch (CB), a mean fecundity of 83.72% was recorded, with seasonal fluctuations ranging from 77.70% in summer to 88.46% in winter. The scientific literature frequently indicates the negative influence of high temperatures on nidation and consequently, on fecundity. For the experimental batch (EB), the fecundity level was similar, namely 82.50%, with seasonal variations ranging from 76.92% in summer to 89.47% in winter. The fecundity obtained in hormonally treated gilts demonstrates that the administered hormonal combination induced ovulation and maintained the physiological conditions necessary for the establishment of pregnancy.

The average farrowing rate was 81.39% in CB and 78.75% in EB (table 9). During the observation period, 3.62% of gilts aborted.

Table 9. The gilts fecundity

Batch	Season	A.I*. (no.)	Gilts in gestation		Farrowing gilts	
			(no.)	(%)	(no.)	(%)
Control (CB)	Spring	24	20	83.33	19	79.16
	Summer	18	14	77.70	13	72.22
	Autumn	18	15	83.33	15	83.33
	Winter	26	23	88.46	23	88.46
	Total	86	72	83.72	70	81.39
Experimental (EB)	Spring	18	15	83.33	15	83.33
	Summer	26	20	76.92	18	69.23
	Autumn	17	14	82.35	14	82.35
	Winter	19	17	89.47	16	84.21
	Total	80	66	82.50	63	78.75

A.I.* = artificial insemination

Results regarding the prolificacy

The average prolificacy was 10.32 piglets in the control batch (CB) and higher in the experimental batch (EB) group, at 10.83 piglets. May be noticed a difference of 0.51 piglets in favour of experimental batch (EB), attributable to the trophic effect of the administered hormones on the ovaries, followed by an increase in the ovulation rate. Seasonal differences in prolificacy were insignificant, although slightly lower values were observed in gilts inseminated during summer (10.02 in CB and 10.69 in EB) compared with those inseminated in winter (10.56 in CB and 10.98 in EB) (table 10).

The proportion of weaned piglets was 83.7% in CB and 84.57% in EB.

Table 10. The gilts prolificity

Season of A.I.	Control batch (CB)			Experimental batch (EB)		
	Gilts number	Piglets number	Weaned piglets no.	Gilts number	Piglets number	Weaned piglets no.
Spring	19	10.31	8.89	15	10.78	9.40
Summer	13	10.02	8.01	18	10.69	8.20
Autumn	15	10.40	8.67	14	10.87	9.27
Winter	13	10.56	9.00	16	10.98	9.16
Total	70	10.32	8.64	63	10.83	9.16

CONCLUSIONS

Administration of a dose of 5 ml PG 600 to gilts, 3 weeks after transfer to the shelter for insemination preparing, determined a 12.82% increase in the proportion of females that showed oestrus in a period of

27 days. 75.47% of gilts responded to the applied treatment, determining an average difference between groups, in the period 22-27 days after transfer (1-6 days after treatment) of 36.74%.

Sizeable differences between the CB group and the EB group were recorded in the summer season, which leads us to recommend the application of this treatment to stimulate anoestrus gilts, mainly during this period.

After treatment, oestrus grouped in a 2–5-day interval, the highest rate being observed on the fourth day.

Fecundity of treated sows was similar to that of untreated ones, and prolificacy was higher by 0.51 piglets/farrowing.

Hormone therapy with PG 600 may improve reproductive performance in sows (induction and synchronization of oestrus, prolificacy).

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