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REPRODUCTIVE PERFORMANCE OF GILTS SYNCHRONIZED WITH ALTRENOGEST

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Summary:*The introduction of gilts into herds is a key element of management in commercial pig farms and this requires an efficient method for estrus synchronization of young animals. In this case the objective of this study was to evaluate the efficacy of Altrenogest treatment on reproductive performance of synchronized gilts in comparison with nonsynchronized animals depending of the age and the live weight of the animals. Two hundred sixty and two gilts were randomly assigned to two different groups: control group (55) and treated group (207) receiving 20 mg. of Altrenogest for 18 consecutive days. All animals were inseminated twice per estrus with semen dose of 80 ml. containing 3.0×10^9 spermatozoa. The conception rate and farrowing rate numerically increased in treated gilts in comparison to the control group – respectively with 7.46% and 7.72% ($p>0.05$). The same tendencies were found for litter parameters – 0.34 piglets more in total born and 0.39 piglets more born alive per litter. The age and the live weight of gilts had not statistically significant effect on their reproductive performance, but always the better reproductive performance was obtained in treated animals. The treatment with Altrenogestproved to be a highly effective method for managing the estrus in replacement gilts.*

Key words:*Altrenogest, gilt, synchronization, reproductive performance.*

INTRODUCTION

With current pig production systems and type of sow's genetics the annual replacement rate of a farm is between 40-50% of the total census of animals. In this case the introduction of gilts into herds is a key element of management in commercial pig farms and this requires an efficient method for estrus synchronization of young animals. The progesterone-like compound *Altrenogest* is widely used for control of estrus in gilts (Kirkwood, 1999; Kaeoket, 2008; Kraeling and Webel, 2015). In some previous studies (Martinat-Botte et al., 1994; Martinat-Botte et al., 1995; Soede et al., 2007; Krejci et al., 2014) were found that altrenogest's treatment of gilts increased fertility rate and litter size (Martinat-Botte et al., 1990; Wittmann et al., 2006).

The objective of this study was to evaluate the efficacy of *Altrenogest* treatment on reproductive performance of synchronized gilts in comparison with nonsynchronized animalsdepending of the age and the live weight of the animals.

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MATERIAL AND METHODS

Animals.The experiment was carried out in gilts (Topigs40) housed in one pig farm in the period of January-December 2013. Before the gilts to enter in gestation building the animals were kept in penswith group size of between 12 and 15 gilts/pen (density 1.0m^2/gilt). The rearing gilts were providedwith water ad libitum from water nipples and were fed twice a day (about 1.85-2.4 kg of feed/gilt/day). At 180 days of age the backfat thickness of the gilts was measured and the animals which did not satisfy the selection standard (13-15 mm backfatthinknessat the level of the lastrib about 6–8 cm from the mid line - P_2 point) were not used in the trial.

Experimental group.In this group were included 207 gilts. The animals were kept in individual crates in the gestation unit.During 18 consecutive days the gilts were treated with 20 mg of *Altrenogest*(trade name Altresyn®-CevaSanteAnimale, France) in a single dose of 5 ml, mixed with the feed in the individual feeders. Starting the second day after the withdrawal of the treatment the animals were checked and stimulated for estrus twice a day using mature boars.

Control group.55 gilts with clear external signs of estrus anda standing reflex in front of the boar were included in this group.The detectionofestrus was performed twice aday – the first one by stock workers through visual observation of the behavior (restlessness and loss of appetite, mount other females and allow other females to mount her, abundant salivation, special gruntings, erected ears) and aspectof the vulva(vulva edema and vaginal discharge).The second checking was carried out by moving mature boar down the alley in front of the gilts while a technician performed the back-pressure test and controlled the secondary external signs of heat.

Artificial insemination and Pregnancy diagnosis.All animals were inseminated twice per estrus with semen from boars (TALENT - crossbred line TOPIGSD) with good fertilizing ability, with dose of 80 ml, containing 3.0×10^9 spermatozoa. The semen doses were applied with a spiral type catheter using the hands-free cervical technique.

The pregnancy was diagnosed between 23-25 days after insemination with ultrasonic detector SmartScan (HRE Agrar Elektronik GmbH, Germany).

Data analysis.The following parameters were recorded: conception rate and farrowing rate (percentage), number of total born and live born piglets per litter. After farrowing all litters were weighed. The live weight and the age of gilts were recorded before treatment.

Prior to data analysis the gilts were categorized into: 1) animals up to 240 days of age and over 240 days of age; and 2) gilts up to 135 kg live weight, between 136-140 kg live weight and over 140 kg live weight

A one-way ANOVA with fixed effects was used for the statistical analysis.

The post hoc comparisons were done by LSD test. All calculations and statistical analysis were processed by statistical package Statistica for Windows Software (StatSoftInc., 1994), and nonparametric analysis of means and proportion using of the Student's t-criterion.

RESULTS

The differences found both in conception rate and farrowing rate were nonsignificant ($p>0.05$), but the gilts synchronized with *Altrenogest* improved the results by 7.46% and 7.72% respectively in comparison with the nonsynchronized control group. The same tendencies were found for litter parameters – 0.34 piglets more in total born per litter, 0.39 piglets more live born per litter and 0.340 kg more weight per litter (Table 1).

Table 1. Descriptive statistics for reproductive performance of gilts synchronized with Altrenogest and nonsynchronizedanimals(mean±SD)

Reproductive parameters	experimental group	control group
Number of animals	207	55
Live weight of gilts, kg	134.37±6.53	138.47±7.24
Age of gilts, days	242.75±6.59	246.25±7.22
Conception rate, %	80.19	72.73
Farrowing rate, %	76.81	69.09
Total piglets born/litter, n	12.60±1.68	12.26±2.10
Live born piglets/litter, n	11.62±2.53	11.23±2.46
Total weight of live born piglets, kg	15.00±3.16	14.66±2.76

Table 2 shows the reproductive performance of gilts synchronized with *Altrenogest* and nonsynchronized animals depending on age of animals. A nonstatistically tendency (p>0.05) was found for the higher conception rate in experimental group – 0.65% (category up to 240 days of age) and 10.42% (category over 240 days of age). The same tendency was determined regarding farrowing rate – 10.65% (category up to 240 days of age) and 8,47% (category over 240 days of age) (p>0.05). Not significant differences were found (p>0.05) with regard to total piglets born and born alive.

Table 2. Reproductive performance of gilts synchronized with Altrenogest and nonsynchronized animals depending on the age of animals (mean±SD).

Parameters	Age of animals (days)			
	experimental group		control group	
	≤ 240 (n=62)	≥ 240 (n=145)	≤ 240 (n=10)	≥ 240 (n=45)
Conceptionrate, %	80.5	79.1	80.00	68.89
Farrowingrate, %	80.5	75.14	70.00	66.67
Total pigletsborn, n	12.40±1.49	12.69±1.76	13.25±1.58	12.00±2.16
Live born piglets, n	11.65±1.96	11.61±2.76	12.13±1.34	11.00±2.66

The reproductive parameters in gilts synchronized with *Altrenoges*t and nonsynchronized animals depending on the live weight is showed in Table 3. The data analysis shows that a higher percentage of conception rate was obtained in synchronized gilts - 2,93% (category up to 135 kg), 5.65% (category 136-140 kg) and 10,39% (category over 140 kg) in comparison with nonsynchronized animals (p>0.05). The same tendency was observed for farrowing rate in treated animals – 0.69% (category up to 135 kg), 5.65% (category 136-140 kg) and 12.55% (category over 140 kg) (p>0.05). Concerning prolificacy (total born piglets and live born piglets) again nonsignificant tendencies were found but, again, higher (better) results in the synchronized group. Only in the category of animals over 140 kg the value of total born piglets per litter was equal.

Table 3. Reproductive performance of gitls synchronized with Altrenogest and nonsynchronized animals depending on the live weight of animals (mean±SD).

Parameters	Live weightof animals (kg)					
	experimental group			control group		
	≤ 135 (n=134)	136-140 (n=31)	≥ 140 (n=42)	≤ 135 (n=13)	136-140 (n=20)	≥ 140 (n=22)
Conceptionrate, %	79.85	80.65	78.57	76.92	75.00	68.18
Farrowingrate, %	77.61	80.65	76.19	76.92	75.00	63.64
Total pigletsborn, n	12.48±179	13.16±1,34	12.54±1,44	11.60±3,06	12.33±1,72	12.54±1,44
Live born piglets, n	11.46±2.67	12.20±2,24	11.54±2,14	11.10±2,80	11.40±2,32	11.21±2,46

DISCUSSION

The key element of the management in the commercial pig farms is the flow of farrowings of sows and gilts. Estrus synchronization allows organizing the batches according to the mating plan and thus achieving the breeding targets.

At present, the only available method of estrus synchronization in gilts is using *Altrenogest* to block on the hypothalamus-hypophysis system by suppressing the GnRH pulse generator. After 18 days of altrenogest's treatment new follicular phase will start in all animals at the same time and synchronized estrus will finally appear. *Altrenogest*is an orally active progesterone which is similar to natural progesterone. Its action prevents the female comes into heat. So, orally administred suppresses estrus cycle and removes the signs of estrus and ovulation. Once administration is suppressed, the release of natural hormones is restarted, GnRH from the hypothalamus and consequently, FSH and LH from the pituitary, making the females come again in perfect synchronized cycles.

In the current experiment was established that concerning the main reproductive parameters (conception rate, farrowing rate and litter size) better results were found in synchronized gilts in comparison with nonsynchronized animals in spite of nonstatistical differences. These tendencies probably are connected with the short time from the insemination to the fecundation and the more ovulations in treated animals. This hypothesis was established by Martinat-Botte et al. (1994), Martinat-Botte et al. (1995) and Soede et al. (2007). Other experiments showed that *Altrenogest* treatment not influence the reproductive performance of gilts (Kaeoket, 2008).

In the present study, the age of animals had not statistically significant effect on the reproductive performance of the gilts although the experimental group, both animals up to 240 days of age and over 240 days of age, had better reproductive. The same tendency was reported by Goss (2014). This author found more total piglets born and born alive in litters from gilts mated at 190-240 days of age. The commonly accepted idea is that the age of gilts at the first mating should be around 220 - 240 days.

The live weight is an important factor for the effectiveness of estrus synchronization. In this experiment we did not find statistically significant differences between the weight categories, but always the better reproductive performance was obtained in treated animals. Goss(2014)also recommended that the first mating of young sows should be at 130-140 kg live weight.

The current results confirm the need for good gilt's management including synchronization of gilts at the optimal age/weight parameters.

CONCLUSIONS

The conception rate, farrowing rate and litter size's parameters were numerically increased in gilts after treatment of animals for 18 days with *Altrenogest* in comparison to the control group, however the differences were not statistically significant. *Altrenogest*proved to be a highly efficient substance when used for managing the estrus in replacement gilts.

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