International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463
Vol. 3 Issue 11, November-2014, pp: (1-6), Impact Factor: 1.252, Available online at: www.erpublications.com

Study on oestrus control in gilts by using progestin Altrenogest

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Abstact: The effect of Altrenogest as a method for synchronization of oestrus in gilts was investigated. The synthetic progesterone Altrenogest was given on a daily base through feeding to 207 nrs. gilts (Topigs 40) on 20 mg/gilts for 18 consecutive days. The animals were examined for oestrus occurrence starting on the second days after withdrawal of the hormonal treatment.

The average interval from the end of Altrenogest treatment to oestrus appearance was 5.69±0.91 days. The age of gilts at treatment did not shown the statistical effect over the reproductive performance of gilts. The highest reproductive parameters were obtained in gilts inseminated at 136-140 kg on live weight. The seasons (months) of the year have statistically effect on the results of the synchronization of oestrus.

Altrenogest treatment is an effective method for oestrus synchronization in pubertal gilts. The weight and first–mating age of animals as well as the seasons of the year may influence the interval between the end of the treatment to oestrus signs and the reproductive performance.

Key words: gilts, Altrenogest, oestrus, synchronization.

Introduction

The introduction of gilts into a pig farm requires an efficient method of oestrus synchronization. Controlling the oestrus cycle of gilts helps to minimize the number of days required for oestrus detection, planning of insemination program and saving labour costs.

Previous studies have demonstrated that the oral treatment with synthetic progestins is an effective way to control oestrus in cyclic gilts. **(Martinat-Botte et al., 1994; Martinat-Botte, 1995)**. Experimental data indicate that oestrus synchronization of cyclic gilts results in 80% to 100% of animals exhibiting oestrus, during the first 5-7 days after stop feeding Altrenogest, farrowing rate ranging from 72.00% to 87.50% and the average total number of piglets born per litter ranging from 8.9 to 11.3 **(Davis et al., 1985; Rhodes et al., 1991; Wood et al., 1992; Kaeokat, 2008; Stancic et al., 2009).**

The aim of this study was to evaluate the effect of age, body weight and season on reproductive performance in gilts following oestrus synchronization with Altrenogest.

Material and Methods

In total 207 crossbred gilts (Topigs 40) were investigated, which were housed in one pig farm in January-December. The average gilts weight was 134.40±6.52 kg and their average age was 242.74±6.58 days at the beginning of treatment. In the gestation unit the animals were kept in individual gestation crates and were fed once per day. During 18 consecutive days the gilts were treated with 20 mg Altrenogest (trade name ALTRESYN®, Ceva Sante Animale, France), which was mixed with feed in the individual feeders. Starting two days after the last treatment with Altrenogest, all gilts were examined for oestrus twice a day by moving mature boars down the alley in front of the gilts while a technician performed the back-pressure test.

The gilts were inseminated twice during oestrus with semen from boars (TALENT - crossbred line TOPIGS D) with good fertilizing ability. Each dose of semen consisted of 80 mL containing 3.0 x 10^9 spermatozoa. Insaminations were administered by using a spiral type catheter held by a hands-free cervical method. The pregnancy diagnosis was performed between 23-25 days after insemination with real-time ultrasonography SmartScan (HRE Agrar Elektronik GmbH, Germany).

The following parameters were recorded: number of days from last day of feeding Altrenogest to the beginning of oestrus signs, farrowing rate (percentage of bred sows farrowing), total number of born and live born piglets per litters. Also the live weight and the age of gilts were recorded before treatment.

Prior to data analysis the animals were categorized into: 1) gilts up to 240 days of age and over 240 days of age; 2) gilts up to 135 kg. live weight, gilts between 136-140 kg. live weight and gilts over 140 kg. live weight and 3) gilts treated in January-March, April-June, July-September and October-December.

A one-way ANOVA with fixed effects was used for the statistical analysis. The post hoc comparisons were done with LSD test. All calculations and statistical analysis were processed by statistical package Statistics for Windows Software (StatSoft Inc., 1994).

Results

The percentage of gilts expressing signs of oestrus within 4 to 7 days after the last feeding of Altrenogest was 97.58%. The first signs of oestrus (gilts expressing immobilization) were observed on the 3rd day after the last day of feeding Altrenogest, and the majority of the gilts showed oestrus on the 5th day (37.2%) and on the 6th day (36.7%) after stopping feeding Altrenogest **(Figure 1).**

Gilts that were inseminated when they first expressed oestrus on days 5 and 6 after the last feeding of Altrenogest had greater ($P<0.05$) farrowing rates than gilts cycling on days 4 and 7 **(Table 1)**. The numbers of total born and live born piglets per litters was greater ($p<0,05$) in gilts that exhibited oestrus on the 4th day after stopped feeding Altrenogest.

Age of gilts did not significantly ($p>0.05$) affect the average interval between the last day of feeding Altrenogest and the onset of estrus (240 or less days of age - 5.63±0.79; over 240 days of age - 5.72±0.96) **(Figure 2)**. Age of gilts at the time of insemination did not significantly ($p>0.05$) affect farrowing rate, total number of piglets born per litter or number of live born piglets per litter **(Table 2)**.

Live weight of gilts had a significant effect on the interval from the last feeding of Alternogest and onset of oestrus **(Figure 3)**. The shortest average interval was indicated in the animals with live weight up to 135 kg. ($p<0,05$). Reproductive performance between the three levels of live weight are small and nonsignificant **(Table 3)**.

The shortest average intervals ($p<0,05$) when the feeding of Altrenogest was stopped to the beginning of oestrus signs occurred in January-March and October-December, and the most prolonged interval was in July-September ($p<0,05$) **(Figure 4)**. The category of month bred did not significantly ($p>0.05$) affect the farrowing rate, total number of piglets born per litter or number of live born piglets per litter **(Table 4)**.

Discussion

The annual rate of removing sows from the herd has been reported to range from 33 to 66% **(Engblom et al., 2007)**. Thus, there are a substantial number of gilts entering the sow herd. Proper gilt management can lead to large increases in breeding herd efficiency by meeting replacement targets from smaller pools of select gilts with improved lifetime performance **(Foxcroft et al., 2004)**. The use of Altrenogest to synchronize oestrus in replacement gilts helps in decreasing of nonproductive days in the gilts pool, provides a more precise timing for flush feeding, increases efficient use of labor and facilities in the gilt pool, improves planning of semen delivery for gilts insemination, enhances the ability to meet breeding targets, and more efficient use of gestation and farrowing facilities.

The average interval from the last feeding of Altrenogest to the onset of oestrus for the 202 gilts (97.58% of all gilts) expressing oestrus was 5.69±0.91 days. **Martinat-Botte et al. (1995) and Dimitrov et al. (2010)** reported similar intervals for onset of oestrus after withdrawal of Alternogest.

The key element of managing a commercial pig farm is the consistency of farrowing a specific number of sows and gilts. In this case there is a necessity to use a reliable method to synchronize estrus in gilts.

From the current conceptions for estrus synchronization in the gilts the wide application has indirectly synchronization. In this method is to apply a temporary block on the hypothalamus-hypophysis system by back negative mechanism from progesterone. After 15-20 days of progestin treatment synchronized estrus provoked in animals by the rebound effect.

Altrenogest is steroid synthetic progesterone for oral treatment of sows and mares for oestrus synchronization. The main pharmacological action is to decrease the plasma levels of hypophyseal gonadotropins (FSH and LH) in the blood. **Stevenson and Davis (1982)** established that there have not significant differences in oestrus dynamics on treated gilts during 14 or 18 days with 15 mg Altrenogest. The period of progesterone treatment 14 days is not effective, because can not ensure effective control of growing and maturation of the follicles **(Flowers, 2006)**. Regarding daily dose of Altrenogest **Davis et al. (1976), Kraeling et al. (1981)** established that when it is applied dose under 13 mg per head daily there is possibility to form of ovary cysts.

In this present investigation was established that the age of the animals has not statistical effect of the reproductive performance of the gilts, although in the animals up to 240 days of age there were better reproductive results. Some tendency was reported by **Goss (2003).** The author established more total born and live born piglets in litters in gilts 190-240 days of age. Generally point of view is that the young sows should be at 220 days of age before first conception.

The live weight is an important factor for the effectiveness of oestrus synchronization. In this experiment was established statistical significant tendency for better reproductive parameters in gilts synchronized and inseminated at 136–140 кg live weight. **Goss, 2003** also recommended that the first mating of young sows should be at 130-140 kg live weight.

The analysis of the interval of the end of the treatment until the oestrus occurrence have shown that the factor live weight of gilts has a significant statistical effect of the value of this parameter in comparison with factor age of animals. This tendency is logical, when the animals have a target live weight (in this experiment - 135 kg.) they have breeding condition and optimal development of the reproductive system.

The season (months) of the year has the statistical significant effect of the results of the synchronization of the estrous. It was established that during the months, January-March and October-December the average period of the exhibition of estrus following Altrenogest treatment was with the lowest values. During July-September was observed prolonged period of the last days of treatment to the oestrus. This result may be connected with „summer or seasonal infertility syndrome" **(Britt et al., 1983; Stancic et al., 2011)**. Analogical tendencies were observed in others reproductive parameters – percent of farrowing, total born and live born piglets in litters.

Obtained results in the present study demonstrate the efficiency of Altrenogest treatment for the synchronization of oestrus in pubertal gilts of current breeds. Fertile oestruses are cumulated into the period of a few days in the treated animals, however age and weight of gilts at first mating as well as the season in the year may influence the interval between the end of the treatment to oestrus and the reproductive performance.

Acknowledgements

The author is grateful to Dr. Donald Levis and Dr. Roman Krejci for critical review of this manuscript.

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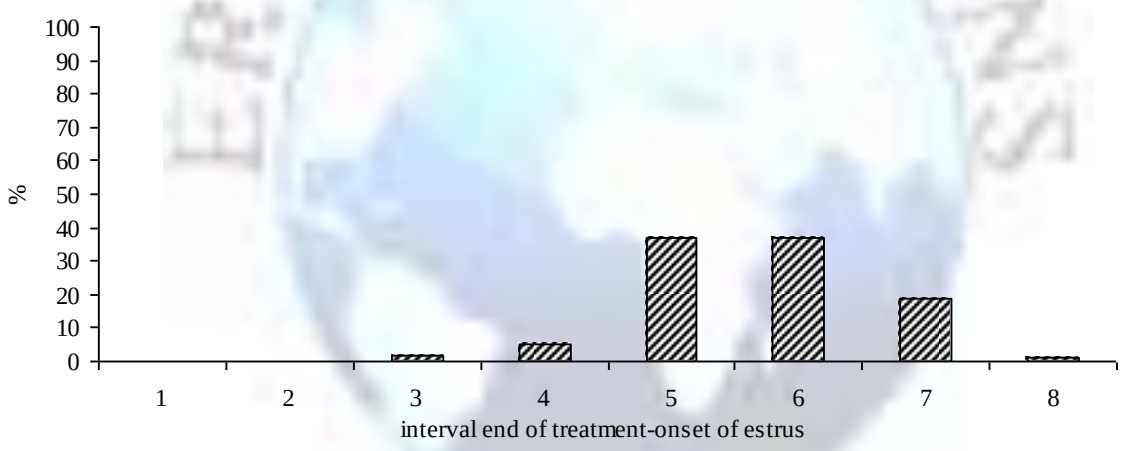

Figure 1. Dynamic of the intervals between the treatment and the onset of oestrus in gilts following synchronization with Altrenogest.

Table 1. Reproductive performance in gilts following synchronization of oestrus with Altrenogest as affected by day first inseminated after stopped feeding Altrenogest (mean±SD).

Duration of time after stopping treatment (days)	n	Farrowing rate %	Total born piglets per litter	Live born piglets per litter
4^{ty} days	10	60,00 ^{a}	13,67±1,36	13,33±1,03 ^{a}
5^{ty} days	77	83,12 ^{c}	12,51±1,61	11,92±2,13
6^{ty} days	76	92,10 ^{ab}	12,60±1,59	11,37±2,74 ^{a}
7^{ty} days	39	64,10 ^{bc}	12,33±2,31	10,81±2,94

^{abc} Values in the same columns with different superscripts are significantly different between groups ($p<0,05$)

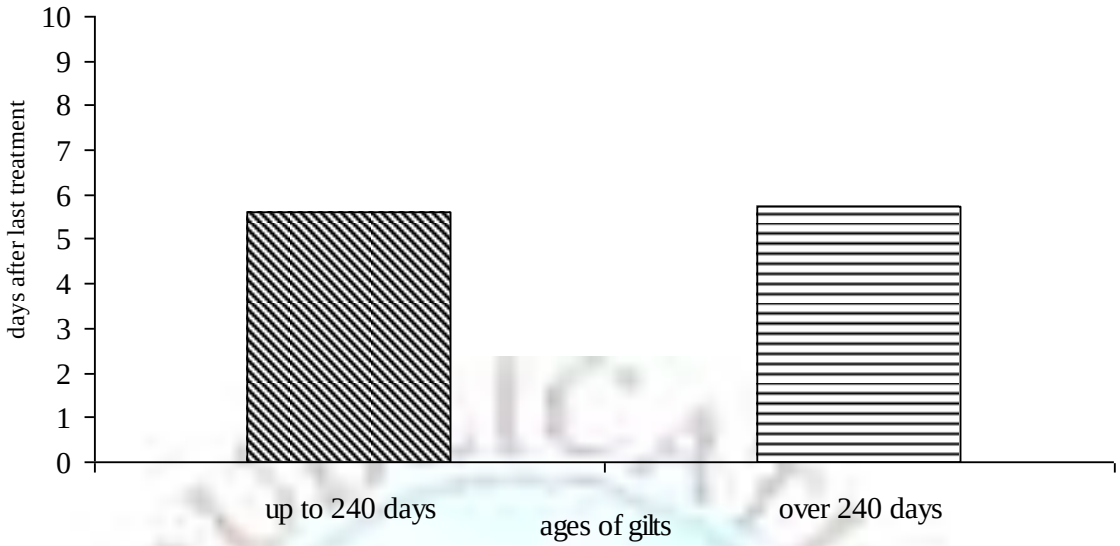

Figure 2. The effect of gilt age on the average intervals between the last day of feeding Altrenogest and the onset of oestrus in gilts

Table 2. Reproductive performance in gilts following synchronization of oestrus with Altrenogest as affected by age of gilts when stopped feeding Altrenogest (mean±SD).

Age of animals	n	Farrowing rate %	Total born piglets per litter	Live born piglets per litter
Up to 240 days	62	80,65	12,40±1,49	11,65±1,96
Over 240 days	145	75,14	12,69±1,76	11,61±2,76

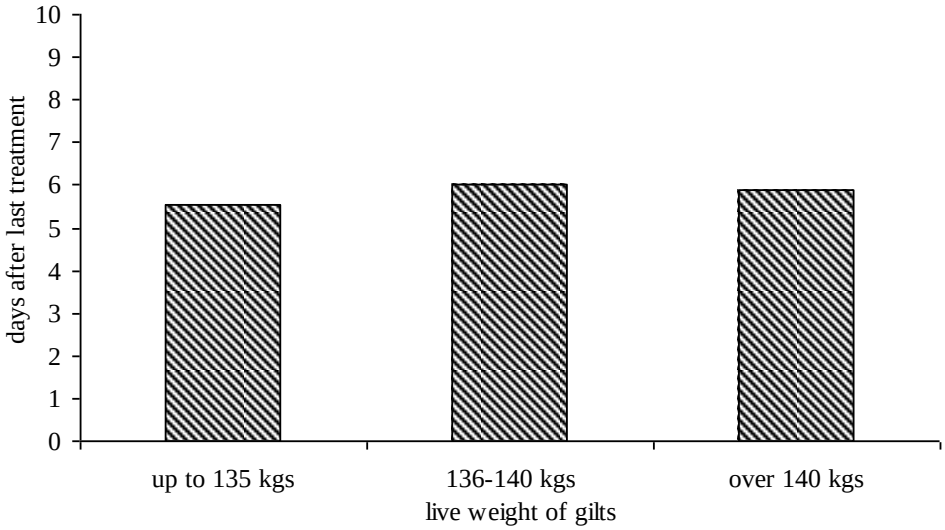

Figure 3. The effect of live weight on average intervals between the last day of feeding Alternogest and the onset of oestrus in gilts

Table 3. Reproductive performance in gilts following synchronization of oestrus with Altrenogest as affected by live weight of animals when stopped feeding Altrenogest (mean±SD).

Live weight	n	Farrowing rate %	Total born piglets per litter	Live born piglets per litter
Up to 135 kgs	134	77,61	12,48±1,79	11,46±2,67
136-140 kgs	31	80,65	13,16±1,34	12,20±2,24
Over 140 kgs	42	78,57	12,54±1,44	11,54±2,14

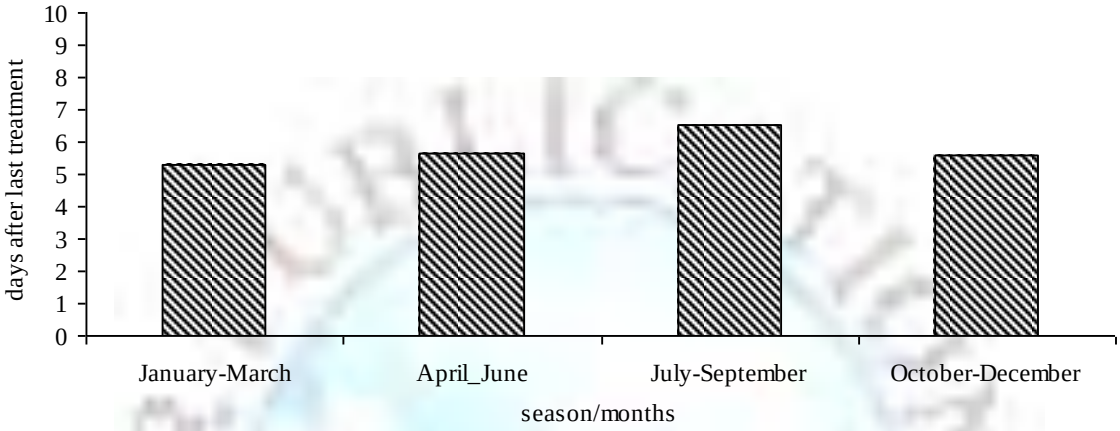

Figure 4. The effect of month on average intervals between the last day of feeding Alternogest and the onset of oestrus in gilts

Table 4. Reproductive performance in gilts following synchronization of oestrus with Altrenogest as affected by month when stopped feeding Altrenogest (mean±SD).

Months	n	Farrowing rate[1] %	Total born piglets per litter	Live born piglets per litter
January-March	72	77,78	12,98±1,07	12,60±1,15
April-June	52	71,15	11,59±1,64	10,51±2,68
July-September	43	74,41	13,12±1,49	11,40±2,72
October-December	40	85,00	12,59±2,44	11,44±3,26

[1] Farrowing rate is for the month bred.