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THE INFLUENCE OF TREATMENTS WITH SYNTHETIC HORMONES ON THE REPRODUCTIVE PERFORMANCE OF YOUNG SOWS EXPLOITED FOR THE PRODUCTION OF BACON

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Abstract

The purpose of the paper is to highlight the reproductive performance obtained in a pig farm in Denmark following the treatment of sows with a hormonal preparation used to synchronize oestrus. The research involved the study of 105 YL (Yorkshire x Landrace) cross-breed females, all between the ages of 28 and 30 weeks, weighing between 100 and 120 kg, exploited for the production of bacon. The following indicators were followed: fertility, index of use of sows for reproduction, prolificacy, number of piglets weaned on female and piglets' mortality. The obtained results showed higher values for all the indicators analysed at the batch treated with the hormonal preparation compared to the control group (fertility 94.99 vs 91.66%; the index of use of sows for reproduction 2.47 vs 2.29; prolificacy 16.7 vs 15.6 piglets; number of weaned piglets on female 15.7 vs 15 piglets). The results of the study demonstrate that hormone treatment in sows leads to improvement of reproduction indicators in sows.

Key words*: fertility, mortality of the piglets, number of piglets weaned on the female, oestrus synchronization, reproductive performance.*

INTRODUCTION

Swine growth is of great economic importance as the branch of animal breeding in many countries (Rotaru, 2018). In Romania, the carcasses from pig's exploited in industrial systems, after classification, shows a very good quality, with a percentage of meat in the carcass of over 50% (Cărătuș et al., 2017, Găureanu et al., 2017). In the current breeding systems, it is considered that the proliferation is optimal when the number of piglets is equal to the number of sows' tits (approximately 14 piglets).

In order to optimize the efficiency of artificial insemination (AI) at sows the time of ovulation after weaning should be controlled (Pearodwong et al., 2019). For this reason, it is necessary to carry out multiple researches and to encourage various ovulation induction protocols (Driancourt et al., 2013).

In the last period protocols have been developed that use only GnRH (Baroncello et al., 2017) but also LH (Ulguim et al., 2014). Ovulation induction is of great interest to the entire pig breeding industry. It is a technology that, if well realized, leads to the improvement of pig production and implicitly to increased economic efficiency (Knox, 2015).

Hormone-inducing products can be administered at a fixed time after weaning (Cassar et al., 2005) or from the oestrus (Gooneratne et al., 1988). Treatment with hormonal preparations leads to synchronization of the oestrous period at sows. However, its effect on reproductive performance is inconsistent, scientific literature presenting contradictory data. Therefore, the purpose of the study is to determine if treatment with Progestin have positively or negatively effects of the reproductive performance of sows.

MATERIALS AND METHODS

The study was conducted on a commercial pig farm (i/s Petersmide v. Anne og Martin Jensen) in Denmark, with a capacity of 780 sows which specializes in breeding piglets up to 30 kg weight and can produce 25,000 piglets per year. The sows used on the farm come from the elite farms in Denmark, based on the Landrace and Yorkshire cross-breeds.

The research involved the study of 105 YL

(Yorkshire x Landrace) cross-breed females, all between the ages of 28 and 30 weeks, weighing between 100 and 120 kg, exploited for the production of bacon.

Progestin is a hormonal preparation that is mainly used for synchronizing oestrus in sows with a success rate of up to 90%. This hormonal treatment is intended to suppress ovarian development. Progestin administration has negative feedback on gonadotropin-releasing hormone (GnRH) released from the hypothalamus. This inhibits the release of follicle stimulating hormone (FSH) and the release of luteinizing hormone (LH) and extends the range from weaning to oestrus.

Compared to natural oestrus, synchronization allows for greater predictability of the period when the oestrus will occur.

Due to Progestin treatment, the level of progesterone in the blood decreases, this being the signal for starting a new cycle and obtaining a new ovulation within 5 to 6 days. For the administration of the product several rules must follow:

• It is administered orally for 14 or 18 days;

• Treatment should take place at the same time every day (+/- 15 min.);

• 5 ml of Progestin shall be administered daily to each sow.

To determine the performance of reproduction and to determine the optimal period for applying the treatment with Progestin, sows taken in the study were divided in three batches:

• L_1 - 35 sows treated with Progestin for 14 days, maintenance in boxes with a capacity of 10 heads;

• L_2 - 35 sows treated with Progestin for 18 days, maintenance in boxes with a capacity of 10 heads;

• L_m - 35 sows without treatment, maintenance in boxes with a capacity of 10 heads.

The main indicators followed were: fertility, farrowing index, prolificacy, number of weaning piglets for sow, piglet's mortality.

RESULTS AND DISCUSSIONS

For optimal artificial insemination of females, it was found that the best fertility was obtained when the females were inseminated 10 to 16 hours before ovulation, including the time of spermatozoon ascension through the uterine horns.

In the farm, gestation diagnosis is made at 18, respectively 35 days, with the help of the WED-2000AV ultrasonic wave based device.

A common feature of the two experimental batches is the synchronization of heat at sows with rates of over 90% (Table 1).

Table 1. Fertility of the sows from the experimental batches

Parturition	Batch	No of inseminated sows	No of pregnant sows of 18 days		No of pregnant sows of 35 days	
			No	%	No	%
I	L_1	35	33	91.42	32	91.42
	L_2	35	33	94.28	33	94.28
	L_m	35	32	88.57	31	88.57

The highest fertility value, at the first and the second control, was for the sows from the L_2 experimental batch (94.28%). Good values are also recorded for the L_1 batch (91.42%) at 35 day control. The differences between experimental batches L_1 and L_2 was 2.86%. If we also consider L_m where the values reach up to 88.57%, we can say that the sows from the experimental batches L_1 and L_2 have fertility values higher than those from L_m batch.

The farrowing index indicates the number of offspring that a sow has during a year. It is a breeding indicator that most effectively expresses the use of sows on the farm. The farrowing index is considered good when the values are between 2.3-2.5 (Table 2).

Table 2. Farrowing Index

Batch	Reproduction indicators (days)			Farrowing index	Average value in Romania
	Average preparation period for artificial insemination	Average period of gestation	Average lactation period		
L_1	6	117	30	2.41	2.2 – 2.3
L_2	5	118	29	2.38	
L_m	8	118	29	2.29	
Average (x)	-	117.66	29.33	2.38	

From the data presented in Table 2, we can see that the best value of this index was recorded at L_1 batch (2.41), followed by those from L_2 batch (2.38) and last L_m (2.36) batch. Comparing the values obtained we note the superiority of the results obtained by the batches treated with Progestin over the control batch.

Comparing the values from L_1, L_2 and L_m batches with the results from Romania (Păsărin, 1997; Hoha, 2009) we note the superiority of the results obtained in Denmark (Radu, 2015).

The reproductive performance of the sows is appreciated by prolificacy and is closely related to the number and quality of the weaned piglets during one year of production. The life of weaned piglets can be considered as an integrated measure of reproductive productivity throughout the life of sows. Therefore, a high fertility and prolificacy of sows is not sufficient, if they do not have a high capacity for breastfeeding, a maternal care for the piglets and a good management of the caregiver to remove the events that can cause the death of pre and postnatal products (Table 3).

Table 3. The average prolificacy of sows at parturition

Parturition	Batch	Total farrowed piglets (heads)	Piglets farrowed live		Piglets farrowed dead (heads)	Weaned piglets (heads)	% weaned piglets from total farrowed piglets
			Viable (heads)	Nonviable (heads)			
I	L_1	16.8	16.1	0.4	0.3	15.1	89.88
	L_2	16.7	15.9	0.4	0.4	14.7	88.02
	L_m	15.6	14.6	0.3	0.7	13.5	86.53

From the data presented in table 3, we notice that the number of piglets farrowed alive ranged between 15.6 and 16.8, values considered to be very good compared to the ones found in the literature (Nacu, 2005; Hoha 2009).

By comparison, the number of piglets farrowed and the total number of parturition on sows treated with Progestin increased by approximately 0.9-1.2 piglets compared to those of L_m batch. This increase may be due to increased ovulation rate, embryonic survival and higher uterine capacity.

The large number of piglets obtained on the parturition is due to the genetic value of the sows as well as the breeding technology that implies the introduction to reproduction of the sows at the age of 28 to 30 weeks with the weight between 100 and 120 kg, so the body is able to respond positive regarding gestation, improving reproductive performance since the first parity.

From the analysis of the data recorded in the weaned piglets it is observed that there were losses between 10 and 14% in all 3 batches. Compared with the data from the Romanian literature (Păsărin, 1997; Teiu, 2003; Hoha, 2009), one can observe the superiority of the values obtained in Denmark.

Dead piglets are those piglets that are alive at the onset of parturition, but die intrapartum or postpartum. In practice, dead piglets are those found dead behind the sow at first check after parturition, without any signs of decomposition. In the last decades, the biggest losses from the economic point of view have been observed in case of the piglets, where the losses can reach up to 20-25% of the number of piglets farrowed. The high number of dead piglets may also be related to other aspects of reproductive performance, for example, for sows with increased parity a higher risk of abortion and an increase in the number of dead piglets has been reported.

The mortality recorded during the experimental period of the three batches of pigs' shows that the percentage of losses, from the total pigs farrowed, was around 10.12 and 13.47%. The data recorded fall within the limits presented in the specialized literature (12-15%) (Table 4).

Table 4. Mortality recorded in maternity

Batch	Percentage of losses/ productive sow life (%)	% of dead piglets/sow during maternity (head)	Average in Romania (%)
L_1	1.4	10.12	12-15
L_2	1.3	11.98	
L_m	1.3	13.47	
Average (x)	**1.33**	**11.85**	

Average losses of 11.85% in all 3 batches can be taken into account due to the age and the special quality of the sows, as well as the breeding technology. The factors that determined these losses until the moment of weaning were caused by: crushes/accidents, diarrhoea syndrome, respiratory syndrome, hypothermia, anaemia, dystrophies and congenital anomalies.

CONCLUSIONS

The reproductive performance of sows are very important indicators for the economic efficiency of pig farmers. Improving reproductive performance, therefore, increases the economic efficiency of pork production.

Sows from experimental groups were treated with progestin for 14 and 18 days respectively, so the results were investigated by separate analysis. Both treatment periods with Progestin showed improvements for all values of reproduction indicators.

Therefore, the 14 and 18 days treatments resulted in a more precise synchronization of oestrus time in sows. Hormonal treatment is recommended to improve reproductive performance when the oestrus period is synchronized.

A treatment regimen that is 4 days shorter has the result of reducing non-productive days and simplifying the management of the herd. The treatment duration of 14 days is sufficient for synchronizing the oestrus period and improving the reproductive performance.

The conclusions of the study show that treatment with Progestin in sows has improved reproductive performance by obtaining a better reproductive use index, by increasing the number of piglets made and by the number of piglets weaned.

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