

Ovulation Rate in Gilts Treated with Different Hormone Protocols

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Abstract

In this study different hormonal protocols were used, in order to determine their effectiveness in ovulation value rated postmortem by the inspection of the ovaries of treated gilts. The total of 48 prepubertal Swedish Landrace gilts were used in the study, aged 150 to 160 days, 30 sexually mature gilts, aged 180 to 210 days, with a pre-established one spontaneous estrus (first pubertal), 30 gilts aged 210 to 240 days, with a determined two spontaneous (first and second pubertal) estrus, and 40 long-term anestrus gilts, aged 280 to 290 days. The following hormone protocols were conducted: 400 I.U. eCG - one-time; 750 I.U. ECG - one time; 1000 IU eCG- one-time; 1500 IU eCG- one-time; 250 ng PGF2 α - one time; 20 mg Altrenogest and the combination of 20 mg Altrenogest and 1,000 I.U. eCG at the end of treatment with altrenogest. An overview of the reproductive organs of slaughtered gilts was carried out in the Laboratory for Reproduction of Domestic Animals at the Faculty of Agriculture, Novi Sad. It was found that the ovulation value of the treated gilts depends primarily on the dose of ECG and reproductive status of gilts at the moment of initiation of hormone treatment.

Key words: gilts, ovulation value, hormone treatment, postmortem inspection

Introduction

The most common reason for the exclusion of gilts from further reproduction is the lack of records on outward signs of pubertal estrus in gilts older than 8 months, which is above the technologically acceptable age for fertile insemination (Kovčín et al., 2006; Gagrčín et al., 2009; Stančić, 2010). In physiological terms, the moment of reaching sexual maturity (puberty) is defined by the appearance of the first ovulation and the establishment of the first estrous cycle in normal duration (18-24 days), or a gilts' ability to establish and maintain a normal pregnancy, after insemination (Dyck, 1988). However, a large number of gilts, culled from breeding because of long-term prepuberty anoestrus, had established a normal cyclical ovarian activity, as shown by the results of morphological examination of their ovaries post-mortem (Stančić et al., 2011). Modern technology of ultrasound diagnosis of ovarian cyclicity, pregnancy and pathological changes in the reproductive organs of gilts and sows is a very precise method (Moeller, 2002; Williams et al., 2008). However, this is still a very expensive and impractical method for diagnosing ovarian activity gilts in large pig farms. In the practical production, treatment of gilts and sows hormone preparations from the group of gonadotrophins, luteolitics and progestogens is quite often used, as the therapy of various disorders of reproduction, and for controlling the stimulation of certain reproductive functions (Bošnjak, 2008.). For these purposes, hormonal preparations of gonadotropine group (placental: ECG and hCG or pituitary FSH and LH), luteolitic group (prostaglandin F₂ α - PGF₂ α or its synthetic analogues) and progestogen group (synthetic progesterone analogues) are often used.

According to some authors, certain hormonal treatments can increase or decrease the value of ovulation in sows and gilts. Ovulation value, i.e. the number of ovulated eggs in one estrus, is usually expressed on the basis of established corpora lutea (corpora lutea - CL). Its value is much lower in gilts (10-18 CL) than in adult sows (15-24 CL). Ovulation value of 25 or more CL is considered as superovulation (Stančić, 2005).

The aim of this study was to determine ovulation value in gilts of different reproductive status, treated with various hormonal protocols.

Material and Methods

Experimental treatment of Swedish Landrace gilts with various hormone preparations was carried out on a large farm for intensive pig production, in Vojvodina, Serbia.

Slaughtering of experimental gilts was carried out in a registered industrial slaughterhouse, as required under the Animal Welfare Act ("Official Gazette of RS", no. 41/2009 of 06.02.2009.), in order to minimize causing pain, suffering, fear and stress in animals. An overview of the reproductive organs of slaughtered gilts was carried out in the laboratory for reproduction of domestic animals at the Faculty of Agriculture in Novi Sad. Post mortem morphological examination of ovaries to determine the specific ovarian structures (corpus haemorrhagicum - CH, corpus luteum - CL, corpus albicans - CA) was made by a total of 48 prepubertal gilts, aged 150 to 160 days, 30 sexually mature gilts, aged 180 to 210 days, with a pre-established one spontaneous estrus (first pubertal), 30 gilts aged 210 to 240 days, with a determined two spontaneous (first and second pubertal) estrus, and 40 long-term anestrus gilts, aged 280 to 290 days. The following hormone protocols were conducted: 400 I.U. eCG - one-time; 750 I.U. ECG - one time; 1000 IU eCG- one-time; 1500 IU eCG-one-time; 250 ng PGF 2α - one time; 20 mg Altrenogest and combination of 20 mg Altrenogest and 1000 I.U. eCG at the end of treatment with altrenogest.

Results and Discussion

Ovulation value was determined in fully immature, sexually mature and long-term anestrus gilts by present number of CH, CL or CA on both ovaries after treatment with various types and combinations of hormones. In fully mature, untreated gilts, the ovulation value in the first estrous cycle is puberty averaged 10.1, and in the second 12 CH or CL. In the long-term anestrus and untreated gilts, post-mortem examination found previous spontaneous ovarian cyclicity and ovulation and the average ovulation value of 10.7 CH or CL (Table 1.).

The ovulation value of the treated gilts depended on the dose of eCG and reproductive status of gilts at the moment of initiation of hormone treatment. Thus, this value was an average of 11.9 CH in full immature gilts treated with a single injection 400 IU of eCG.

In sexually mature gilts, this value was between 12 and 13, when treatment did not include gonadotropins, or between 14.5 and 18.2 CH or CL, when the treatment involved gonadotropins. Superovulation (>18 CH or CL) was induced in sexually mature gilts treated with 1.000 IU eCG (19.5) and the 1.500 IU ECG (31.1).

Our results show a very specific ovarian response in gilts with different spontaneous reproductive status, after treatment with gonadotrophin (eCG), luteolytic (PGF 2α) or progestogens hormones (altrenogest).

This is also shown by Knox et al. (2000) and Estiene and Harper (2009), who found that in spontaneously asynchronous cyclic (sexually mature), gilts ovulation occurs after induction eCG treatment, but estrus signs are not well defined.

Table 1. Ovulation value in gilts treated with various hormonal treatments
Овулациона вриједност назимица третираних различитим хормонским третманима

Group <i>Група</i>	Category of gilts <i>Категорија назимица</i>			
	Fully immature <i>Полно незреле</i>	Sexually mature <i>Полно зреле</i>		Long-term anestric <i>Дуготрајно анестричне</i>
		First cycle <i>Први циклус</i>	Second cycle <i>Други циклус</i>	
N	48	30	30	40
Control - <i>Контролна</i>	-	10.1	12.0	10.7
400 IU eCG	11.9	-	-	-
750 IU eCG	-	14.5	-	-
1.000 IU eCG	-	19.5	-	18.2
1.500 IU eCG	-	31.1*	-	-
250 ng PGF _{2α}	-	12.2	-	-
20 mg altrenogest	-	12.8	-	-
20 mg altrenogest + 1.000 IU eCG /	-	18.2	-	-

* superovulation (*изражена овулација*)

Our study found that there had been increased ovulatory values in such gilts, but without significantly pronounced estrous reaction. Bošnjak (2014) found ovulation in 85% of gilts after treatment with gonadotropins, with the average ovulation value of 11.8 CH in prepubertal and spontaneous cyclic gilts, while the lowest results were achieved after treatment with PGF_{2α}, which is also confirmed in our study.

Conclusion

The results of our study found that 90% immature gilts ovulate after eCG treatment, and that eCG treatment in sexually mature gilts at any stage of the spontaneous estrous cycle results in ovulation and development of accessory CL. Also, it was found that treatment of sexually mature and prepubertal gilts with PGF2 α does not lead to good synchronization of ovulation and estrus.

Our results show that the use of hormone treatment can be used as a very precise and practical method for diagnosing the reproductive status of gilts in farm conditions. Application of this method has also a special significance in the diagnosis of reproductive status of gilts with "long-term preinsemination anoestrus", before a final decision on their culling from further breeding.

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Овулациона вриједност назимица третираних различитим хормонским протоколима

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У овом испитивању кориштени су различити хормонски протоколи, како би се установила њихова ефикасност на овулациону вриједност оцијењену *post mortem* прегледом јајника код третираних назимица. Истраживањем је обухваћено укупно 48 препубертетских назимица шведског ландраса, старих 150 до 160 дана, 30 полно зрелих назимица старих 180 до 210 дана, са успостављеним спонтаним првим еструсом, 30 полно зрелих назимица старих 210 до 240 дана, које су показале два спонтана еструса и 40 дуготрајно анестричних назимица, старих 280 до 290 дана. На наведеним назимицама спроведен је третман са сљедећим комбинацијама хормонских препарата: 400 IU eCG једнократно; 750 IU eCG једнократно; 1000 IU eCG једнократно; 1500 IU eCG једнократно; 250 ng PGF2 α једнократно; 20 mg алтреногеста и комбинација 20 mg алтреногеста и 1000 IU eCG након престанка третмана алтреногестом. Преглед репродуктивних органа жртвованих назимица је извршен у лабораторији за Репродукцију домаћих животиња Пољопривредног факултета у Новом Саду. Установљено је да је овулациона вриједност третираних назимица, зависила прије свега, од дозе eCG и репродуктивног статуса назимица у моменту почетка хормонског третмана.

Кључне ријечи: назимице, овулациона вриједност, хормонски третман, *post mortem* налаз

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