Pregnancy Diagnosis by Real-Time Ultrasonograpy at Different Gestational Periods in Gilts and Sows

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Abstract
The experiment was conducted on commercial swine farm unit in Serbia, to evaluate the effectiveness of pregnancy diagnosis with real-time ultrasonography in 87 gilts and 65 sows, performing at different periods after artificial insemination (AI). Positive pregnancy diagnosis was establish in 89.47%, 93.38%, 96.06%, 99.18% and 99.17% gilts+sows, at 17-20d, 21-23d, 24-26d, 27-29d or 42-45d after artificial insemination (res.). According to the total number of examined gilts+sows, positive diagnosis of pregnancy was establish in 89% females at 17 to 20 days, and in 79% females at 42 to 45 days after (AI). It was concluded that real-time ultrasonography is the method for successful early pregnancy diagnosis in commercial farm units.

Keywords: diagnosis, gilt, pregnancy, sow, ultrasound

1. Introduction

The number of piglets weaned per mated female per year (PWMFY) is the best parameter to measure the reproductive performance of female breeding herd. These parameter is the product of the number of litters per mated female per year (LMFY) and the number of piglets weaned per sow per year [1]. The LMFY depends on the number of nonproductive mated female days (NPD), lactation duration, and gestation duration within a breeding herd. Decreasing the NPD is the best way to improve herd productivity as measured by the LMFY and PWMFY [2]. The greate part of total NPD include: (a) gilt first mating-to-pregnancy interval and (b) sows weaning-to-fertile insemination interval [3]. These NPD interval generate production costs and occupy space in breeding and gestation facilities, yet they do not participate actively in the production of piglets. The most common reason for increasing the mentioned NPD intervals in swine operations is the failure to identify sows and gilts that do not conceive as soon as possible after breeding. Consequently, the development and implementation of effective pregnancy diagnostic procedures is an important component of an efficient reproductive management program [4] (Flowers and Knox, 2000).

On commercial Serbian swine farm units, the most common strategy for identification of nonpregnant females is detection of estrus via daily boar exposure, buth these diagnostic method is not of sufficient accurate [5-7]. Becouse, it is recommended that estrus detection by boar exposure, must be followed by use of ultrasound technique, for beter pregnancy detection in gilts and sows [8-10]. Real-time ultrasonography for pregnancy diagnosis has been implemented increasingly on swine production units, becouse this technique is superior to other methods of pregnancy diagnosis [11, 12].

The objective of the present paper was to evaluate the effectiveness of pregnancy diagnosis with real-time ultrasonography in gilts and sows, performing at different periods after artificial insemination.

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2. Materials and methods

Transabdominal real-time (B-mode) ultrasonography was performed for pregnancy diagnosis in 87 gilts and 65 sows, at 17-20, 21-23, 24-26, 27-29 or 42-45 days after previous artificial insemination (AI).

Diagnosis were performed by Mindray DP6600 real-time (B-mode) machine and convex 3,5 MHz transabdominal transducer.

Eighty-seven gilts, that had exhibited at least one estrous cycle of normal length (18 to 24 days), were AI once each day of estrus. Sixtu-five sows were AI 12h, and reinseminated 24h after standing estrus detection, within 7 days after weaning. Insemination doses for gilts and sows containe $5x10^9$ viable spermatozoa in 100 ml of Beltsville Thawing Solution semen extender (BTS).

3. Results and discussion

The proportion of pregnancy real-time ultrasonography established at different period after artificial insemination are shown in Table 1.

Table 1. Positive pregnancy ultrasound diagnosis established at different gestational periods

			Days of gestation*				
			17 - 20	21 - 23	24 - 26	27 - 29	42 - 45
Glits	Total examined	n	87	78	72	69	68
	Positive diagnose	n	78	72	69	68	67
		%	89.65	92.31	95.83	98.55	98.55
Sows	Total examined	n	65	58	55	53	53
	Positive diagnose	n	58	55	53	53	53
		%	89.23	94.83	96.36	100.0	100.0
Gilts + Sows	Total examined	n	152	136	127	122	121
	Positive diagnose	n	136	127	122	121	120
		%	89.47	93.38	96.06	99.18	99.17

*Days after previous insemination.

The level of estimated pozitive pregnancy diagnosis were similar in gilts and sows at the same period of detection after artificial insemination, ranged from aprocsimately 89.5%, at 17-20 days to more than 98% at 42-45 days after previous insemination.

According to the total number of examinated gilts and sows, the proportion of gilts and sows diagnosed as pregnat decrease from average 89.5% at 17-20 days, to 78.9% at 42-45 days after AI. These decreasing were slowly higher in the gilt (from 89.6% to 77%) then in the sows (from 89.2% to 81.5%) (Tabele 2 and Figure 1).

Table 2. Reduction of positive diagnose according to total gilts and sows examinated (%)

	Days of gestation				
	17 - 20	21 - 23	24 - 26	27 - 29	42 - 45
Gilts	89.6 (78/87)	82.8 (72/87)	79.3 (69/87)	78.2 (68/87)	77.0 (67/87)
Sows	89.2 (58/65)	81.5 (53/65)	81.5 (53/65)	81.5 (53/65)	81.5 (53/65)
Gilts + Sows	89.5 (136/152)	83.5 (127/152)	80.3 (122/152)	79.6 (121/152)	78.9 (120/152)

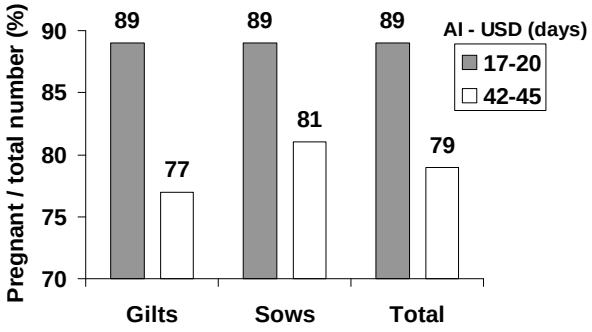

Figure 1. Percentage decreasing of gilts and sows ultrasound diagnosed (USD) as pregnant from 17 - 20 to 42 - 45 days after artificial insemination (AI)

In our experiment, positive pregnancy diagnosis were establish in 89.5% from the total number of gilts and sows examined at 17-20 days (136/152) and in 99.2% of gilts and sows examined at 42-45 days after AI, calculated from the number of females that were detected as pregnant at 27-29 days after AI (120/152). Buth, according to the total number of examined gilts and sows, diagnosed as pregnant at 17-20 days after AI, positive diagnosis were reconfirmed in 78.9% (120/152) females, at 42-45 days after AI. Williams et al. (2008) was scanned 142 sows for pregnancy diagnosis between 17 and 24 days post-mating (PD1) and reconfirmed between 38 and 45 days of gestation (PD2). Accuracy between PD1 and PD2 was 80.6%. The proportion of correct positive diagnosis (accuracy) increase from 57%, at 18 days after AI, to 96.2% at 24 days after AI [13]. Pregnancy diagnosis in sows using transabdominal ultrasound testing can be assessed quickly and reliably under field conditions, from day 23 of gestation onwards. Buth, predictive values of positive test results is high, whereas those of negative test results is low. This implies that sows with a negative test result early in pregnancy should be retested later [14].

Early and accurate diagnosis of nonpregnant sows and gilts has the potential to increase reproductive efficiency and the financial income in pig production by reducing non-productive days per sow per year [12]. Furthermore, in recent years, real-time (B-mode) ultrasonography has found increased application in its use for monitoring ovarian activity and in estimating time of ovulation in pigs. B-mode ultrasonography is also valuable in providing a detailed assessment of the sow's ovaries and uterus to determine if pathological conditions exist, which could be contributing to poor individual or herd reproductive performance [15]. In its most recent application in pigs, the gilt genital tract has been characterized peripubertally by ultrasonography in order to detect onset of puberty [7, 16].

4. Conclusions

Based on our results, it can be conclude:

1. The positive pregnancy diagnosis by real-time ultrasonography in gilts and sows were increase from average 89.5% at 17-20 days to 99.2% at 42-45 days after AI.
2. According to the total number of examined gilts and sows, the confirmed positive pregnancy diagnosis decrease from 89.5% at 17-20 days to 78.9% at 42-45 days after AI.
3. Real-time ultrasonography can be used with a high degree of effectiveness for pregnancy diagnosis on swine production units.

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