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Pregnancy rate in Bulgarian White milk goats with natural and synchronized estrus after artificial insemination by frozen semen during breeding season

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ABSTRACT

Objective: To determine the pregnancy rate (PR) in goats with natural and synchronized estrus after artificial insemination (AI) by frozen semen during breeding season.**Methods:** The experiment was carried out with 89 Bulgarian White milk goats divided as follows: group I ($n = 54$) animals with natural estrus (NE), allocated in two subgroups treated with or not with GnRH after the last insemination and group II ($n = 35$) goats with synchronized estrus by intravaginal sponges and injection of PMSG after the sponges withdrawal. Both groups were also divided according to number AI – single or double. All animals in group I were inseminated by frozen semen after proved standing estrus as a part of goats received second insemination 8 h later. Single insemination in synchronized goats was done 48 and double at 48 and 56 h after the sponge removal. Ultrasound pregnancy diagnosis was performed on day 30 post insemination.**Results:** The pregnant animals in both subgroups with natural estrus and single AI (33.3% and 45.2%) were less than those (58.3%) after estrus synchronization (ES). The pregnancy rate in synchronized goats with double insemination was 63.6%, whereas in animals with natural estrus varied from 40 to 50%. Overall pregnancy rate in group I (60%) was significantly ($P < 0.05$) higher than (37%) in goats without GnRH treatment.**Conclusion:** The goats with natural estrus and GnRH treatment tend to enhance pregnancy rate after double artificial insemination 8 h apart. The insemination number has no significant impact on pregnancy rate in synchronized goats as the overall pregnancy rate is better than in animals with natural estrus without GnRH administration.

1. Introduction

The optimal reproductive performance has an important role in intensive goat breeding [1,2]. The improvement of the productive characteristics in goats descending from different regions and the accelerate production of genetically valuable offspring require artificial insemination with semen from elite sires [3–6]. Recently, artificial insemination of synchronized animals by frozen semen has been reported as one of the most used option for this purpose [7–10]. According to Simões [11] the use of P₄ or progestagens remains crucial for

synchronization of fertile ovulation if we want to maximize the fertility during the anoestrous season. During the breeding season different estrus induction or synchronization schedules (P₄-PMSG; P₄-PMSG-PGF₂α; GnRH-PGF₂α-GnRH) have been utilized [12,13]. Nevertheless, the question about achievement of satisfactory pregnancy rate after ES and AI of goats with frozen semen is still open.

Effective pregnancy rate from 63.6 to 66% in goats [14,15] and 75–83% in sheep [16] after laparoscopic insemination has been achieved. In contrast to sheep, in the goats there are specific features (highly susceptible to pain, sedation and local anesthesia are required, high price) that limit routine utilization of the laparoscopy [17]. Registered pregnancy rate in goats after cervical or transcervical insemination with frozen semen is rather variable – from 15.8% [18], 38.5–48.6% [7], 57% [19], 60–65% [8,20] up to 71% [21]. In most of the studies, season [22], breed and age of goats [15,23], estrus synchronization protocol [24], time and number of AI [2] body condition score

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and the breeding technology [6,25] have been shown as a reason for different results. The above mentioned data presumes an accomplishment of investigations for adjustment of the reproductive programs to the breed of the goats, the breeding technology or the specific climatic condition in the different regions.

The aim of this study was to determine the pregnancy rate in local goats with natural and synchronized estrus after artificial insemination by frozen semen during breeding season.

2. Material and methods

The experiment was conducted on 89 Bulgarian White milk goats, 2–4 year of age and weighing 45–50 kg, housed in the same technology, located at latitude 42.25° and longitude 25°37'. The experiment was done during the breeding season (October–November).

All animals were arranged in groups according to the farm breeding management. Group I (*n* = 54) included animals with a natural estrus, allocated in two subgroups, that received or not received 25 µg GnRH (Ovarelin, Ceva Animal Health, France) immediately after the last insemination. Group II (*n* = 35) was consisted of goats with synchronized estrus by intravaginal sponges, containing 30 mg FGA (Syncro-part, Ceva Animal Health, France) for 12 days and injection of 500 IU (Syncro-part PMSG, Ceva Animal Health, France) at day of sponges withdrawal. Both groups were also divided according to number of AI – single or double. The artificial insemination was deep cervically with 0.25 mL frozen semen in straw (Sersia, Rennes Cedex 7, France), one straw per goat. Each goat with a natural estrus was inseminated after proved standing estrus by buck teaser and these with double AI 8 h later. The synchronized animals were inseminated at a fixed time – 48 h and 48 and 56 h following sponge withdrawal in single and double insemination, respectively. All goats were tested for pregnancy 30 days post AI by ultrasound scanner A5 Vet SonoScape (SonoScape, Co. LTD, Shenzhen, China) with a linear probe 5–12 MHz. Pregnancy rate in different groups and subgroups was determined on base ultrasound diagnoses.

Statistical analysis was performed with Stat-Soft 1984–2000 Inc. statistical software (Copyright©1990–1995 Microsoft Corp.) by means of non-parametric analysis for comparison of two proportions, using Student's *t*-criterion. Differences were considered significant in *P* – values < 0.05.

3. Results

The positive pregnancy diagnosis on day 30 post insemination was connected with visualization of increased uterine lumen, fulfilled with anehogenic fluid and echogenic embryo. In some of cases a corpus luteum graviditas into one of the ovaries was also observed (Figure 1).

The percentages of pregnant goats (33.3% and 45.2%) with natural estrus and single AI without or with GnRH treatment, respectively, were less than the obtained value (58.3%) in the group submitted to estrus synchronization and AI in fixed time (Table 1). The pregnancy rate (45.2%) in the non-synchronized subgroup II (AI plus GnRH administration) tended to increase compared to non-treated one (33.3%), but significant difference was not detected (*P* = 0.27). The results after double AI showed 40% pregnancy rate in subgroup I and 50% in subgroup II. These values were also less than the percentage (63.6%) in goats with estrus synchronization and AI in fixed time. The comparative analysis of the results according to number of insemination into the groups did not determine significant effect of this parameter on the pregnancy rate (*P* > 0.05). However, there was an impression the high difference (13.3%) between the pregnancy rates after single and double AI in goats with natural estrus, but non-treated by GnRH.

Statistically difference between overall pregnancy rate (37.0% and 48.2%) for both subgroups with natural estrus was not observed (*P* = 0.2), regardless of the increased percentage of pregnant animals after GnRH administration. The highest overall pregnancy rate (60.0%) was accounted in goats with synchronized estrus, as the showed value was statistically

Table 1

Pregnancy rate in Bulgarian White milk goats according to type of estrus and number of inseminations.

No. of inseminations	Type of estrus		
	Natural estrus (group I)		Synchronized estrus (group II)
	GnRH (–)	GnRH (+)	
Single	33.3 (4/12)	45.2 (6/13)	58.3 (14/24)
Double	40 (6/15)	50 (7/14)	63.6 (7/11)
Overall	37 (10/27) ^a	48.2 (13/27) ^{ab}	60 (21/35) ^b

Values in the same row marked with different letters differ significantly at *P* < 0.05.

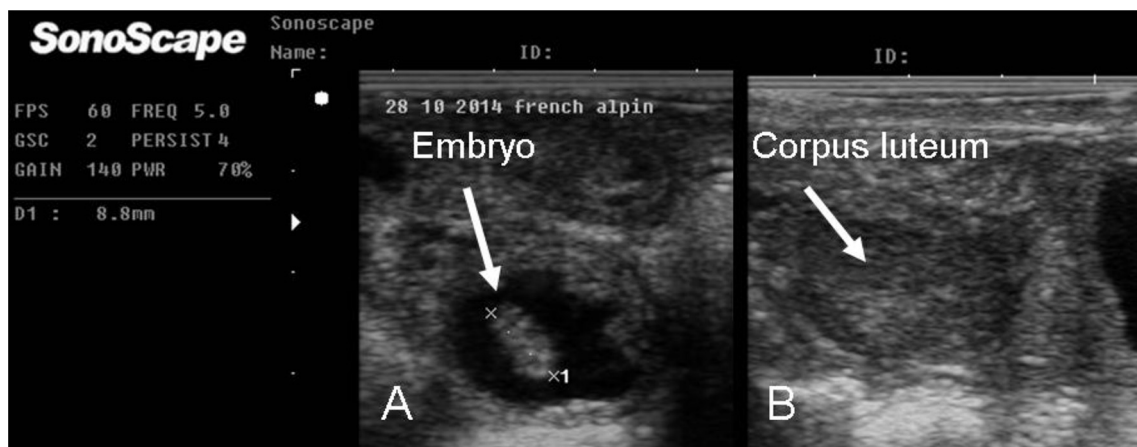


Figure 1. Embryo and corpus luteum graviditas in pregnant in goat – Day 30 after insemination.

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