

A NON-GENETIC APPROACH FOR PROMOTING REPRODUCTION IN SHEEP FROM THE ILE-DE-FRANCE BREED

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Summary

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One hundred and ninety eight sheep at the age of 3–5 years weighing 60–65 kg from the Ile-de-France breed, divided into two groups, bred at the Research Institute of Cattle and Sheep Breeding have been studied. The first group included 77 animals with synchronized oestrus and a double artificial insemination and the second one – 121 sheep with spontaneous oestrus and a double artificial insemination. The ultrasonographic study was performed with Aloka SSD 500 Micrus, a 5 MHz linear transducer and a Mitsubishi P91E printer using a transabdominal approach in the right inguinal region. In the first group, 45 positive and 32 negative findings were observed whereas in the second one – 88 positive and 33 negative. The parameters, evaluating the efficacy of the ultrasonographic diagnosis of pregnancy in sheep with a 5 MHz transducer and transabdominal approach for the entire herd were as followed: accuracy – 96.96%, sensitivity – 93.23% and specificity – 95.38%. The biological fertility percentages were 134% and 115% in the first and second group respectively. The data showed that the combination of oestrus synchronization, artificial insemination and ultrasonographic diagnostics of early pregnancy in stock herds, inseminated during the anoestrous season (March and April) allowed an optimization of reproduction. The timely insemination of non-pregnant sheep resulted in more offsprings and their realization at higher market prices in December and January.

Key words: oestrus, pregnancy, sheep, ultrasonography

INTRODUCTION

Reproduction biotechnologies in sheep contribute to the optimal utilization of their reproductive potential. Oestrus synchronization, artificial insemination and the early ultrasonographic diagnostics of pregnancy are integrated in contemporary reproductive programmes for accelerating lambing, introduction of new lines or

breeds and finally, for rising the economical effect of sheep breeding (Nicholas, 1994).

The differentiation of animals depending on their physiological status results in a better scheduling of housing and feeding technologies (Fowler and Wilkins, 1984) and reduction of reproductive pathology

(Gonzales *et al.*, 1998). The management of ovine reproduction uses various methods for pregnancy detection, but one of most accurate and most practical among them is the real-time B mode ultrasonography. The main advantages of the method are: non-invasiveness, unlimited capacity of evaluations: 200-300 sheep daily (Gonzales *et al.*, 1998), early detection of pregnancy: at days 25-30 with an accuracy of 100% (Garica *et al.*, 1993), monitoring of foetal development (Coubrough and Castell, 1998; Karen *et al.*, 2001).

Despite the numerous experimental data, the early ultrasonographic diagnostics of pregnancy in sheep still needs to be completed.

The aim of the study was to obtain experimental data in order to promote the reproduction in ovine stock herds via oestrus synchronization, artificial insemination and ultrasonographic diagnostics of early pregnancy.

MATERIALS AND METHODS

The studies were performed during the anoestrous season (March, April and May) and the oestrous season (June, July and September) in 198 sheep aged 3-5 years, weighing 60-65 kg, from the Ile-de-France breed, bred at the Research Institute of Cattle and Sheep Breeding in Stara Zagora. The animals were under a uniform regimen of housing and feeding, and underwent uniform immunoprophylaxis and treatment against parasitic infections. All sheep were divided into two groups. In the first group of 77 sheep, the oestrus was synchronized by means of intravaginal sponges containing 30 mg fluorogestone acetate (cronolone) (Chronogest Ch®, Intervet International, B. V.

Boxmeer, Holland) applied intravaginally for 14 days. After the removal of sponges the sheep were treated with 500 UI pregnant mare serum gonadotropin (PMSG) (Folligon, Intervet International, B. V. Boxmeer, Holland). A programmed artificial insemination was done twice by the 48th and the 60th hours after the removal of sponges. The semen was diluted with crystalloid fluid 6A. The volume for the insemination dose was 0.2 mL according to the Bulgarian State Standard requirements, i.e. over 70% motility and 80×10^6 motile spermatozoa. The insemination was performed within 2 h after collecting the ejaculate. The second group of 121 sheep from the same herd included animals with spontaneous oestrus, naturally inseminated twice by controlled mating by six previously prepared and checked rams of the same breed. The sexual regimen of rams consisted of 4 matings per day. Both groups of sheep were submitted to ultrasonographic evaluation with an ultrasonic equipment Aloka SSD 500 Micrus, a 5 MHz linear transducer, a Mitsubishi P91E printer, an ultrasonographic gel (Barbera del Valles, Barcelona, Spain), using a transabdominal approach in the right inguinal region. The observations were performed every ten days from the 25th to the 60th day of pregnancy and then every thirty days until the parturition.

Within the 30th-35th days after the insemination, the pregnancy was evidenced on the basis of enlarged uterine lumen with amniotic fluid and visualization of an embryo, whereas after the 35th-40th day – by detection of the characteristic C-shaped caruncles.

The following parameters were determined: accuracy (confirmed diagnoses/total number of initial diagnoses), sensitivity (number of confirmed positive diagnoses/total number of the initial posi-

tive diagnoses) and specificity (number of confirmed negative diagnoses /total number of the initial negative diagnoses) (Baronet and Vaillancourt, 1984).

The data were statistically processed by the non-parametric method of percentile comparisons using the Student's t-criterion and the Statistica software (StatSoft 1984-2000 Inc.,)

The results for the reproductive performance of the herd are presented in Table 1. The pregnancy resulting from the first insemination was 57.14% for group I and 73.55% for group II. The farm fertility in synchronized sheep was 76.60%, in non-synchronized – 90.00% and the biological fertility – 134% and 115% for groups I and II, respectively.

RESULTS

Table 1. Parameters of the reproductive status of studied sheep

Group s	Num ber of par- turi- ent shee p	Preg- nant from the first insemi- nation, %	Fertility, %	
			Vs all sheep	Vs par- turi- ent shee p
Group I – sheep with synchr onized oes- trus (n=77)	44	57.14	76.60	134
Group II – sheep with spon- tane- ous oes- trus (n=12 1)	89	73.55 * (p=0.0 3)	90.00 * (p=0. 01)	115

* significant difference vs Group I

Table 2. Comparison of ultrasonographic diagnoses of pregnancy with those observed at parturition

Type of diag- nosis		Ultrasono- graphic di- agnoses	Diag- noses con- formed by the parturi- tion
Posi- tive diag- noses 48	Grou p I	45	43
	Grou p II	88	87
	Grou ps I+II	133	130
	Grou p I	32	31
Nega- tive diag- noses	Grou p II	33	31
	Grou ps I+II	65	62
	Total	198	192

The positive diagnoses in the group with synchronized oestrus during the anoestrous period were 45. Compared to parturitions, 43 of those diagnoses were confirmed. The negative diagnoses were 32 (coincidence with 31 at parturitions). For the second group of sheep, the positive and negative diagnoses were 88 and 33, respectively. The respective number of confirmed ones were 87 and 31. A total 133 positive diagnoses were observed for the entire herd (Table 2). When compared to parturitions, the positive diagnoses were 130 and 3 were falsely positive. Depending on the stage of pregnancy, the number of positive diagnoses vs parturitions were 23 up to day 30, 36 between days 30–40, 38 between days 40–50 and 36 after the 60th day. The accuracy of the method for the various periods of the study was 92.00% by day 30, 86.97% between days 30–40 and 100% after the 40th day. From all 65 negative diagnoses, 62 were confirmed and 3 were falsely negative, being observed in the early period of the study (up to day 30). The non-pregnant sheep were submitted to synchronization in due time and subsequently – inseminated.

The parameters describing the efficacy of the ultrasonographic detection of pregnancy for the entire herd were 96.96% accuracy, 93.23% sensitivity and 95.38% specificity.

DISCUSSION

The results suggesting a lower fertility rate after the first insemination in sheep with synchronized oestrus during the anoestrous period compared to non-synchronized sheep resulted, in our opinion, from the administration of the exogenous progestogen – fluorogestone acetate (cronolone) (Bonev *et al.*, 2001).

The manifestations of oestrus and the insemination of sheep untreated with cronolone and PMSG could be due to the influence of andropheromones, released by “tester” rams during their stay in the herd for identification of oestrous sheep, as well as to the production of allomones from sheep in oestrus (Georgiev, 1994). The increased fertility in synchronized sheep was probably a consequence of the higher number of ovulations that occurred after the PMSG treatment (Murray and Sower, 1992).

Our data suggest that the most appropriate time for detection of pregnancy on the basis of enlarged uterine lumen and visualization of the embryo via the transabdominal approach was between days 30–35. That interval differs from those reported by Garica *et al.* (1993), Gearhart *et al.* (1988) – up to day 25.

The accuracy of the method in our studies was 92.00% up to day 30 and 100% after the 40th day. These findings are different from the data of Cellorio *et al.* (1994) reporting a 100% confidence between days 28–30 and similar to the results of Fowler and Wilkins (1984) by day 35 after the last insemination.

In conclusion, the application of ultrasonography together with methods of oestrus synchronization and the artificial insemination in stock herds, inseminated during the anoestrous season (March and April) contributed to the differentiation of animals according to their physiological status and to decreasing housing costs. The timely insemination of non-pregnant sheep could result in more offsprings and their realization at higher market prices in December and January. Thus, the tested approach could be useful for management of the reproduction in sheep.

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