

INDUCTION OF SYNCHRONIC OESTRUS, IMPREGNANCY AND FERTILITY OF FEMALE LAMBS AT 18 MONTHS OF AGE AND FEMALE LAMBS AT 7-8 MONTHS OF AGE, AFTER TREATMENT WITH *PMSG*

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Abstract

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The impregnation of sheep at an early age is important for obtaining additional production of sheep (milk and lambs). The purpose of this study was the induction of synchronized oestrus and the comparison of the insemination and fertility of female lambs at 18 months of age and female lambs at 7-8 months of age in the current year of birth, using progesterone vaginal tampons in combination with serum gonadotropin (*PMSG*). In the experiment were used 30 female lambs of 18 months of age, with body weight of 48-50 kg and 30 female lambs of 7-8 months of age, with body weight of 38-40 kg of the Pleven Blackface sheep breed. After the 12-day stay of the vaginal tampons, and after their removal and treatment with *PMSG*, 98.3% of the sheep have shown signs of oestrus between 48 and 60 hours.

It is observed that the impregnancy of those that have shown signs of oestrus is 69.0% (female lambs of 7-8 months of age), while with female lambs of 18 months of age the impregnancy is higher – 83.3%. The biological fertility, expressed by the number of lambs live born compared to the number of births is 160% with the female lambs of 7-8 months of age, while with the female of 18 months age, it is lower – 128%. The average impregnancy and fertility in both groups of animals is respectively 74.6% and 142.2%. There were no significant differences in the duration of pregnancy in female lambs at 7-8 months and female lambs at 18 months, respectively –147 and 149 days. The number of lambs of the same mother (type of birth) had no effect on the duration of pregnancy.

Keywords: female sheep 7-8 months, female sheep 18 months, *PMSG*, impregnancy, fertility

Introduction

Our country is a traditional producer of sheep cheese and lamb meat on the table of the Bulgarian and European consumer. With the expansion of our markets to Europe and the Arab world, the demand for products of sheep increases. In this regard, the increasing dairy milk yield and fertility of sheep are becoming of greater economic importance. It is a crucial factor in the management of sheep, as it represents basic earnings of the farmer in dairy breeds (Fernández et al., 2006). This requires the optimization and use of all reproductive potential of sheep from their birth to scrapping them. Achieved through early breeding, and synchronization

of oestrus in order to utilize more births and lactations, respectively getting more milk during the economic use of the sheep. Ensuring optimal conditions for feeding and rearing of young animals, oestrus synchronization and artificial insemination, twins and triplets lead to better economic performance in dairy sheep (Dimitrov et al., 2003).

Synchronization of oestrus and artificial insemination methods allow compaction of births and weaning lambs in the short term and better planning and regulating duration of milking period. It is known that hormonal preparations are the most widely used for the induction and synchronization of oestrus (Husein and Haddad, 2006).

Purpose

The purpose of this study was the induction of synchronized oestrus and comparing the number of impregnations and fertility of female lambs at 18 months of age (FL(18m)) and female lambs at 7-8 months of age (FL(7-8m)) of Pleven Blackface sheep in the current year of birth using progesterone vaginal swabs, with combination of serum gonadotropin (*PMSG*).

Materials and Methods

For the implementation of the objective, an experiment was conducted to induce and synchronize oestrus of female sheep at 30 FL (18m) with a body weight of 48-50 kg and female sheep at 30 FL (7-8m) with body weight of 38-40 kg of Pleven Blackface breed of the flock of IFC - Pleven. The preparation of the animals for fertilization was made in August-September 2013 with an expected period of birth - January-February 2014. The female lambs for early insemination were weaned at 30 days of age and fed in a way described by Simeonov (2013). After reaching a live weight of 26 kg the fattening continued based on meal from rapeseed used as protein sources (Stoycheva et al., 2013) until reaching 39-40 kg live weight. After reaching this body weight, the FL (18 m) and FL (7-8 m), designated for the experiment, have been grown together grazed on artificial pasture of legume and cereal grasses.

During the grazing period, the sheep were fed with 0.500 kg/head fodder crops (triticale and barley in equal amounts). Compound feed was given twice a day - morning and evening. Animals had free access to drinking water and salt licks. Animals are wormed one week before applying the swabs (5 mg Albendazole/kg). Each animal is put a progesterone vaginal swab Syncro-part (Flugestone acetatum), which stays for 12 days. Immediately after the removal of the swab, the animals were injected with gonadotropin (*PMSG*) 500 IU/animal. They were observed for manifestation of signs of oestrus of FL (18 m) and FL (7-8 m) after the treatment (between 48-60 hours). There

has been a double artificial insemination, respectively at the 48th and 60th hour. Seed material was taken from rams designated under the plan of insemination of sheep in the farm at Institute of Forage Crops - Pleven.

It was monitored for sheep that were not impregnated after the initial insemination. For this purpose, after the 15th day of the first insemination, there were put "rams-testers" in the flock, which have been fitted special aprons. Sheep showing oestrus, were inseminated again. Rams-testers are placed on the each successive sexual cycle to the ewes, until they didn't find sheep in estrus in the herd.

After the insemination, FL (18 m) and FL (7-8 m) have been grown together on grazing and on winter ration until the birth.

Results and Discussion

At the insemination of the animals, FL (18 m) reached 82.11% of the average body weight of sheep weighing 60 kg, while the FL (7-8 m) reached 64.12% of the same (Table 1). Relative body condition of sheep is 2.8 (FL (18 m)) and 2.7 (FL (7-8 m)). During pregnancy, the animals continued to grow. At the time of birth the sheep have increased their living mass and almost reached the average body weight of adult sheep (60 kg). The relative body condition of FL (18 m) and FL (7-8 m) is respectively 3 and 2.8.

Table 2 shows the number of sheep manifesting oestrus after treatment with gonadotrophin. 98.33% of the sheep have shown signs of oestrus between the 48th and 60th hour (except one FL (7-8 m)). The application of 300 IU *PMSG* is preferably 24 hours before or in the moment of the removal progesterone swab, it is essential for the good effect of the induced estrus (Romano et al., 1997). Bonev et al. (2003) synchronized oestrus in ewes, as the best result was achieved after injection of 500 UI *PMSG*, as the number of impregnated sheep reached 41% and 65% fertility.

The treatment with *PMSG* produces rapid growth of follicles, increasing the number of ovulated follicles and synchronized oestrus and ovulation (Eekass et al., 1989; Geor-

Table 1
Characteristics of relative body condition of sheep (RBC)

	Insemination of sheep			Sheep at birth		
	Body weight, kg	RBC	% of Avg. body weight of sheep, 60 kg	Body weight, kg	RBC	% of Avg. body weight of sheep, 60 kg
FL (18 m)	49.26	2.8	82.11	57.82	3	96.36
FL (7-8 m)	38.47	2.7	64.12	47.52	2,8	79.19

Table 2
Oestrus, impregnated sheep and fertility

	Number of sheep	Sheep in oestrus		Total impregnated ewes		Total Fertility	
		Number	%	Number	%	Number of lambs	%
FL (18 m)	30	30	100	25	83.34	32	128.0
FL (7-8 m)	30	29	96.60	20	68.96	32	160.0
Total	60	59	98.33	45	76.27	64	142.2

Table 3
Impregnated sheep in the first and second insemination

	Number of sheep	Sheep in oestrus		Non impregnated after the 1st insemination		Impregnated after the 1st insemination		Impregnated after the 2 nd insemination	
		Number	%	Number	%	Number	%	Number	%
FL (18 m)	30	30	100	12	40.0	15	50.0	10	83.33
FL (7-8 m)	30	29	96.60	4	13.3	16	55.17	4	100

giev, 2003). A disadvantage of the treatment with *PMSG* is that the number of anovulatory follicles increases, the recovery rate is low (Armstrong et al., 1983; Samartzi et al., 2003). During oestrus season dose of *PMSG* should be higher in breeds with lower fertility and lower in breeds with higher fertility (Bonev et al., 2002). Dosing cannot be fixed due to the influence of genetically determined and exogenous factors. Equal doses of *PMSG* induce different follicular growth in different sheep breeds (Georgiev, 2003). Samartzi et al. (2003) have achieved satisfactory results in Chios breed with a dose of 750-1000 IU *PMSG*.

From a total of 30 FL (18 m) showing oestrus, 25 of them were impregnated in the first and second insemination (83.34%). The number of impregnated FL (7-8 m) (first and second insemination) of the total 29 showing oestrus is 20 (68.96%). The number of impregnated FL (18 m) (83.34%) is larger compared to FL (7-8 m) (68.96%). The fact is probably due to age, physiological development and the live weight of the two separate groups of animals. The number of lambs received from 25 impregnated FL (18 m) is 32 or 128%, while the number of obtained lambs from 20 impregnated FL (7-8 m) is 32, or 160% fertility. The biological fertility is defined in percentage based on the ratio of the number of live births to the number of sheep given birth. According Metodiev (2012), fertility is genetically determined and in the majority of sheep breeds it is 100-140%, and it is a major determinant of the economic performance in sheep, regardless of the productive direc-

tion. Fertility correlates with the dose *PMSG* (Georgiev, 2003). After surveys Aköz et al. (2006), concluded that the treatment with 300 UI *PMSG*, with local crossed breed didn't achieve a significant increase in fertility and twins (78.6% and 18.2). There has been an increase in the impregnancy, fertility and twins (92.8%, 76.9%, 40.0%), but after the injection of 500 UI *PMSG*. The concentration of gonadotropic hormone in the body of the animal directly affects the ovarian function including the amount of ovulated follicles. The higher fertility of FL (7-8 m) in our study is most likely due to the higher dose of gonadotropic hormone (*PMSG*), in relation to their body mass.

The average impregnancy in both groups of animals is 74.57%, and fertility is 142.20%. After treatment with *PMSG*, Romano et al. (1997) reached 57.7% impregnancy and 120% fertility of local breed of sheep. In this scheme of treatment Zeleke et al. (2005) achieved impregnancy of 75-78% and fertility-126.2 to 147.8%, which is in support of our results.

After the first artificial insemination, 50% of FL (18 m) and 55.17% of FL (7-8 m) are impregnated (Table 3). The percentage of animals showing signs of oestrus at the next sexual cycle (after the 15th day after the first insemination) was 40% in FL (18m) and 13.3% in FL (7-8 m). The percentage of re-inseminated sheep is high, respectively 83.33% of FL (18 m) and 100% of FL (7-8 m).

Duration of gestation to impregnated FL (18 m) is from 138 to 152 days, average - 147 days, while FL (7-8 m) rang-

Table 4
Average, minimum and maximum duration of pregnancy

	Average duration, days	Minimum duration, days	Maximum duration, days
FL (18 m)	147 ^a	138	152
FL (7-8 m)	149 ^a	147	153

^aThe lack of identical letters shows statistically significant differences in the indicators between the groups at $P > 0,05$

Table 5
Average duration of pregnancy, according to type of birth and sex of lambs, days

Type of birth	Number		Duration of pregnancy		Minimum		Maximum	
	FL (18 m)	FL (7-8 m)	FL (18 m)	FL (7-8 m)	FL (18 m)	FL (7-8 m)	FL (18 m)	FL (7-8 m)
Loners, total	15	10	146.6	148.8	138	147	151	151
Loners, male	6	4	147.0	150.5	139	150	151	151
Loners, female	9	6	146.5	148.2	138	147	151	150

es from 147 to 153 days, 149 days on average (Table 4). No significant differences in the duration of pregnancy between the two groups are observed.

46.8% of the total number of lambs, produced by the impregnated FL (18 m) are loners, while to FL (7-8 m) the lambs loners are 31.2% (Table 5). The number of twins is relatively large – 56.2% of impregnated FL (7-8 m) and 50% of impregnated FL (18 m). The percentage of impregnated FL (18 m) which produced more than one offspring is 36% and 45% for FL (7-8 m).

The type of birth (the number of lambs of the same mother) had no effect on the duration of pregnancy in impregnated FL (18 m) and FL (7-8 m) (Table 5). The sheep which are pregnant with loners have an average duration of pregnancy – 146.6 and 148.8 days; with twins – 149.75 and 149.6 days and with triplets – 148.0 days, respectively for impregnated FL (18 m) and FL (7-8 m). Sex of offspring did not affect the average duration of pregnancy.

Conclusion

Hormonal effect is a means to regulate the breeding process in early inseminated FL (18 m) and FL (7-8 m).

98.33% from treated sheep from Plevan Blackface breed have shown signs of oestrus between 48th and 60th hour after the injection of PMSG.

Impregnancy of FL (7-8 m) is lower than that of FL (18 m) respectively 68.96% and 83.33%. The fertility of FL (7-8 m) is 160% and it is higher by 12.2% compared to the fertility of FL (18 m), which is 128%.

The average impregnancy in both groups of animals is 74.57%, and fertility is 142.20%.

The percentage of impregnated FL (18 m) producing more than one offspring is 36% and 45% for FL (7-8 m).

The type of birth had no effect on the duration of pregnancy to FL (18 m) and FL (7-8 m) from Plevan Blackface sheep breed.

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