

# EFFICACY OF REPRODUCTIVE BIOTECHNOLOGIES APPLIED IN OUT-OF-SEASON TURCANA SHEEP

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## **Abstract**

*This paper aimed at testing the efficacy of a well-known method of estrus induction and synchronization in out of season ewes of Turcana breed, kept under extensive conditions. We also aimed at comparatively evaluate the efficacy of natural cover versus artificial insemination with freshly collected and diluted semen. The study was carried out on a batch of 20 ewes in which out-of season estrus was induced using progestagens and PMSG. Subsequently, two groups of ten ewes each were formed and the females were subjected to natural breeding (group1, n=10) or artificial insemination with freshly collected and diluted semen (group 2, n=10). Fifty days later, pregnancy diagnosis by ultrasonography was performed. All sheep (100%) showed heat signs and were marked by the teaser ram following the estrus induction protocol. Pregnancy diagnosis and parturition supervision showed a fertility percentage of 80% and prolificacy of 137.5% for group 1, while in group 2, fertility was 60% and prolificacy 116.6%.*

**Key words:** sheep, out-of-season, breeding, insemination

## **Introduction**

Sheep breeding is currently oriented worldwide towards mutton production, as it will surely represent an important source of protein in the future. This goal can only be achieved by obtaining a large number of lambs, which will also ensure large amounts of milk and wool (Boitor I., 1981). The major measures that need to be applied in order to increase animal numbers as well as genetic progress of breeds should focus on increased production and amelioration of sheep breeds (Groza I., 2006). Thus, it is very likely that the future will belong to ruminant species, which do not compete humans by feeding on cereal and other concentrates (Roman M. et al., 2003). In order to increase mutton production early lambing should be organized (Şonea A., 2013). The number of animals submitted to fattening process can be increased by: increasing prolificacy, early breeding of animals, acceleration of lambing rhythm, early weaning of lambs and therefore achieving three parturitions in two years (Zamfirescu S., 1995, Zamfirescu S. and Şonea A., 2004). This paper aimed at testing the efficacy of a well-known method of estrus induction and synchronization in out of season ewes of Turcana breed, kept under extensive conditions. We also aimed at comparatively evaluate the efficacy of natural cover versus artificial insemination with freshly collected and diluted semen.

## **Materials and methods**

Twenty ewes were selected out of a flock of 90 Turcana sheep, extensively reared in a rural area of Transylvania, Romania. The body condition score of all subjects that were included in the study was above average and each of them had at least one pregnancy in their reproductive history.

Out-of-season estrus induction and synchronization was performed in all ewes belonging to the experimental group. Chronogest CR intravaginal sponges were inserted on day 0 and left in place for 14 days. On day 14, once the sponges were removed a single dose of 500 IU PMSG (Folligon, Intervet) was administered as an i.m. injection. This protocol is based on the rebound effect, which results in follicular development, estrus manifestation and ovulation.

Following the hormonal treatment, ewes were further divided into 2 experimental groups, 10 ewes each.

Group 1 was left with the rest of the flock, including a total of 4 fertile rams, for natural breeding. Twenty-four hours after PMSG administration, first signs of estrus appeared and within the next 2 days, all sheep from group 1 were covered by rams, several times.

In group 2, artificial insemination was performed, using freshly collected and diluted semen. Semen was collected from 2 rams, using an electroejaculator for small ruminants (*fig. 1*).



Figure 1. Electroejaculator for small ruminants

A macroscopic examination of semen was immediately performed, including volume, color, viscosity and aspect, followed by a microscopic examination using a light microscope equipped with a 10x objective, for spermatid waves, motility and density evaluation. Smears were also performed and stained with eosin-nigrosine in order to assess the percentage of dead and/or abnormal spermatozoa

Following examination, semen from the two rams was pooled, in order to avoid the involvement of individual factor. Dilution was performed using a commercial extender (Tryladil) enriched with 20% egg yolk. The volume of extender was calculated according to spermatozoa concentration, which was assessed using a hematology counting chamber. The final concentration was 200 million spermatozoa/insemination dose.

Artificial insemination was performed 55 hours after sponge removal, using the intra-cervical technique (*fig.2*).

Fifty days later, all ewes belonging to the two experimental groups were submitted to pregnancy confirmation using ultrasounds.



Figure 2 Intracervical insemination of ewes

## Results and discussions

The four rams that were introduced in the flock immediately after sponge removal started to perform mounts 42 hours later when the first ewe accepted to be mounted.

In group 1, made up of 10 ewes prepared for natural breeding, normal heats were observed, similar to those appearing during the reproductive season in what duration and intensity was concerned.

Results of the pregnancy diagnosis can be seen in figure 3. One of the ewes from this batch gave birth to 3 lambs as shown in figure 5.

Ewes from group 2 were isolated from rams, but local clinical signs clearly showed that all 10 ewes were in heats.

Artificial insemination was successful, beginning with semen collection, quality assessment, extension, straw preparation and insemination itself.

The macroscopic and microscopic parameters of the ejaculates can be observed in table 1 and 2.

Results of the pregnancy diagnosis can be seen in figure 4.

Table 1

Parameter	Ram 1	Ram 2
Volume	1.5 ml	2 ml
Color	Yellowish-white	Yellowish-white
Aspect	Creamy	Creamy

Table 2

Parameter	Ram 1	Ram 2
Spermatic waves	++++	++++
Subjective motility	90%	95%
Density	D	D
Abnormalities or immature spermatozoa	<5%	<5%
Concentration	4.3 bill. /ml	3,8 bill. /ml

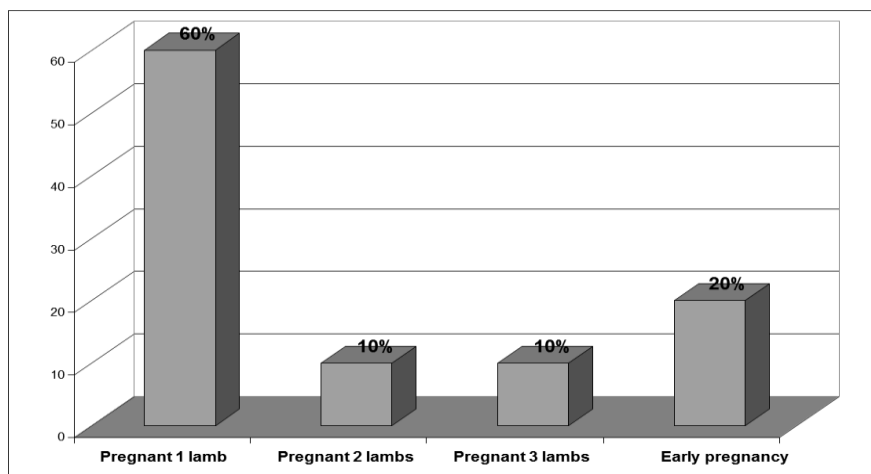


Figure 3 Results obtained in group 1

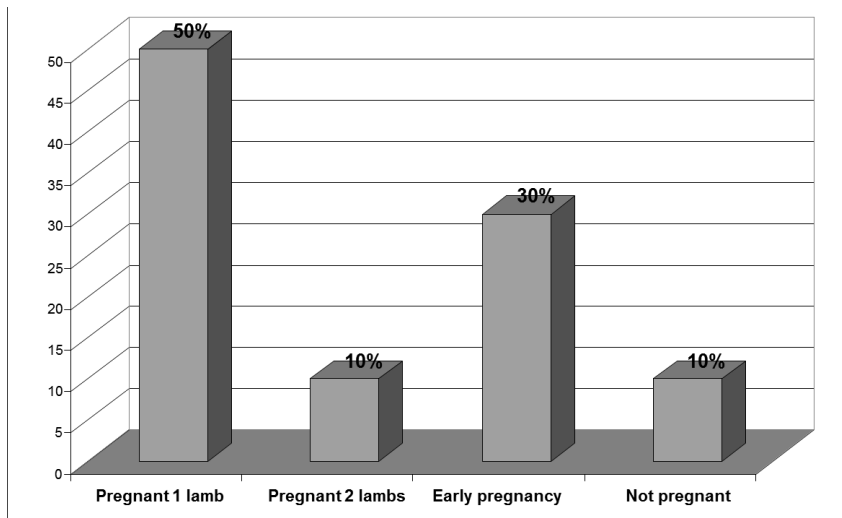


Figure 4 Results obtained in group 2



Figure 5 Ewe with 3 lambs

### Conclusions

Following the application of the estrus induction and synchronization protocol, all ewes showed specific heats signs.

The application of this protocol led to an increased prolificacy in group 1 and 2, of 116.6% and 137%; respectively.

The 60% fertility percentage obtained in group 1 after artificial insemination using the

intracervical method is satisfactory, and comparable to literature data.

Natural cover is more convenient but cannot produce the desired genetic progress.

We recommend the use of Chronulon CR intravaginal sponges together with Folligon in out-of-season estrus induction and synchronization.

We recommend the use of intracervical artificial insemination in ewes in order to improve genetic quality of local breeds.

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