Effect of Using Melatonin Implants on Reproductive Performances in Turcana Ewes

Ioan Pădeanu[1], Sorin Voia[1], Dinu Găvojdian[2], Iulian Frăţilă[1], Călin Mircu[3], Ioan Bratu[3], Constantin Pascal[4], Ioan Sauer[2]

[1] *Faculty of Animal Sciences and Biotechnologies, 300645, Calea Aradului, 119, Timisoara, Romania*
[2] *Sheep and Goats Research and Development Station, 325400, Drumul Resitei km 2, Caransebes, Romania*
[3] *Faculty of Veterinary Medicine, 300645, Calea Aradului, 119, Timisoara, Romania*
[4] *Faculty of Animal Sciences, 707727, Mihail Sadoveanu Street, no 8, Iasi, Romania*

Abstract
It is estimated by some authors that the administration of subcutaneous melatonin implants during a period of 30 days, in lactating or dry ewes, would improve the reproductive performance in some sheep breeds. This study was conducted in Giarmata Mare, Timis County, on 78 lactating ewes and 75 dry ewes, which were individually inserted with implants containing 18 mg melatonin on 31 August 2009. Control group consisted of 100 lactating and dry ewes in equal proportions. The results shown that the main reproduction indices as prolificacy, birth rate and the lamb number productivity index are significantly ($p < 0.05$) higher in ewes from the experimental group, compared with ewes from the control group, and that treated ewes shortened the period of mating and lambing to half-time comparing to the control group. There is a suggestion that the use of melatonin implants Melovin ® type near the normal breeding season increases the reproductive performance of ewes from Turcana breed.

Keywords: sheep, melatonin, reproductive performances.

1. Introduction

In Romania Turcana sheep breed is representing 70% of the breed structure. This breed is rustic, but late breeding and not reproducing in out of season, only during the autumn (September to November) with lambings in February-March [1].
External markets demand light lamb meat all year round.
Reproductive performances realized of this breed are lower, compared with Tigaie and Merino breeds. The use of Melatonin as a subcutaneous implant inserted in the ear area, subcutaneous, has become a method used frequently on high performance sheep breeds from the Western Europe [2, 3].

* Corresponding author: Ioan Padeanu, 0256277148, ioan_padeanu@yahoo.com

The continuous administration of melatonin through the hypodermic implants (Melovine R, Requilin R, types) allows the mimicry of short days (specific to the principal autumn season), even if retina accepts long spring –summer days. The ovine breeders that use natural mating will insert melatonin implants, starting with 30-40 days before reproduction period [4, 5.]
The purpose of the research was to evaluate the influence of the Melatonine implants (Melovin ®) on the reproduction indices of the Romanian indigenous Turcana sheep breed.

2. Materials and methods

The experiment was carried out on gimmers from Turcana breed, reared in an commercial farm from Giarmata Mare, Timis County. In 21 august 2009, to the experimental groups (lactating and non-lactating ewes), 153 gimmers (78 lactating and 75

dry ewes) were implanted with Melatonin implants (product named MELOVIN®).
After 28 days from the Melatonin implants insertion, rams were introduced into the flock, during a 40 days period.
Ewes from the experimental groups were monitored under the aspects of time of entrance in estrum, mating and the evolution of the pregnancy up to parturition and lambs survival rates until weaning.
Based upon the primary data, were calculated the birth rate (number of lambing obtained from 100 ewes), the prolificacy (number of lambs obtained from 100 laming ewes), natality (number of lambs/100 ewes), the survival rate (number of weaned lambs/100 born lambs) and the numeric productivity (number of weaned lambs from 100 ewes).
Testing the significance of differences was made by $\chi 2$ tests after Pearson method [6].

3. Results and discussion

Results registered in lactating and non-lactating Turcana ewes treated with melatonin implants are shown in Table 1.

Table 1. Postnatal reproduction indices in Turcana ewes after the insertion of the melatonin implants

Group	Specification	Ewes		Ewes lambed		Lambs	Prolificacy		Natality		Survival rate		Numeric productivity	
		treated	Live at lambing	n	%	n	%	E-C	%	E-C	n	%	%	E-C
Experimental	Lactating ewes	78	75	72	96	94	130.5	+22.0***	125.3	21.3***	90	95.7	120	+20.0***
	Dry ewes	75	75	75	100	86	114.6	61*	114.6	10.6*	84	97.6	112	+12.0*
	Total	153	150	147	98	180	122.5	+14.0**	120.0	16.0**	174	96.6	116	+16.0**
Control	Lactating and dry ewes	100	98	94	95.9	102	108.5	-	104.0	-	98	96.0	100	-

Note: Implant insertion was done in 31.08.2009 on Turcana ewes; E – experimental group; C – control group.

During the experiment, was pursued and monitored survival rate of sheep included in the study (in both control and experimental groups).
Starting insertion of melatonin implants and until lambing season, 3 losses were recorded (1.9%) of experimental group from the lactating ewes, and two losses in the control group (2%), due to some nutritional deficiencies.
Analysing lambd ewes index, results reveal that the percentage of ewes is very high (96% in the lactating ewes and 100% in the non-lactating ewes), both the experimental group (98%) and in control group 95.9%.
Following the birth rate, was observed that the ewes in the experimental group treated with melatonin, the lambing period decreased by half (21 days) versus 40 days in ewes included in the control group. Prolificacy, an very important indicator of reproductive activity is higher in lactating ewes group (130.5%) and then in dry ewes group (114.6%), with an average of 122.5% in the experimental group, significantly ($p < 0.01$) higher by 14.0% compared with ewes in the control group (108.5%). Note that indigenous unimproved Turcana breed has a low prolificacy (105-108%), case confirmed by the control group in the current experiment.
Natality, the synthetic indicator of reproductive activity is also significantly higher in the experimental group (120%) with 16% more ($p<0.01$) than that achieved index in the control group (104%). The survival rate of lambs from birth to weaning is normal and very close to the experimental group (96.6%) and control group (96%). Index of lambs weaned (numerical productivity) is also significantly higher ($p < 0.01$) in the experimental group (116%), with 16% compared with the control group (100%).
On Turcana ewes (n=34) results suggest that melatonin implants, groups reproduction season, but does not influences prolificity [7].
Experiments carried out on five French sheep breeds, shown that ewes treated with melatonin implants were producing an extra 16 lambs on 100 ewes lamnbd, compared with control groups, and the lambings occurred more early and more grouped [8, 9].
Abecia et al (2005), treating with 18 mg melatonin 71 ewes from Aragines breed on the start of March (8) they had introduced the rams in the herd after 42 days obtaining an significant increase ($p<0.05$) of the ewes in estrus. Ewes treated with melatonin manifested the first estrus sooner compared with untreated ewes, but more than 80% from the treated ewes had manifested

silenced heats, followed by an normal cycle. The same authors collective [11] have done another experiment on an impressive number of sheep (1932) from three breeds: Aragonesa, Assaf and Merinos, belonging to 12 commercial farms. Ewes were inserted melatonin implants in the winter period (1 January-15 February and 1 April-15 May). Ewes from Aragonesa breed had produced more lambs per ewe (1.16), compared with the ewes from the control lot (0.83) in April, and situation was repeated in May (1.23 compared with 0.97). In Assaf ewes results were modest in January (0.62 lambs /ewe), in February (0.64 compared to 0.32), and better results in May (0.77 compared to 0.54). In Merino treated with melatonin group, the effect was evident only in January- February period (0.91 lambs/ ewe, compared with 0.61). Authors conclusion was that the melatonin implant on big flocks have improved the lamb production from studied sheep breeds, even if economic efficiency may vary with the breed, season and farm conditions. Forcado et al (2006), from the University of Zaragoza reported that on older ewes (10-11 years), melatonin can functionally restore the neuro-endocrine system, after it was affected by senescence.

4. Conclusions

In Turcana ewes treated with melatonin implants (18 mg) prolificacy indices (+14%), natality (+16%) and numerical productivity (+16%) are significantly ($p<0.01$) higher compared with ewes from the control group.

In treated ewes, lambing season was shortened by half (21 days) compared to untreated ewes (40 days).

Acknowledgements

This work was supported by CNCSIS- UEFISCDI, project number PNII - IDEI code 2389/2008.

References

1. Pădeanu, I.,Producţia de carne la ovine, Ed, Mirton Timişoara, 2010

2. Forcada, F., Effect exogen melatonin and plane of nutrition after weaning on estrus activity, endocrine status and ovulation rate in ewes lambing in the seasonal anestrous. Theriogenology, 1995, 43, 1179-1193

3. Forcada, F., Abecia, J. A., Casao, A., Cebrian-Perez, J. A., Muino-Blanco, T., Palacin, I., Effects of ageing and exogenous melatonin on pituitary responsiveness to GnRH in ewes during anestrus and the reproductive season, Theriogenology, 67, Zaragoza, Spain., 2007, 855-862

4. Chemineau, P., Malpaux, B., Petits ruminants: Photoperiodisme et reproduction. La semaine veterinaire Fevrier, 1997, 97, 18-20

7. Malpaux, B., Viguie, C., Bertrand, F., Skinner, D.C., Thiery, J.C., Chemineau, P., Photoperiodic regulation of the annual cycle of reproduction in the ewe: mode of action of melatonin. Colloque "Biological Rhytms: Physiological and Molecular Mechanisms" 9-12 mars 1997, Lyon, France

8. Sandu, GH., Modele experimentale in zootehnie, Ed. Coral Sanivet, Bucuresti, 1995

9. Pădeanu, I., Productiile ovinelor şi caprinelor. Ed. Mirton Timişoara, 2002

5. Chemineau, Ph., Declenchement de l`activite sexuele en avance de saison chez les brebis et les agnelles en lutte naturelle. Publ. INRA, 1995

6. Chemineau, P., Maplaux, B., Pelletier, J., Laboeuf, B., Delgadillo, J.A., Deletang, F., Pobel, T., Brige, G., Emploi des implans de melatonine et des traitements photoperiodiques pour maîtriser la reproduction saisonniere chez les ovines et les caprins. INRA, Productins Animales, 1996, 9, 45-60

10. Abecia, J. A., Palacin, I., Forcada, F., Valares, J. A., The effect of melatonin treatment on the ovarian response pf ewes to the ram effect Domestic Animal Endocrinology, Zaragoza, Spain, 2005, 31. 52-62

11. Abecia, J. A., Valares, J. A., Forcada F., Palacın, I., Martın, S., Martino, A., The effect of melatonin on the reproductive performance of three sheep breeds in Spain. Elsevier, Small Ruminant Research, 2007, 69, 10–16

12. Forcada, F., Abecia, J., Cebrian-Perez, J., Muino-Blanco, T., Valares, J., Palacın, I., Casao, A., The effect of melatonin implants during the seasonal anestrus on embryo production after superovulation in aged high-prolificacy Rasa Aragonesa ewes. Elsevier, Theriogenology, 2006, 65, 356–365