Effects of Using Melatonin Implants and Syncro-Part Pessaries + PMSG on Reproduction Performance in Transylvanian Merino Breed Ewes

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Abstract
Investigations were carried out in a commercial farm from Sinnicolau Mare, western Romania, on a number of 70 yearling ewes of 17-18 months of age from the native Transylvanian Merino breed. Ewes included into study lambed for the first time as maiden-ewes at the age of 14-15 months, with their lambs being weaned at the age of two months. First group (V1), numbering 25 ewes received during out of season breeding (30.05.2011) a dose of 18 mg subcutaneous melatonin implants (Melovin®), while the second group (V2) consisting out of 25 ewes were treated with subcutaneous melatonin implants + 30 mg FGA (Syncro-Part pessaries) + 500 IU PMSG. Control group was represented by 20 intact females. Ewes were put to ram in July 7th 2011. Researches shown that in ewes treated with melatonin, 30 mg FGA + 500 IU PMSG (V2) the conception rate was of 80%, with a prolificacy of 140%, with a weaning rate of 1 lamb/ewe. In V1 group, the weaning rate was of 0.84 lambs/treated ewe, with significantly lower production costs. Ewes from the control group produced a weaning rate of 0.55 lambs/ewe, significantly less (p≤0.05) comparing to V1 and V2 experimental groups. It was concluded that in Transylvanian Merino breed, although the V2 group performed best (producing 28 lambs) compared to V1 group (23 lambs), the difference of 5 lambs does not cover additional production costs, therefore the use of melatonin implants alone should be recommended.

Keywords: melatonin implants, pessaries, PMSG, reproductive performance, Transylvanian Merino breed

1. Introduction
Sheep breeding in Romania is currently the most dynamic from all agricultural sectors, with an annual growth rate of 7-8% and markets that are growing their demand for sheep products. Nowadays, Merino breed strains make up to 4-5% from the national flock, being reared in western and eastern part of the country. Merino ewes are being bred mainly for the lamb production, with the lambs being sold at body weights of 20-22 kg. Foreign markets are demanding light lamb carcasses year around, however during November-December the sale prices are higher than average with 25-30%.

Breeding season for indigenous Turcana and Tsigai breeds is during autumn, period which corresponds with the gradually reduction of the day-light form 14 h / 24 h to a 12 h / 12 h ratio (1:1). Major differences were reported between breeds, while fine wool breeds manifest estrus at a light-dark ratio of 1:1 (September), the less improved, coarse wool breeds go into estrous

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during months with longer dark nights (October) [1]. In general, Merino ewes proper feed and managed 70-80% will manifest estrus during spring season as well (April-May), while in years with severe drought, 40-50% of the ewes will not manifest estrous. In order to improve reproduction performance in these ewes, a series of methods could be applied; the most frequent is one which uses exogenous progesterone treatments and PMSG [1]. Administration of progesterone associated with PMSG became a widespread method for estrous induction and synchronization in sheep and goats. However, it is an expensive method and requires a large volume of work, and generates an anti-PMSG reaction that reduces substantially the reproductive efficiency [2, 3]. Vast majority of the Romanian breeders do not show interest to applying these methods in their farms due to the high cost of treatments (4.5-5 Euros/ewe) [3], and also due to the high labor input needed.

Photoperiodic effects are being used during spring-summer seasons, when the light/dark ratio is much in favor of light (14-16 light/day). Keeping the ewes in dark sheds or using melatonin implants, might lead to an increase of the number of ewes that go into estrus. The continuous administration of melatonin through the hypodermic implants (Melovin® and Regu1in) allows the mimicry of short days (specific to autumn season), even if retina accepts long spring – summer days. Sheep breeders that use natural mating will insert melatonin implants, starting with 30-40 days before reproduction period [4, 5]. Use of Melatonin as a subcutaneous implant inserted in the ear area, has become a method frequently used on high performance sheep breeds in Western Europe. [5-7].

Aim of the current research was to evaluate influence of the Melatonin implants (Melovine) on the reproduction indices of Romanian indigenous Merino sheep breed during summer season.

2. Materials and methods

Experiments were carried out in a commercial farm from Timis County in 2011, on a number of 70 Transylvanian Merino gimmers of 17-18 months of age. The gimmers lambed as maiden ewes at the age of 12 months, with the weaning of the lambs at the age of 3 months.

Three experimental groups were set-up, as follows: V1 – 25 gimmers, group that was treated subcutaneous with 18 mg of melatonin (Melovin®) in the peri-auricular area; V2 – 25 gimmers treated with melatonin implants, Syncro-Part sponges (FGA 30 mg) and 500 IU PMSG (Folligon); V3 – 20 un-treated gimmers, which was considered the controls group.

The ewes had an average body weight ranging between 45 to 50 kg. Ewes were put to ram in June, for a period of 40 days.

Ewes from the experimental groups were monitored regarding time of entrance in estrus, mating, evolution of the pregnancy up to parturition and lambs survival rates until weaning. Birth rate (number of lambing /100 ewes), the prolificacy (number of lambs /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 / 100 ewes) were calculated [1]. Ewes from both control and experimental groups were kept during reproduction season on good quality pastures.

In order to test significance of the differences between the two experimental groups, Pearson test was performed (Table 1), following the model bellow:

<table>
<thead>
<tr>
<th>Table 1 Pearson test formulas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Event organized</td>
</tr>
<tr>
<td>Group A</td>
</tr>
<tr>
<td>Group B</td>
</tr>
<tr>
<td>a₁ + a₂ = n₃</td>
</tr>
</tbody>
</table>
3. Results and discussion

Results regarding post-natal reproduction indices, following the melatonin implants insertion are being presented in Table 2.

Data shown in the Table 2 presents that in Transylvanian Merino gimmers, in the experimental group V2 ewes, which were treated with 18 mg melatonin, Syncropart pessaries impregnated with 30 mg of FGA and 500 IU PMSG (Folligon commercial product), registered the best reproductive performances. Thus, out of the 25 gimmers treated, 20 lambed (80%) with an average prolificacy of 140%, 112% natality and a weaned lambs index of 100%, being obtained one lamb/hormonal treated ewe.

Worth mentioning is that during reproduction season, during summer season (in July), the temperatures were extremely high (32-38°C) therefore the temperatures might have influenced negatively the conception rates of the females.

Table 2. Reproduction performance of Transylvanian Merino gimmers following the out of season breeding hormonal treatments

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Ewes (n)</th>
<th>Ewes lambed (%)</th>
<th>Lambs (n)</th>
<th>Prolificacy</th>
<th>Natality</th>
<th>Survival rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melatonin (V1)</td>
<td>25</td>
<td>68.0</td>
<td>23</td>
<td>135.3%</td>
<td>92.0%</td>
<td>21</td>
</tr>
<tr>
<td>Melatonin + Syncropart + PMSG (V2)</td>
<td>25</td>
<td>80.0</td>
<td>28</td>
<td>140.0%</td>
<td>112.0%</td>
<td>25</td>
</tr>
<tr>
<td>Control (C)</td>
<td>20</td>
<td>50.0</td>
<td>12</td>
<td>120.0%</td>
<td>60.0%</td>
<td>11</td>
</tr>
</tbody>
</table>

*p<0.05; ** p<0.01; *** p<0.001; E – experimental group; C – control group

In V1 group, ewes treated with melatonin alone, 68% of the females lambed and the average prolificacy was of 135.3%, natality of 92% and numerical productivity 84%, values registered being very close to those from the V2 group.

In the control group, all reproduction postnatal indices had significantly (p<0.01) lower values compared with the two experimental groups, 50% conception rate, 120% litter size, 60% natality, 55% numerical productivity, respectively. Therefore, when compared to prolificacy registered by V2 group, prolificacy in the controls was with 20% lower (p<0.01) and weaning rate lower with 45% (p<0.001). Remarkable differences were registered when controls were compared with the V1 group, to which the prolificacy is lower with 15.3% (p<0.05), and the number of weaned lambs was lower with 29% (p<0.01). Between the two experimental groups (V1 and V2) no significant (p>0.05) differences were found for the number of weaned lambs (25 lambs in V2 and 21 lambs in V1).

Survival rate of lambs until weaning was very close between the controls (91.7%) and the experimental groups (89.3% in V2 and 91.3% in V1), differences being insignificant (p>0.05).

In general, in Romania the value of a newborn lamb is considered 50 RON (4 kg x 12.5 RON/kg = 50 RON), while a melatonin implant costs 2 Euros, and a Syncropart sponge + 500 IU PMSG costs 2.5 Euros, therefore a melatonin treatment costs 2 Euros (V1) and a treatment with melatonin and pessaries costs 4.5 Euros (V2).

Ewes from V2 produced a number of 28 lambs, and those from V1 produced 23 lambs, difference of 5 lambs represents 250 RON, much lower than difference in treatments costs between the two experimental variants (V1 = 50 Euros, V2 = 111.5 Euros, ≅276.7 RON). Therefore, it might be concluded that results registered in V2 group, although superior are not economically viable in Transylvania Merino breed.

In Greece, Laliotis et al. (1998) [8] have experimented on lactating multiparous native breeds, during spring season, using melatonin implants associated with pessaries (60 mg MAP) + 500 IU PMSG, and registered a lambing rate of 60.4% following AI, compared to 32.6% in the control group. A significant increase of the prolificacy was registered as well, of 148% compared to 131%.

In Spain, Gomez et al. (2006) [9] have done experiments on a large number of ewes (548) of Manchega breed, during seasonal anestrous and lactation, and used pessaries impregnated with progesterone and chorionic gonadotropine (V1),...
and melatonin implants with effects of 100 days (V2). For both experimental groups, a conception rate of 78% was registered. Authors concluded that progesterone impregnated pessaries as the melatonin implants are improving the reproductive performances of ewes during out of season reproduction in lactating ewes. Researchers from New Zealand [1] concluded that treatment with melatonin + progesterone + eCG has induced a significant growth of the conception rate (67%) compared with controls (47%). Experimental groups treated with melatonin + progesterone without eCG have not lead to satisfying results in New Zealand.

In Romania, first researches regarding the influence of the melatonin implants have been carried out by Padeanu et al. in 2001 [10], which found that by using melatonin implants in Transylvanian Merino during the beginning of summer (n=30) lead to a significant (p<0.05) growth of the natality with 13.3% in multiparous ewes. Using the same treatment in Stavropol Merino, additional 16% of improvement of the conception rate was registered, compared to the controls. Researches conducted by Zamfirescu Stela [11] and Nadolu Dorina [12] have studied effects of melatonin implants influence alone or in association with vaginal pessaries (Chronogest) in Palas Merino during out of season breeding and report the following results: - non-return rate in the case of the two associated treatments was higher, compared to groups in which the two treatments were done independently; - Conception rate was good when the two treatments were combined (89.4%), compared with 85.2% in Chronogest single treatment or 75% in melatonin alone treated group. Same experiment was done on Palas Merino in December, period in which the light-dark ration is close to 1:1, and it was reported that ewes treated with melatonin + Chronogest and PMSG had a similar treatment efficiency (58.3%) with the ewes treated only with pessaries and PMSG.

4. Conclusions

In Transylvanian Merino gimmers treated melatonin 18 mg + pessaries containing 30 mg FGA + 500 IU PMSG during out of season breeding, prolificacy (+20%), natality (+52%) and numerical productivity (+45%) were significantly higher compared with the gimmers from the control group. Transylvanian Merino gimmers treated with melatonin alone, prolificacy (+15.3%), natality (+32%) and numerical productivity (+29%) were significantly (p<0.05) higher when compared to the control group.

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