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Research Article

EFFECT OF MELATONIN ON SEMEN TRAITS OF AWASSI RAMS DURING THE DIFFERENT SEASONS

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Abstract

In order to better understand how melatonin implantation affects the semen traits of Awassi rams during the nonbreeding season, this study was carried out. This study was conducted during the period of December/2020 to august/2021 using fifteen adult Awassi rams. Animals were randomly divided into two groups: control group (without treatment), treated group melatonin implants (54 mg).Semen samples were collected from rams weekly through the artificial vagina. Volume of ejaculate, Mass motility, Individual motility and consternation of semen are estimated. Volume of semen showed significantly (P< 0.05) higher values than the control in summer. Mass motility showed significantly (P< 0.05) higher values than the control in winter and spring. Individual motility showed significantly (P< 0.05) higher values than the control in winter and summer. Concentration of semen showed significantly (P< 0.05) higher values than the control in winter and spring. Treatment with melatonin implantation significantly improved the physical characteristics of Awassi rams semen during the nonbreeding season.

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1. Introduction

Ovine are seasonal breeders, and the beginning of their reproductive cycle is controlled by a decrease in photoperiod, which is then converted into a physiological signal by the pineal neurohormone melatonin (Malpaux *et al.,* 1996). Thehypothalamic – pituitary - gonadal axis is modulated for seasonal reproduction by melatonin, according to evidence that shows this hormone operates on both the ovine pituitary and hypothalamus (Castle *et al.*, 2017). Although, breeds' levels of reproductive regression vary, anoestrus, which is indicated by a cessation in the ovarian cycle, tends to be more prevalent in the ewe (Bittman *et al.*, 1983; Al-Saigh *et al.*, 2015). While the ram retains some fertility throughout the non-breeding season, this time is marked by a decline in libido, testicular size, and sperm quality and quantity, which ultimately causes a period of decreased productivity (Lincoln *et al.*, 1990). Since, it reduces reproductive potential and thus lifetime productivity, reproductive seasonality in rams continues to be a problem in sheep production systems. There is an effect of the season on reproductive performance, semen quality and sexual desire for most animals such as bulls (Hussain *et al.*, 2015; Kreem *et al.*, 2016),

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buffalo (AL-Sahaf, and Ibrahim, 2012), bucks (Zalzala, 2017), dogs (Ibrahim and Zaid, 2017), and the effect of the season is not limited to rams only (Al-Samarai *et al.*, 2016).

The stimulation of neurons, especially the synthesis and secretion of GNRH, is greatly aided by Melatonin (Kalatova *et al.*, 2009). By enhancing hormone and eventually semen quality, melatonin was first intended to increase semen and fertility in rams (Yellon *et al.*, 1992). The Melatonin was effective for improvement reproductive performance (Al-Hamedawi *et al.*, 2020; Al-Hamedawi and Hatif, 2020; Imad and Najla, 2019).

Regarding the impact of melatonin on the characteristics semen in Awassi rams, the published publications to yet have only provided sparse information. Therefore, the purpose of this study is to examine how melatonin affects the features of semen in Awassi rams.

2. Materials and Methods

The present study was conducted in the state board for Agriculture Research Ruminant Researches station- Ministry of Agriculture; Semen was collected using the artificial vagina for sheep at a rate of once a week for each animal within a period of December 2020 to August 2021 in order to study the effect of melatonin. Fifteen healthy Awassi rams were used. These rams were divided randomly into two groups, ten rams as treated group they were given Melatonin 54 mg/head and five as control group. In the early morning, the volume of ejaculate in ml were evaluated, percentages of mass and individual motility and concentration of semen. Individual motility estimated according to Walton (1947), Mass motility according to (Evan. And Maxwell, 1990). Sperm Concentration according to Cheimineau *et al.* (1991).

3. Results and Discussion

The Table – 1 showed that Volume of semen in the treated group showed significantly (P< 0.05) higher values compared with control group in summer, while treated group showed significantly (P<0.05) higher value in the Volume of semen between all seasons (summer, spring and winter). In control group Volume of semen showed significantly (P< 0.05) higher values in summer and spring compared with winter, and this agreed with Al-Mituti (2009) and Al Sabawi (2010) who recorded a significant effect of the season on the semen volume of Awassi rams, as the semen volume was high during the summer season and the volume was less in the winter season. Also this agreed with Williams et al. (1990) The semen volume increasing within treatment of melatonin.

Table 1: Volume of semen (ml) in different seasons by using melatonin in Awassi rams

Groups Period	Control	Treatment	LSD
Winter	B0.79±0.04a	C0.92±0.08a	0.16
Spring	A0.97±0.05a	B1.11±0.03a	
Summer	A1.02±0.05b	A1.29±0.08a	

Different capital letter means significantly different (P<0.05) vertically. Different small letter means significantly different (P<0.05) horizontally

The Table - 2 shows that Mass motility of semen in the treated group showed significantly (P< 0.05) higher values compared with control group in spring and winter, while treated group showed significantly (P<0.05) higher value in the Mass motility of semen in summer and spring compared with winter. In control group Mass motility of semen showed significantly (P< 0.05) higher values in summer and spring compared with winter, and this agreed with Javed *et al.* (2007) and Al-Matiouti (2009) who recorded a significant effect of the season on the mass

motility of the semen of rams, as the percentage was high during the summer season and decrease in the winter due to the decrease in temperature and its negative impact on the semen during the collection process. Also this agreed with Casao *et al.* (2010) melatonin implants increase of testosterone secretion because of an increase of GnRH and these changes of sperm motility. Melatonin implants were placed in adult rams enhanced sexual behavior, and improved semen qualities in several breeds (Casao *et al.*, 2010; Egerszegi *et al.*, 2014).

Table - 2: Mass motility (%) of semen in different seasons by using Melatonin in Awassi rams.

Groups Period	Control	Treatment	LSD
Winter	B84.75±1.00b	B88.25±0.76a	2.93
Spring	A88.33±1.48b	A92.41±0.65a	
Summer	A90.87±0.68a	A93.75±.63a	

Different capital letter means significantly different (P<0.05) vertically. Different small letter means significantly different (P<0.05) horizontally.

The Table - 3 shows that Individual motility of semen in the treated group showed significantly (P< 0.05) higher values compared with control group in summer and winter, while treated group showed significantly (P<0.05) higher value in the Individual motility of semen in summer compared with spring and winter. In control group Individual motility of semen showed significantly (P< 0.05) higher values in summer compared with spring and winter, and this agreed with Mostari *et al.* (2005) and Javed (2007) who recorded individual motility of sperm increases during the summer season and decreased during the winter season in Awassi rams. Also agreed with Coyan *et al.* (1998) and Kaya *et al.* (2000) studies had shown that melatonin treatment improved individual motility.

The Table - 4 showed that Concentration of semen in the treated group showed significantly (P< 0.05) higher values compared with control group in spring and winter, while treated group showed significantly (P<0.05) higher value in the Concentration of semen in summer compared with winter. In control group Concentration of semen showed significantly (P< 0.05) higher values in summer compared with spring and winter, and this agreed with Salem *et al.* (2005), Makawi *et al.* (2007) and Gundogan (2007) who recorded that the concentration of sperm in rams increased during the summer season. Also, this agreed with Chemineau *et al.* (1992), the concentration of semen increasing within treatment of melatonin. According to Perdomo *et al.* (2013), Casao *et al.* (2010) and Rosa *et al.* (2012), melatonin's anti-inflammatory and antiproliferative properties contribute to reducing oxidative damages and may be the cause of this improvement.

Table - 3: Individual motility (%) of Semen in different seasons by using melatonin in Awassi rams.

Groups Period	Control	Treatment	LSD
Winter	B83.16±0.57b	B86.83±0.97a	2.56
Spring	B84.75±0.92a	B86.58±0.63a	
Summer	A88.75±0.85b	A91.75±.1.26a	

Different capital letter means significantly different (P<0.05) vertically. Different small letter means significantly different (P<0.05) horizontally.

Table - 4: Concentration of semen (×10^9sperm/ml) in different seasons by using melatonin in Awassi rams.

Groups Period	Control	Treatment	LSD
Winter	B1.51±0.04b	B1.65±0.05a	0.11
Spring	B1.55±0.04b	AB1.67±0.04a	
Summer	A1.66±0.02a	A1.75±0.03a	

Different capital letter means significantly different (P<0.05) vertically. Different small letter means significantly different (P<0.05) horizontally.

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