Plant Archives Volume 20 No. 1, 2020 pp. 2778-2780 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFECT OF MELATONIN USE IN HOT WEATHER IN IRAQ ON SEMEN TRAITS IN ARABIA RAMS

Zeaid Amad Zeny[1*], Atheer Salih Mahdi[1] and Aiman Mohammed Baqir Al-Dhalimy[2]

[1*]Department of Animal Production, Faculty of Agriculture, University of Kufa, Najaf, Iraq.
[2]Faculty of Pharmacy, University of Alkafeel, Najaf, Iraq.

Abstract

Several factors can affect the fertility and seminal fluid characteristics in rams, among them the weather and temperature. Melatonin is a hormone that has recently shown beneficial effects in a variety physiological and pathological conditions. This study was conducted during the period of July the 2nd 2017 to August the 17th 2017 using twelve adult Iraqi Arabi rams (2-3 year). Animals were randomly divided into three groups: control (T1), melatonin 10 mg/head (T2) and melatonin 15mg/ head (T3)given orally. Treatment with melatonin significantly improved the physical characteristics of semen. Melatonin (T3) also improved ALT and AST enzymes in seminal plasma.

Key words: hot weather; semen traits; Arabia rams.

Introduction

Arabi sheep is one of the most important dual-purpose (meat and wool) native sheep breeds in Iraq and most important breeds in semiarid regions (Kassim *et al*, 2016). Climatic stress and seasonal changes may affect the heat balance and physiological responses of sheep. Heat tolerance is a complex process in which ambient temperature, humidity and radiation are associated (Mohamed *et al*, 2012).

Melatonin plays an important role in the stimulation of neurons, particularly the production and secretion of GNRH (Kalatova *et al*, 2009), which in turn regulates endocrine signals and sex hormone (Yellon *et al*, 1992).

Melatonin was initially intended to improve semen and fertility of rams by increasing hormone and ultimately semen quality (Çoyank *et al*,1998)

The published reports so far have only shown few data regarding the effect of melatonin on the traits semen in Arabia rams of Iraqi. Hence, this study aims at investigating the role of melatonin on traits semen in Arabia rams of Iraqi.

Materials and Methods

This work was performed during the period July the 2nd to August the 27th 2017 in Iraq with a temperature in the shade between 43-48°C (according the U.S. National Climatic Data Center, Asheville, N.C) (Yellon *et al*, 1992).

This study was conducted in Najaf and involved electrical stimulation with a bi-polar rectal probe (Cameron, 1977). After that, semen samples were collected from rams twice weekly within a period of 14 days from July the 17th to October the 16th 2017. Furthermore, they were under unified nutritional system.

Twelve adult Iraqi Arabi rams 2-3 year of age were randomly divided into three groups and housed in semi open pens. During the day, they were left to outdoor feeding and supplemented with hay and some barley. The 1st group (T1) was the control group while the second (T2) and third group (T3) were given melatonin 10 mg / head and 15 mg/ head orally, respectively.

According to the method of (kennaway and seamark, 1980) the physical properties, plasma enzymes (ALT and AST) and the volume of ejaculate in ml were evaluated instantaneously in the morning hours and graded according to the mass motility percentage, individual motility percentage, consternation of sperm in million/ml, viability percentage and abnormal sperm percentage. Mass activity (wave motion) according to (Blom, 1946). Individual motility estimated according to (Walton, 1933), which was clarified by (Chemineau, 1991). Sperm consideration according to (Salisbury, 1943) which was

***Author for correspondence :** E-mail: zaide.zainy@uokufa.edu.iq

Table 1: The effect of melatonin on certain physical semen parameters.

Groups	Volume	MM	Individual mortality	Sperm concentration	Abnormal sperm percentage%
T1	A0.59±0.05	A69.23±2.78	A68.22±2.31	A119.7±0.70	A16.13±0.62
T2	B0.61±0.09	B81.42±3.81	B80.21±2.37	B121.5±0.28	B14.18±0.81
T3	A0.59±0.07	A70.31±1.01	A70.01±1.01	A119.9±0.8	C15.18±0.78
Letters A to B in columns refer to the significant difference (p<0.05) between groups.					

clarified by (Mohan *et al*, 1980). Abnormal of sperm percentage considered according to (Hancock, 1951).

The concentration of AST and ALT enzymes (bioassay system America/USA) in plasma semen was estimated as instructed by the supplier (Mohamed *et al*., 2012 and Walton, 1933)

Statistical analysis

Our data were analyzed using SPSS software program (15) and expressed as Mean ± standard error of mean (SEM). The correlation pf plasma protein fractions and vitamins in semen with months was examined using Spearman's correlation coefficient test. Those differences with p value < 0.05 were considered statistically significant at P under a liner model:

Yij = M + ti + pj + eijk

Results

Table 1 shows that T2 has a significant effect on the volume, mass mortality (MM), individual mortality, sperm concentration and abnormal sperm percentage while table 2 shows a highly significant effect treatment with melatonin hormone on AST and ALT enzyme in seminal plasma in T2 with no significant differences between treatment T3 and T1.

Discussion

The mass mortality, individual mortality, sperm concentration and abnormal sperm percentage were significantly improved after treatment with melatonin in T2. This improvement may be due to the role of melatonin as antioxidant, anti-inflammatory, antiproliferative, which participate in decreasing oxidative damages (Perdomo *et al*., 2013; Casao *et al.*, 2010; Rosa *et al.*, 2012).

Table 2: The effect of melatonin hormone on AST, ALT enzyme in seminal plasma.

Groups	AST UE/ML3	ALTUE/ML3
T1	A 6.41±1.31	A 5.29±0.91
T2	A 6.21±1.81	A5.31±0.93
T3	B 5.35±1.31	B 3.97±0.61
The letters A-B in columns refer to the significant differences (p<0.05) between groups.		

Treatment melatonin enhanced the semen characteristics in different ram breeds.

In terms of AST and ALT enzymes, melatonin treatment significantly increased their concentration in seminal plasma. However, T3 but not T2 showed significantly different ALT and AST activities in the seminal plasma, findings that are consistent with the (Bharti *et al*., 2010) in Chottanagpuri rams. High levels of melatonin may cause stress on rams leading to elevated level of AST and ALT enzymes in seminal plasma (waleed *et al.*, 2016).

Acknowledgement

The authors are grateful to the Department of Animal Production in the University of Kufa for their assistance in conducting the research and confirm that there is no conflict of interest.

References

Bharti, M.K., M.P. Sinha, B. Singh and D. Mahto (2010). Biochemical and enzymatic profile of the seminal plasma of Chottanagpuri rams. *The Indian Journal of Small Ruminants.*, **16(2):** 261-263.

Blom, E. (1946). Kompartions kammeret, et Hjaelpe Middelt Forberet Mikroskopisk Under Sogelse of Ufortyndet Tyresperma, Skand. Vet. tidskr. for Bakteriol, Patologi, Samr. Koh Ock Mjalk Iggirn. *Abst. Vet. J.*, **613:** 252.

Cameron, R.D.A. (1977). Semen collection and evaluation in the ram: The effect of method of stimulation on response to electro-ejaculation. *Australian veterinary journal.*, **53(8):** 380-383.

Casao, A., S. Vega, I. Palacín, R. Pérez Pe, A. Laviña, F.J. Quintín and T. Muiño Blanco (2010). Effects of melatonin implants during non breeding season on sperm motility and reproductive parameters in *Rasa aragonesa* rams. *Reproduction in domestic animals.*, **45(3):** 425-432.

Coyan, K., A. Kaya, F. Karaca, M.B. Ataman and C. Yildiz (1998). Der Einfluss Von Melatonin Auf Die Samenqualitat Und Hodengrosse Bei Den Normo-und Pathospermischen Schafbocken In Der Anostrischen Saison. *Wiener tierärztliche Monatsschrift.*, **85(11):** 383-388.

Hancock, J.L. (1951). A staining technique for the study of temperature-shock in semen. *Nature.*, **167(4243):** 323-324.

Kaľatová, J., R. Vlčková, D. Sopkova and I. Maraček (2009). The effect of melatonin, its combination with FGA and eCG and OvSynch protocol on the levels of steroid hormone and morphometry of ovaries during oestrus season of ewes. *Slovak Journal of Animal Science.*, **42(Supplement):** 30-34.

Kassim, W.Y., M.F. Al-Helou and K.A. Al-Rishdy (2016). The influence of melatonin hormones treatment on sex

hormones and some biochemical parameters on Arabi sheep and local goats. *Life Sci. Arch.*, **2:** 773-780.

Mohamed, S.S., A.M. Abdelatif and A.A.G. Adam (2012). Effects of Exposure to Solar Radiation on Thermoregulation and Semen Characteristics of Sudanese Desert Rams (Ovisaries). *Global Vet.*, **9:** 502-507.

Muino-Blanco, T. (2010). Effects of melatonin implants during non-breeding season on sperm motility and reproductive parameters in *Rasa aragonesa* rams. *Reprod. Domestic Anim.*, **45:** 425-432.

Perdomo, J., J. Cabrera, F. Estévez, J. Loro, R.J. Reiter and J. Quintana (2013). Melatonin induces apoptosis through a caspase dependent but reactive oxygen species independent mechanism in human leukemia Molt 3 cells. *Journal of pineal research.*, **55(2):** 195-206.

Rosa, H.J.D., C.C. Silva and M.J. Bryant (2012). The effect of melatonin treatment in rams on seasonal variation of testicular size and semen production parameters. *Small ruminant research.*, **102(2-3):** 197-201.

Salisbury, G.W., G.H. Beck, I. Elliott and E.L. Willett (1943). Rapid methods for estimating the number of spermatozoa in bull semen. *Journal of Dairy Science.*, **26(1):** 69-78.

Walton, A. (1933). The technique of A.I. Imperial Bureau of Animal Genetics, Edinburgh. (Cited by Rollinson *et al*., 1970).

Yellon, S.M., D.L. Foster, L.D. Longo, L. D. and J.M. Suttie (1992). Ontogeny of the pineal melatonin rhythm and implications for reproductive development in domestic ruminants. *Animal Reproduction Science.*, **30(1-3):** 91-112.