



EXHIBITION OF DIFFERENT HORMONAL REGULATIONS IN AWASSI AND KARAKUL BREEDS AT SEXUAL MATURITY

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Abstract

This study was conducted on the animal breeding station in the Al-Kafeel breeding station / Al-Atabah Al-Abbasia / Kerbala from 1-5-2019 to 20-12-2019. This study aimed to investigate the possible association between the breed factor with the follicular stimulating hormone (FSH), luteinizing hormone (LH) and estrogen (E2) assays at sexual maturity for two breeds of sheep, Awassi and Karakul. This experiment included 200 lambs, 90 lambs of Iranian Karakul breed and 110 lambs of Iraqi Awassi breed that were born in November, December and January. Age and weight of the sexual maturity were measured and the analyzed animals from both breeds were kept in the same conditions of daily regimen and feeding and serviced by the same personnel in the stated breeding station. The experimental analyses were performed in the College of Science, Babylon University. Hormonal assays for the female lambs at sexual maturity. The results showed a non-significant effect of FSH, LH and E2 for both breeds. Results showed a non-significant effect of both included breeds in the concentrations of FSH, LH and E2 during the seventh month of age of the female lambs. Whereas there was a significant effect ($P < 0.01$) of both breeds on the concentrations of FSH and E2 in the eighth month of age, in which Karakul lambs exhibited higher concentrations of these hormones than Awassi lambs. However, there was some a significant effect of all studied hormones on the sexual maturity between both investigated breeds. In conclusion, the breed of Awassi and Karakul has remarkable differences in the sexual maturity in terms of FSH and E2 hormones, while LH hormone has not involved in this variation between both analyzed breeds of sheep.

Key words: Awassi; Karakul; sheep; sexual maturity.

Introduction

Sheep are considered as seasonally polyestrous animals, due to their ability to exhibit a seasonal pattern in reproduction to ensure the birth of lambs in the accurate time of the parity. The sexual season of European sheep is usually starts at the end of summer or the commence of autumn as a result of the shortness of the day length, while it is terminated at the end of winter or the commence of spring. The season of reproduction is one of the most important challenges that face the sheep industry worldwide. As a result of the fluctuation in the seasonal reproduction, the availability of animal products, such as milk and meat, takes a noticeable seasonal pattern in different times in the year (Gómez-Brunet *et al.*, 2012).

Awassi breed is one of the most important breeds of sheep in the Middle East regions. It has a triple utilization purpose, as it is usually employed to produce meat, milk

and wool (Al-Zubaidi, 2013). However, the productivity and its sexual characteristics differ according to the regions at which they usually survive (Haile *et al.*, 2019; Al-Shuhaib *et al.*, 2019a). Meanwhile, the fat-tailed Karakul sheep has a widespread in Asian and African countries. This breed is characterizing with its ability to withstand the hardy circumstances. As in the case of Awassi sheep, Karakul sheep have also been utilized to produce meat, milk and wool (Aljubouri and Al-Shuhaib, 2020; Mirhoseini *et al.*, 2015).

The breeding of sheep has huge economic importance in the Middle East and the sheep industry has become the main source of income for breeders through their minimum requirements to living conditions. However, the enhancement of the sheep industry is the main concern for many researchers nowadays. The growth character is the most important feature for the economy as it is controlled by many genetic loci (Ajam *et al.*, 2019; Al-

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Shuhaib *et al.*, 2017; Al-Shuhaib *et al.*, 2018a; Al-Shuhaib *et al.*, 2018b; Al-Shuhaib *et al.*, 2019b; Hashim and Al-Shuhaib, 2019; Al-Thuwaini *et al.*, 2020).

Sexual maturity is the process of the body and hormonal development that has been taken place as a result of the activity of the hypothalamus, pituitary and sexual organs, which cause at the end of the ability of reproduction. The activation of these organs requires the activation of the pituitary to release sexual hormones to triggers the development of gametes and sex hormones as a response for these pulses from both ovary and testes accompanied with the development of the secondary sexual characters (Bianco, 2012; Decourt *et al.*, 2018; Moulla *et al.*, 2018). However, the main marker for sexual maturity is the increase of gonadotropin hormone levels that are represented by luteinizing hormone (LH), follicular stimulating hormone (FSH) from the posterior lobe of the pituitary gland. However, the release of both LH and FSH relies on the release of gonadotropin-release (GnRH) from the nerve cells in the hypothalamus. These cells are considered the most important factors in the development of natural reproduction. So, any damage to these cells may lead to infertility and reduction in reproductive performance (Burt Solorzano and McCartney, 2010; Smeets, 2015). The current study was aimed to investigate the differences of both the Iraqi Awassi and the Iranian Karakul breeds on the levels of the FSH, LH and estrogen (E2) sexual hormones. The concentrations of these sexual hormones were measured at the sexual maturity of each investigated breed to get the best knowledge regarding their accurate concentration in the referred period of development.

Materials and Methods

Animals

This study was conducted on the animal breeding station in the Al-Kafeel breeding station / Al-Atabah Al-Abbasia / Karbala from 1-5-2019 to 20-12-2019. This station was situated in longitude of 32.60, altitude 44.01 east, 32 m above the sea level. The experiment included 200 lambs of sheep, 90 lambs of Karakul breed and 110 lambs of the local Awassi breed. The age and the weight of the sexual maturity were measured on the basis that the first estrus for both breeds based on the detector sheep that released in early morning every day since the commence of the eighth month of age.

Feeding regiment

All included lambs were fed until the sixth month with a specific feeding strategy following the recommendation of Urbano *et al.*, (2017). All animals were fed on natural grazing farms (Al-Thuwaini and Al-

Shuhaib, 2019). All animals were allowed to get free access to water.

Blood collection

At the seventh and eight months of age of the investigated female lambs, the blood samples' withdrawal was conducted. Samples of peripheral blood were taken from the jugular vein for measure the concentration of investigated hormones. A sterile medical syringe was used in the withdrawal process. Blood samples were placed in 4 ml capacity gel-contained tubes. Serum samples were isolated by a centrifuge at 400 rpm/min for 6 min. the separated serum layer was stored at -20°C in a sealed 1.5 ml tubes until conducting the downstream experiments of hormonal assays.

Sexual hormonal assays

Three types of hormonal assays were performed at the laboratory of clinical analysis in the College of Science, University of Babylon. These sexual hormonal analyses were included three sexual hormones, FSH, LH and E2 hormones. The procedure of these analyses was based on the procedure recommended by the manufacturers (Bioassay Technology Laboratory, Shanghai, China).

Statistical analyses

Using the SPSS package, version 23 (IBM, New York), the following equation was used to analyses the possible interaction between the breed of included sheep and the sexual hormonal measurement and as the following;

$$Y_{ijk} = \mu + B_i + E_{ijk}$$

Where; Y_{ijk} is the phenotypic value of the traits, μ is the overall mean, B_i is the fixed effect of the breed ($i =$

Table 1: Effect of the breed on the sexual hormonal concentrations of the female lambs of Awassi and Karakul breeds.

Age	Hormones	karakul n=15	Breed Awassi n=18
7 th month	FSH IU/mL	3.39±0.55	2.95±0.50
	LH IU/ml	18.67±13.95	19.59±12.54
	Estrogen ng/L	63.57±4.57	58.34±4.11
8 th month	FSH IU/mL	4.30±0.65 ^a	2.59±0.59 ^b
	LH IU/ml	33.67±9.43 ^a	27.33±8.48 ^b
	Estrogen ng/L	71.69±4.72 ^A	49.71±4.24 ^b
Sexual puberty	FSH IU/mL	3.60±1.53	4.83±1.37
	LH IU/ml	18.87±14.67	19.83±13.19
	Estrogen ng/L	79.77±10.56	84.73±9.49
Values with different superscript letters within the same line differ significantly at P<0.05 for "a" and "b" and P<0.01 for "a" and "b".			

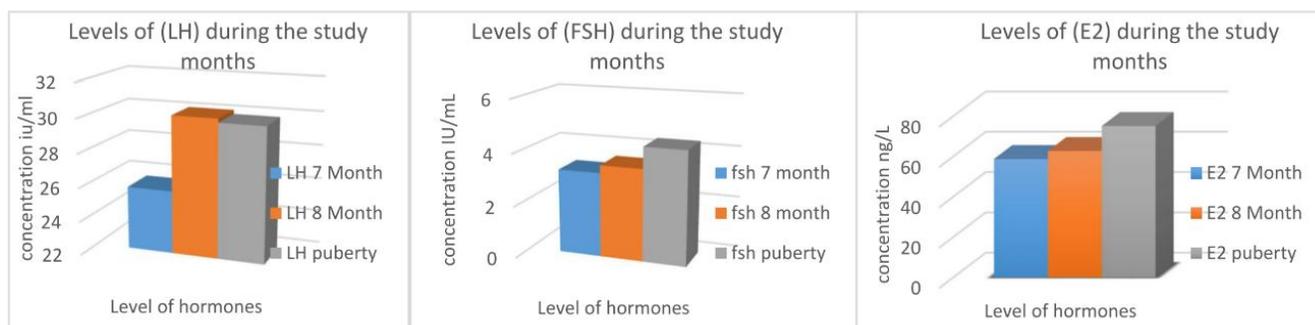


Fig. 1: The levels of three sexual hormones at the seventh and eighth months of age for the investigated Awassi Karakul breeds.

I , 2) and E_{ijk} is the random residual effect of each observation. Phenotypic correlations between the traits analyzed were investigated through the use of Pearson correlation coefficients. P -values of less than 0.05 were considered statistically significant for all comparisons.

Results and Discussion

This study was designed to analyze the effect of the breed of Awassi and Karakul breed on three sexual hormonal levels at sexual maturity. Results indicated the absence of any significant ($P < 0.05$) association between the included breed and the level of FSH, LH and E2 hormones during the seventh month of the age (Table 1). Meanwhile, during the eighth month of age, there were a significant ($P < 0.05$) differences of the levels of FSH, in which the female lambs of Karakul breed exhibited higher levels of FSH over Awassi, 4.30 IU/MI for Karakul and 2.59 IU/mL for Awassi breed. Furthermore, significant differences in the concentrations of LH were observed, in which female lambs of Karakul breed exhibited higher levels of LH over Awassi, 33.67 IU/ml for Karakul and 27.33 IU/mL for Awassi breed. the levels of E2 were also scored significant differences between both breeds since female lambs of Karakul breed exhibited higher levels of E2 over Awassi, 71.69 ng/L for Karakul and 49.71 ng/L for Awassi breed.

The increased levels of FSH during the seventh and eighth months indicated the increased levels of this hormone reaching its maximum concentration during the sexual maturity, 4.72 IU/ml. these results are in agreement with other results that reported an increase in the level of this hormone during the sexual maturity (Aygün, 2016). This finding has also indicated the presence of a considerable association between the concentration of FSH and sexual maturity. However, the current results showed that there were fluctuations in the levels of LH during the seventh and eighth months of age in the female lambs of Awassi and Karakul breeds due to the elevated concentrations of this hormone in the seventh and eighth months of age. Afterword, the levels of this hormone

were also increased at the end of sexual maturity to get 26.80. these results were also in agreement with the results reported from Decourt and Beltramo, (2018), in which it has been mentioned that the hypothalamus may become less sensitive to reverse feeding induced by E2 during sexual maturity. This, in turn, stimulates the elevation in the concentration of GnRH and LH, which may lead to LH elevation and ovulation (Fig. 1).

The levels of E2 were also elevated during the seventh and eighth months of age for both breeds and reach its maximum levels during the sexual maturity (81.50 ng/L). our results are in agreement with the results that indicated the elevation of FSH and E2 at sexual maturity for Iraqi goats and Turkish Akkaraman goats, respectively (Al-Mutar *et al.*, 2018; Kocakaya and Özbeyaz, 2019). Furthermore, it has recently been shown that both FSH and LH have participated with each other in the production of E2 during sexual maturity (Bazer, 2020).

In conclusion, the levels of sex hormones have a different contribution to the sexual maturity of each individual investigated breed, which has several differences in each particular case.

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