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The effect of doses of the amino acid L-Tyrosine on testicle tissue in Afghan goat

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Abstract: This study was conducted in the ruminant field of the Animal Production Department/ College of Agriculture/ Diyala University. And the animals were in good health, the field experiment period lasted from 10/6/2022 to 10/9/2022 (for a period of three months), after which the animals were slaughtered and testicles were collected to take the required measurements in the experiment, and 16 adult male Afghan goats were used in this study Sexually, their ages range from 1-1.5 years, and their weight ranges between (35-40) kg. The study animals were randomly divided into four groups, with four replicates for each group. The difference in male weights ranged from 1.5-2.5 kg in one group. The first group was left without vaccination (control group), while the other three groups were dosed with different concentrations of the amino acid tyrosine (Tyrosin_L) every 48 hours, namely: the second group was dosed with 50 mg of tyrosine / kg of body weight, the third group was dosed with 75 mg of tyrosine / kg of body weight, and the fourth group was dosed with 100 mg Tyrosine / kg of body weight. At the end of the experiment, the animals were slaughtered and the right testis was taken for measurement and preserved in formalin at a concentration of 10% until the measurement of the dominant sex cells (Sertoli cells, Leydec cells and spermatogenic cells) required in the study.
The results showed that the dose of the amino acid tyrosine led to a highly significant increase ($P \leq 0.01$) in the number of Sertoli cells, Ledec cells, and spermatogenic cells in the third and fourth dose treatments, compared to the second and first doses (control group). Therefore, we recommend the possibility of dosing tyrosine acid in male Afghani goats outside the reproductive season to stimulate them sexually.

***The research is part of a master's thesis for the first researcher .**

***Keywords:** testicle tissue - tyrosine acid - Afghan goats.

Introduction

Goats are considered one of the important economic animals in Iraq because they represent an important part in the livestock industry, as livestock in Iraq occupies a prominent place in the agricultural economy (Lu and Miller, 2019). Goat milk is of nutritional and economic importance all over the world, as the total production increased from 12 million tons in 1993 to nearly 19 million tons in 2017. Some countries do not consider it a major product, while others increasingly consume it. North and South America contributed 4.4% of global milk production until 2017 (FAO, 2019). Many researches indicated that environmental factors have a significant effect on the reproductive efficiency of farm animals (Dinkissa, 2022) such as increasing the daily duration of light and high temperatures (Walkden-Brown et al., 1993, Kalil, 2018). Since the goat is a multi-breeding seasonal animal (Palmer et al., 2009), which is reflected in the dimensions and weight of the testis (Hobby et al., 2016), the cells that generated primary sex cells, Leydeck cells, and Sertoli cells in the testis of male goats (Bitto et al., 2008). And on the rest of the male reproductive system in goats (Talak, 2019). Numerous studies have been conducted to increase the efficiency of goats during the idle period (Isaac et al., 2005), such as hormonal treatment such as injection of some hormones such as Kisspeptin, GnRH, and hCG (Al-Amri, 2015), and the ICSH hormone that works in males to stimulate Leydeck cells to produce testosterone (Perry, 1973), and SSH stimulates spermatogenesis and stimulates Sertoli cells (Bearden and Fuquay, 2000). Amino acids are organic compounds consisting of two groups (Ahmad,2021) one of which is an amino group (-NH2) and the other a carboxylic group (-C) intertwined with each other, as it is the basic building block for building proteins and peptides (Davydova et al., 2022) In addition to the formation of

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proteins, amino acids have multiple uses such as biomass production , and for the formation of energy (Vettore et al., 2020; Lieu et al., 2020). Amino acids also vitally affect the body in order to perform its functions properly, such as nutritional metabolism, physiological activities, development of the nervous system, resistance to stress, and reproduction (Muhammad, 2020), as the semen contains an abundant amount of Amino acids that play a major role in the reproduction process (Deng et al., 2020). Amino acids, along with diet supplements, also improve sperm quality and thus increase their fertile capacity, as there is a close direct relationship between fertility and amino acids such as tyrosine acid (Dong et al., 2016). L-tyrosine is a non-essential amino acid that the body can synthesize from the amino acid phenylalanine (Cassata, (2021) and can also be synthesized by bacteria, fungi, and plants (Timoneda et al., 2018) and is one of the twenty standard amino acids that cells use to synthesize proteins (Kavitha et al., 2020). Tyrosine is the main substance for building thyroid hormones (T3, T4) and the adrenal glands (epinephrine and norepinephrine), as all adrenal and thyroid hormones are important in animal reproduction, whether by raising testosterone (a source) or through the metabolism rate of sex cells, the cells supporting reproduction (Sertoli and Walidk cells) (Silanikove, 2000) and (Ponraj et al., 2022) as enhancing the secretion of sex hormones works to improve growth and reproductive performance (Abu El-Hamd) and Sayah (2015).So this study was conducted to find out the effect of dose different levels of Tyrosin L- in numbers of Sertoli cells, spermatogenic cells, and Leydeck cells in Afghan goats during summer.

Materials and methods of work

This study was conducted in the field of the College of Agriculture / University of Diyala, 16 sexually mature male Afghani goats were used in this experiment, their ages ranged between (1.3-1.5) years, and their weight ranged between (35-40) kg. . For the purpose of studying the effect of amino acid intake on sperm. The animals were divided into 16 males. Afghan goat with four workers:-

T1 treatment:control treatment.
T2 Therapy: L-Tyrosine 50 mg.
T3 remedy: L-Tyrosine 75 mg.
T4 therapy: L-Tyrosine at a dose of 100 mg.

Animals were slaughtered after the end of the experiment, testes were taken and placed in a box containing Nacl physiological solution (0.9%). An autologous sectioned tissue section was taken from testes with 36 samples, size 3–5 mm. Samples were placed in small containers containing 10% formalin. Samples were cut in a 6 µm-thick laboratory Histoline apparatus, stained, placed on slides, and prepared for reading. Read through an optical micrometer of a light microscope at 400 × 2.5 magnification the number of sperm cells within the seminiferous tubules near the membrane beneath the Sertoli cells and measure the number of Sertoli cells, the number of Leydig cells and the number of spermatogenic cells (Luna, 1968). SAS (2010) software was used to analyze the data. Duncan's multiple range test was used to compare a significant mean difference (Duncan, 1955).

Results And Discussion

Effect of doses of the amino acid L-Tyrosine on the sex cells (Sertoli, Ledec, spermatogenic cells) in the testes of male Afghani goats.

Statistical analysis showed that there were highly significant effects ($P \leq 0.01$) of the effect of dose of the amino acid tyrosine on the number of Sertoli cells, the number of Leydec cells, and the number of spermatogenic cells. It is noted in Table (1) the effect of dosing the amino acid tyrosine on the number of Sertoli cells, as it was found that the fourth and third groups excelled at 54.5 and 50.25, respectively, compared to the second and first groups, 40.25 and 32.25, respectively. There is a difference between the fourth and third groups, 54.5 and 50.25, respectively. The results of the statistical analysis of the current study showed that there were significant differences for the dose of tyrosine acid on the number of sperm-generating cells, as the third and fourth groups excelled 94.5 and 93.5, respectively, compared to the first and second groups 79.75 and 85.52, respectively, and no significant differences were recorded between the first and second groups 79.75 and 85.52 respectively, nor among the third and fourth groups, 94.5 and 93.5, respectively (Table 1). The results of the current study also showed a significant superiority in the number of Lydec cells when the amino acid tyrosine was dosed, and significant differences ($P \leq 0.05$) were found in favor of the fourth and

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third groups, 37.75 and 41.75, respectively, compared to the first and second groups, 21.75 and 32, respectively, and the third group outperformed the first group by 41.75. 21.75, and we did not find significant differences between the third and fourth groups, 41.75 and 37.75, respectively (Table 1).

Treatment	Sertoli cells	Leydig cells	Spermatogonia
T1	32.25 ± 1.03 c	21.75 ± 1.25 c	79.75 ± 1.75 b
T2	40.25 ± 1.70 b	32.00 ± 2.38 b	85.52 ± 0.66 b
T3	50.25 ± 2.39 a	41.75 ± 1.10 a	94.50 ± 1.55 a
T4	54.50 ± 2.32 a	37.75 ± 1.54 a	93.50 ± 3.22 a

Different letters in column indicate significant differences (a, b, c: P≤0.05).

The significant superiority may be attributed to the tyrosine dose groups, which raised the T3 hormones (Table 15) and T4 (Table 14), which play a role in the proliferation, differentiation and maturation of Leydeck and Sertoli cells (Wagner et al., 2008).

Or the reason may be due to the increase in the ICSH hormone as a result of the dose of the amino acid tyrosine, as the ICSH hormone works on the growth and development of Leydeck cells (Fig. 4) (Allan et al. 2010).

The effect of L-Tyrosine amino acid intake on the sex cells of the testes of Afghani males.

It was noted from the statistical analysis that there were highly significant (P≤0.01) effects of the effect of dose of the amino acid tyrosine on the diameter of the seminiferous tubule, the area of the lumen of the seminiferous tubule, and the thickness of the germinal layer. It is noted in Table 2)) that there are significant differences (P≤0.05) for the effect of doses of the amino acid tyrosine on the diameter of the seminiferous tubule, as the fourth and third groups outperformed 204.86 and 209.41, respectively, over the first and second groups 162.86 and 190.65, respectively, and the second group outperformed 190.65 over the first group 162.86 We did not find significant differences between the third and fourth groups, 209.41 and 204.36, respectively. It was also noted that there were significant differences in the thickness of the bacterial layer, as the fourth and third groups excelled, 76.03 and 80.14, respectively, over the first and second groups, 58.32 and 50.04, respectively. .14 in a row (Table 2). As for the thickness of the diameter of the lumen of the seminal tubule, it is noted in Table (2) the effect of dosing the amino acid tyrosine, as a significant decrease was found for the first group 52.51 compared to the second, third and fourth groups 74.14, 84.4 and 87.32, respectively, and no significant differences were recorded between the fourth and third dose groups 87.32 and 84. 4 respectively, nor the third and second 84.4 and 74.14 respectively, but a significant difference was found in favor of the fourth group 87.32 compared to the second 74.14.

Treatment	Germ cell layer	Seminiferous tubule diameter	Seminiferous lumen of the tubule

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T1	52.51 ± 3.89 b	162.86 ± 6.68 c	58.32 ± 3.68 c
T2	74.14 ± 4.90 b	190.65 ± 4.49 b	50.04 ± 9.29 b
T3	84.40 ± 2.33 a	4.49, 209.41 a	76.03± 2.15 ab
T4	87.32 ± 3.31 A	2.14, 204.36 a	80.14 ± 3.08 a

Different letters in column indicate significant differences (a, b, c: P≤0.05).

The reason for the significant difference in the diameter of the lumen of the seminiferous tubules, the thickness of the germ layer, and the diameter of the seminiferous tubule may be attributed to the dose of tyrosine in the increase in the number of Sertoli cells and spermatogenic cells (Spermatogonia (Fig. And the diameter of the seminiferous tubule (El-Komati , 2005), or the reason may be due to the fact that tyrosine led to an increase in the testosterone hormone, which has a role in the growth of sperm cells in the seminiferous tubule and thus an increase in Sertoli cells that work on the maturation and development of sperm production in the testis (Lindgren et al., 2012). Which reflects an increase in the diameter of the lumen of the seminiferous tubules, the thickness of the germinal layer, and the diameter of the seminiferous tubule.

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