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Effect of fibrolytic enzymes on serum testosterone level and some of carcass traits in Turkish Awassi male lambs

Khalid Dfeek Ahmed*

Euphrates Higher Basin Developing Center,
University of Anbar/ Iraq, Iraq.

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ABSTRACT

The study was conducted to investigate the effect of fibrolytic enzymes in diet of male Turkish Awassi lambs on the levels of testosterone and some carcass traits. The study included 12 male lambs, aged 4 months with an average body weight of 26±0.50 kg. The animals were divided into 3 equal groups with 4 animals / group. The first group (control C), was fed wheat straw ad libtum with concentrate ration in a ratio of 2 % of body weight on dry matter basis. The other groups were provided the same previous diet of the control group and supplemented with fibrolytic enzymes as 3 and 4g per animal per day for the second and third group respectively. The result showed a significant differences ($P<0.05$) in the level of testosterone between the 2nd group (3g of fibrolytic enzymes) and other groups. The weights of internal organs showed no significant differences ($P<0.05$) among male lambs of different groups. Group of 4g fibrolytic enzymes showed significant increase ($P<0.05$) in abdominal fat as compared with control groups. It was concluded from this study that addition of fibrolytic enzymes to the diet of male lambs in concentration of 3g has an effect on serum testosterone and have an effects on abdominal fat in a concentration of 4g.

Key words: Carcass traits, Fibrolytic enzymes, Serum testosterone, Turkish Awassi lambs.

INTRODUCTION

Sheep in Iraq are considered the main farm animals. It is consider the primary source of lambs, meat and wool (Juma, and Alkass, 2000). The fattening of lambs is an important process in animal production and constitutes about 50% of the total output of animal production (Naser, 2009). Nutrition is consider as an important factor in animal management that increase production and prevents a large numbers of diseases that causes a great economical losses which affects productive and reproductive of the animal (Ibrahim, 1998).

The success of fattening process depends upon the presence of diets and the most important factor that limits sheep production in Iraq is the availability of feedstuffs required to meet animal requirements (FAO, 2011). The low feed intake leads to nutritional deficiency in the body which might affects the production of hormones in the animal (Moustagard, 1969). Several studies have been conducted to study the addition of fibrolytic fungal enzymes to the diet of ruminant animals. The fibrolytic enzymes it is a combined enzymes contained; Cellulase, β –glucanase and Xylanase. Such enzymes are obtained from cultures of fungi such as *Trichoderma longibrachiatum*, *Aspergillus niger*, or *A. oryzae* (Pendleton, 2000). These enzymes play a role in an increase of digestion that leads to meet needs of nutritive elements and energy useful for the animals. Which have a positive effect on final weight of the lambs and improvement of carcass traits (Useni, 2011; Vargas *et al*., 2013). This study was under taken to investigate the effects of fibrolytic enzymes of fungal origin on the level of serum testosterone and some of carcass traits.

MATERIALS AND METHODS

The study was conducted on Agricultural Research station on Al-Ramadi, Al-Dwar area, Al-Anbar Province, which belongs to general directorate of Agricultural research for a period of 90 days. The numbers of animals were included in this study were 12 male lambs. The age of the lambs were 4 months with the average mean weights are 26±0.50 kg. The animals were given wheat straw ad libtum with a concentrate ration in a ratio of 2% from body weight according to dry weight. The composition and analysis of the ration are shown in Table 1 and 2. The animals were examined before beginning the experiment by veterinarian and proved to be in a good health conditions and free from diseases. The animals continued under veterinary supervision till the end of the experiment. The animals were treated with anthelminthic (Ivermectin). The animals were also drenched against tope worms. The animals vaccinated with Co-Baghdad vaccine against pregnancy toxemia

The fibrolytic enzymes used: It is a combined enzymes contained; Cellulase, β–glucanase and Xylanase.

*Corresponding author's e-mail: khdkda@gmail.com

Table 1: The composition of concentrate ration

Ingredients	%
Barley grain	75
Soybean meal	10
Wheat bran	13.5
NaCl	0.5
Lime Stone	1

Such enzymes are obtained from cultures of fungi such as *Trichoderma longibrachiatum*, *Aspergillus niger*, or *A. oryzae* (Pendleton, 2000).

The enzyme prepared commercial by Safizym®-France in a grinding form. The analysis of the product used; Xylanase (EC3.2.1.8):1,400,000 U. Xyl/kg, β-glucanase (EC3.2.1.6): 1,250,000 U.F.Pase /kg and Cellulase (EC3.2.1.4): 5,000 U.F.Pase/kg.

The animals were divided randomly into three groups. Each group contained 4 animals. The first group (control group) was given wheat straw ad libtum and concentrate ration diet in a ratio of 2% from the body according to the dry matter. The second groups were given the same ration as in the control group plus addition of 3g of fungal fibrolytic enzymes with the concentrate. The third groups were given the same ration as in the control group plus addition of 4g of fungal fibrolytic enzymes with the concentrate. Blood samples were collected from each animal every 14 days, via jugular venipuncture with a sterile disposable syringe, and put it in a test tube, leave it at room temperature for 2 hrs. and then put in refrigerator. The tubes centrifuged at 3000 revolution/ minutes for 15 minutes. The serum drawn off in sterile plastic test tubes numbered and stored in a deep freeze at -20CÚ. The measurements of testosterone were done by ELIZA system with applications of Gama B- Testosterone kit supplies from Bio check, Inc.

At the end of the experiments, the animals were slaughtered after cut off diet for 12 hrs. The weight of the following internal organs were taken which includes; liver, heart, heart fat, distended and empty digestive tract, abdominal fat, spleen, kidney and kidney's fat. Statistical analysis was done by using SAS (2004) and Duncan multiple range tests at 5 and 1% probability (Duncan, 1955).

Table 2: Chemical composition of the experimental rations

Ingredients %	Wheat Straw	concentrate ration
Dry Matter	96.1	94.9
Ash	10.4	5.8
Ether Extract	0.34	1.7
Crud Fiber	38.23	5.2
Crud Protein	5.8	9.8
N- Free extract	45.23	77.5
Metabolic energy	9.0451	12.813

RESULTS AND DISCUSSION

Table 3 showed a gradual increase in the concentration of male sex hormone (testosterone) in the 2nd group (3g of fibrolytic enzymes) as compared with control and 3nd groups. There was a significant difference ($P<0.05$) between the 2nd group and the other groups in the concentration of serum testosterone. The concentrations of testosterone for different groups were 0.60 ± 0.49, 3.9±0.73, and 1.63±1.14 n.mol/l for the 1st, 2nd and 3rd groups respectively. These results were agreed with that reported by Al-Dairi (2014) and Mani (2015). This might be attributed to the role of fibrolytic enzymes that leads to increase fed intake and improvement of mean metabolic digestibility (Gado *et al*., 2009; Stone, 2006), this positively reflects on increased animal growth that leads to increased concentration of male hormones. There are a positive correlation between the mean of growth and the level of testosterone (Yarney and Stanford, 1990). As results of testosterone concentration increased it is associated with higher circulating Insulin like growth factor-1 (IGF.I) concentration. This consequently contributes to greater testicular proliferation and sperm production in male animals. As IGF.I receptors can be found in leydig cell, IGF.I has great influence in regulating leydig cell numbers and differentiation (Brito *et al.* , 2007). Table 4 showed showed an increase in abdominal fat weight in the 3rd group (4g of fibrolytic enzymes). There was a significant difference ($P<0.05$) between the 3rd group and other groups. These results were agreed with that reported by Mani (2015). This might be attributed to the early maturation of internal organ (Al-Jassim, 1995). The increase in abdominal fat might be attributed to the role of fibrolytic enzymes that increase fed intake (Pariza and Cook, 2010).

Table 3: Effect of different levels of fibrolytic enzymes in the diet on serum testosterone concentration (n.mol/l) of Awassi male lambs (Mean ± SE)

Period weekly	Control (T1)	T2(3g)	T3(4g)	Level of significance
2	1.07±0.78b	2.86±1.04a	0.96±0.46b	0.05
4	1.63±0.72b	2.86±0.81a	1.16±0.92b	0.05
6	1.79±0.86	2.90±0.55	1.36±0.78	N.S
8	1.04±0.54	2.93±0.75	0.92±0.82	N.S
10	1.36±0.29b	3.03±0.61a	1.40±0.81b	0.05
12	0.60±0.49b	3.90±0.73a	1.63±1.14b	0.05

The different lowercase letters refer to significant differences ($P<0.05$) between different treated groups.

Table 4: Effect of different levels of fibrolytic enzymes on the weight of internal organs of Awassi male lambs (Mean ± SE)

Organs	Control (T1)	T2(3g)	T3(4g)	Level of significance
Liver (gm)	528.3±27.4	565 ± 29.3	541.6± 7.3	N.S
Heart (gm)	173.5 ± 18.3	208.3 ± 10.1	171.6 ± 6.1	N.S
Heart fat (gm)	34.9 ± 7.6	55.9 ± 9.5	41.7 ± 6.1	N.S
Lungs full system(kgm)	9.8 ± 0.8	9.4 ± 0.3	9.3 ± 0.4	N.S
Empty system(kgm)	2.81 ± 0.1	2.7 ± 0.1	2.7 ± 0.1	N.S
Abdominal fat(gm)	258.3 ± 9.3bc	350 ± 49.3ab	141.8 ± 53.6a	0.05
Spleen(gm)	55.1 ± 7.7	51.4 ± 1.8	54.8 ± 2.7	N.S
Kidney (gm)	101.7 ± 1.7	92.7 ± 5.04	98.3 ± 1.7	N.S
Kidney fat (gm)	155 ± 38.8	163 ± 36.6	175 ± 16.1	N.S

The different lowercase letters refer to significant differences ($P<0.05$) between different treated groups.

It was concluded from this study that addition of fibrolytic enzymes to the diet of male lambs in a concentration of 3g has an effect on serum testosterone and have an effects on abdominal fat in a concentration of 4g.

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