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EFFECT OF EXOGENOUS ENZYMES (LABAZYME AND BIO SB-GOLD) IN RUMEN FERMENTATION AND BLOOD PARAMETERS OF AWASSI LAMBS

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Abstract

The experiment was conducted in Abu Ghraib at the Faculty of Engineering Sciences. Fifteen Awassi male lambs of 4 – 5 months-old average BW (22±2.2 kg) were used to evaluate the effects of exogenous enzyme (labazyme and Bio SB-Gold) addition on concentrate diet in the rate of (0. 5g /h/d) intake. The lambs were housed in individual cages to study the effect of exogenous enzymes on the rate of weight gain - rumen fermentation and some blood characteristics. The study showed no significant differences in all the studied traits but it improved the overall health of the experimental animals. Where there has been an increase by weight as well as improvement in rumen fermentation and qualities of blood, but little.

Keywords : Live-weight gain; rumen fermentation; blood characteristics; Awassi lambs; Enzymes

Introduction

The main objective of these treatments is to expose the structure of carbohydrates in cellulose and hemicelluloses to enzymes produced by microorganisms (bacteria, protozoa) as much as possible in the rumen. Microbial treatment may exceed the most disadvantages of chemical treatment such as treatment in digest lignin and does not make it free which can be toxic and it inhibits the activity of microorganisms in the rumen (Beauchemin and Holtshausen, 2011). Among the biological treatment methods is the use of enzymes as an additive to feed externally (Al-Wazeer, 2015, Sujani and Seresinhe, 2015). Though increasing the cost of feed and low cost of the enzymes are still ongoing research efforts for development and enhancement plugins enzymatic for ruminants, and then adding enzymes such as celluloses, hemicelluloses, ferulic acid esterase and proteases is one of the main concerns of the researchers in this field (Beauchemin and Holtshausen, 2011) . Commercial exogenous enzymes improve digestibility (Salem *et al.*, 2012) increased dry matter intake, in vivo fiber digestibility, and milk production of dairy cows (Gado *et al.*, 2011). However, local ligninolytic crude extract enzyme improves *in vitro* dry matter digestibility and reducing lignin content (Hassan and Al-Khateeb, 2017). Daily gain, feed conversion ratio were not affected by the source of an enzyme or the source of roughages (Hassan and Almaamory, 2019). Therefore, the objective of this study is to improve the nutritional value of low-quality roughages by using the type of enzymes and to know their effectiveness in improving the nutritional value of roughages and using them to improve the performance of Awassi lambs.

Material and Methods

This study was conducted at the experimental farm of the Abu Ghraib-Animal production Department at the College Faculty of Agricultural Engineering Sciences-University of Baghdad.

Animals and Treatments

Fifteen Awassi lambs of 4 to 5-months-old with 23.50±1.35 kg body weight (BW) were used in the study. The lambs were housed in individual cages (1.5×1.5 m) in a completely randomized design and the experiment was conducted for 60 days. After 2 weeks of adaptation to the basal diet. The experiment utilized one diet with concentrate supplemented with 500 g for each enzyme labazyme and Bio SB-Gold was added per ton. As well as green alfalfa roughage feed introduced freely. The lambs were weighed and randomly distributed into 3 groups of 5 animals each. The treatments comprised: 1. control: lambs were fed the basal diet of concentrate and green alfalfa only, 2. EL: lambs were fed the basal diet plus 0.5 g of exogenous enzyme labazyme each 1kg contains (*Lactobacillus acidophilus-Streptococcus Faecium –Bacillus Subtilis –Protease –Amylase –Cellulase*) and 3. E Bio: lambs were fed the basal diet plus 0.5 g exogenous enzymes Bio SB-Gold each 1kg contains live *saccharomyces cerevisiae* –bacillus subtilis more 3.0×10^{11} CFU –biomass metabolites more than 4.0×10^{9} CFU. The formulation of a concentrate diet was presented in table 1.

Rumen Fermentation Characteristics: Rumen liquor samples were collected before feeding (zero time) using a stomach tube which connected to 50 ml syringe and filtered through double layers of cheesecloth Samples were withdrawn from the same lambs in all sampling time, as described by Latif (2008). PH value was determined directly using Orian 680 digital pH meter. The concentration of total volatile fatty acid (VFA) was determined in rumen liquor samples by the steam distillation method (Warner *et al.*, 1956) using the Markham micro-distillation apparatus. Analyzed for ruminal NH_3-N by the method of steam distillation with Mgo using a Kjeltec (Gerhardt-Germany) distillate unit (AOAC, 2005).

Blood Parameters: All blood parameters were measured spectrophotometrically, methods of determination, corresponded commercial kits used and the manufactured companies are mentioned below. Determine serum glucose (SG) according to Trinder (1969), serum urea nitrogen (SUN) according to Crocker (1967), Serum total protein (STP) by Doumas (1975) and Serum cholesterol (SCH) as described by Henry (1966).

Statistical Analysis

Data obtained during the experiment was statistically analyzed using a completely randomized design model (CRD) procedure by SAS (2012). Duncan is multiple range tests were used to determine the significance of differences between treatments means (Duncan, 1955). following: the mathematical equation given below:

$$Yij= \mu+Ti + eij$$

Yij: Observation value

where, μ: mean; Ti= Effect of treatment; and eij= standard error.

Table 1 : Formulation of Concentrate diet (DM %).

Ingredients %	Concentrate (%)
Barley	35
Yellow corn	10
Soybean meal	15
Wheat	28
Wheat bran	10
Minerals & Vitamins	1
Salt	1
Chemical composition (%)	**Concentrate (%)**
Dry matter	94.6
Organic matter	87.8
crude protein	12.85
Crude fiber	14.11
ether extract	2.86
Nitrogen free extract	57.40
neutral detergent fiber	45.29
acid detergent fiber	20.4
acid detergent lignin	4.0
Hemi cellulose	24.88
Cellulose	16.38
ME(MJ/Kg DM)***	10.36

Samples of concentrate was analyzed for DM, ash, nitrogen (N), and ether extract (EE) according to AOAC (2005) .The neutral detergent fiber (NDF;), acid detergent fiber (ADF) and lignin (Van Soest *et al.*, 1991).

Result and Discussion

1. Average Daily Gain

The main effect of different sources of enzymes on average daily gain (ADG) is shown in table 2. Results showed that initial weight, final weight, total weight gain (TWG) and ADG when calculated as g DM/TWG not, affected by the source of enzymes, maybe due to factors such as sensitivity and specificity enzyme activity as long as the method and time of implementation. Similar results showed by Bueno *et al.* (2013) who found that addition of two levels of enzymes (5 or 10 g of EFE kg-1 DM) to oat straw in lambs fed was not affected in the average daily gain ,whereas Arce-Cervantes *et al.* (2013) Reported that the weight gain can be improved with enzyme treatment, when addition of lignocellulolytic extract to the corn stove, alfalfa hay and concentrate compared with the control group while, no positive effects of enzyme supplementation on dairy cows (Peters *et al.*, 2015). Almaamory (2016) provide that using exogenous fibrolytic enzymes (EFE) was not affected in the live weight gain of Awassi lambs.López-Aguirre *et al.* (2016) Total body gain, and average daily gain was affected ($P < 0.05$) by supplemental (EE) exogenous enzymes in Pelibuey lambs.

2. Rumen characteristic

The main effect exogenous (labazyme and Bio SB-Gold) enzymes supplementation on concentrate diet on rumen characteristics are shown in Table 3. No significant differences in TVFA, N-NH3, and PH of Awassi male lambs. In a subsequent study Kholif and Aziz (2014) was found that adding enzymes to goat diets reduces pH and increases volatile fatty acids, ammonia nitrogen, and total protein. While sheep fed straw treated by spraying with ligninolytic enzymes (40 days trial) did show any significant difference in TVFA, N-NH3 and PH the rumen fermentation (Sridhar *et al.*, 2015). On the other hand,Tirado-Estrada *et al.* (2011) reported that effect of fibrolytic enzyme mixtures (Fibrozyme and Promote) increased total volatile fatty acids, propionate but only decreased of butyrate, and acetate: propionate ratio, whereas Rumen pH values, ammonia-N concentrations, and acetate were not affected by treatments. The addition of exogenous enzymes also increased (P<0.05) concentrations of rumen ammonia N and total short-chain fatty acids (SCFA) before and 3 h post-feeding in beef steers (Salem *et al.*, 2013). In *in vitro* experience decreased rumen pH while Ammonia-N and total volatile fatty acids (VFA) were not affected with enzyme addition (Elghandour *et al.*, 2016).

3. Blood parameters

The effects of exogenous (labazyme and Bio SB-Gold) enzymes supplementation on concentrate diet are shown in Table 4. No significant differences in all blood parameters. This result may be due to the use of the same dose of the enzyme during the experiment. This study is consistent with some studies that show no positive effects of blood parameters when the addition of exogenous fibrolytic enzymes. Murrah buffaloes (Shekhar *et al.*, 2010) lactation Holstein cows (Peters *et al.*, 2015).Whereas, exogenous fibrolytic enzymes reported a positive effect on β-hydroxybutyrate and total protein in early and mid-lactation cows (Holtshausen *et al.*, 2011, Dean *et al.*, 2013)

Table 2 : Average daily gain of Awassi male lambs fed the concentrate supplemented with exogenous enzymes (labazyme and Bio SB-Gold)

TRT	Initial Weight (kg)	Final Weight (KG)	Total Weight Gain (kg)
Control	23.50±1.48	29.40±1.86	5.90±1.18
Bio-sb-gold	23.50±1.35	29.80±1.25	6.30±1.12
Labazyme	23.20±1.46	29.50±1.41	6.30±1.33
Significantly	N.S	N.S	N.S

N.s :no significant

Table 3 : Rumen characteristic of Awassi male lambs fed the concentrate supplemented with exogenous enzymes (labazyme and Bio SB-Gold)

TRT	TVFA mmol/l	N-NH3 mg/dl	PH
Control	123.47±1.10	27.82±0.85	6.88±0.12
Bi-osb-gold	124.81±0.44	28.33±1.01	6.72±0.07
Labazyme	125.46±1.79	28.33±0.45	6.97±0.11
Significantly	N.S	N.S	N.S

N.S. : No significant

Table 4 : Blood parameters of Awassi male lambs fed the concentrate supplemented with exogenous enzymes (labazyme and Bio SB-Gold)

TRT	SG(mg/dl)	SCH(mg/dl)	STP(mg/dl)	SUN(mg/dl)	Pcv
Control	54.90±13.40	41.50±2.70	6.30±0.60	41.50±2.70	27.00±0.00
Bio-sb-gold	54.80±14.90	39.70±2.20	6.80±0.40	38.50±1.50	27.00±0.00
Labazyme	73.50±0.10	46.55±10.05	6.35±0.15	36.00±1.00	27.25±0.25
Significantly	N.S	N.S	N.S	N.S	N.S

N.s: no significant

Conclusions

Adding exogenous (labazyme and Bio SB-Gold) enzymes s to Awassi lamb's diets no appear any significant in gain, rumen characteristic, and blood parameters.

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