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The effective role of phytase enzyme and phytobiotic on growth performance and immunobiochemical parameters in lambs

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ABSTRACT

Phytobiotic and enzymes are biological materials that improve feed efficiency and animal performance. The present study was carried out to evaluate the effect of phytobiotic and phytase enzymes on growth performance and some hematological and biochemical parameters in lambs. About 30, 4-month-old, 15-20 kg lambs were used in this trial. Lambs were divided into three groups (10/each). Lambs in GP (1) were fed on basal ration only (control group), lambs in GP (2 and 3) were fed on basal ration with 0.5 ml phytobiotic/Liter drinking water and 1 gm phytase enzymes/kg ration for 60 successive days, respectively. All lambs were weighed individually on 1st day of the experiment and on the 60th day post-supplementation, where body performance was recorded. At the 30th and 60th day post-supplementation, 3 blood samples were taken to estimate the hematological and biochemical parameters. Our results revealed that lambs who received phytobiotics for 60 days showed significant elevation in body weight, weight gain, WBCs, neutrophil, lymphocyte, phagocytic %, phagocytic index, Killing %, total protein, albumin and total globulin associated with a significant decrease in MDA improved in FCR (Food Conversion Rate) in comparison to control lambs.

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Lambs received phytase enzymes for 60 days, and all examined parameters showed insignificant changes except a reduction in FCR.

In conclusion, phytobiotic has a good effect on body performance and hematological, immunological, and biochemical parameters in lambs, so it is good to add them to the ration of lambs, but phytase enzyme has no beneficial effects.

INTRODUCTION

Sheep and goats represent one of the most important animals in many countries, as they play an important role in providing milk, meat, and skin (**Haenlein and Ramirez 2017**).

Increasing the growth intensity and slaughter yield of lambs is essential, which can be achieved by improving feeding by enriching the diets with the necessary biologically active substances to contribute to better digestion and assimilation of nutrients from feed **(Perig and Kyryliv 2023).** Feed additives are important materials that can improve feed efficiency and animal performance **(Salem et al. 2004).** It is important for fatting animals and animal production (**Abo El-Nor 2001**). Many biological substances (phytobiotic probiotics, prebiotics, and enzymes) improved the growth of livestock (**Vendramini et al. 2016**).

Phytobiotics are active compounds extracted from different parts of plants (fruits, seeds, flowers, bark, rhizomes, leaves, or roots) that improve the body performance of animals **(Ahmed et al 2024).** Plant products are known to be rich in phenolic, flavonoids, terpenoids, coumarins, and other constituents, which improve body performance (**Jung et al. 2006**). Phytobiotics are bio-active principles found in roots, stems, leaves, and fruits of plants and are supplied in the diet as essential oils, powders, and extracts (**Metwally et al. 2016).** Phytobiotic has many physiological properties (Antimicrobial activity, antioxidant, and immune stimulant) **(Chaves et al. 2011).** Phytobiotics contain several active principles (tannins, glycosides, phenolic, and alkaloids) **(Mandal et al. 2014).**

Exogenous enzymes in animal diets are safe (**Hussain et al. 2008).** Phytases are derived from various types of microorganisms, in fungi as 3-phytases or 6- phytases, besides which Phytases occur in plants (**Joudaki et al. 2023**). Rumen microorganisms produce phytase (**Kincaid et al. 2005)**. Phytase activity is classified according to pH into acid phytases act at pH 5, neutral phytases act at pH 7, and alkaline Phytases act at pH 8, but most phytases act at acid-to-neutral conditions of the gastrointestinal tract (**Konietzny and Greiner 2002)**. Phytase improves catalyzes of the hydrolysis of phytate to inorganic phosphates and inositol, besides reducing phosphorus excretion **(Xin and Porres 2003).** Phytase in the ration of animals for improving nutrient digestibility, and nutritive value of plant material by liberation of inorganic phosphate from phytic acid etransgenic canola, alfalfa, and rice plants **(Lim et al. 2007).**

The present study was carried out to evaluate the effect of phytobiotic and phytase enzymes on body performance, hematological and biochemical parameters as well as studying their effect on immunological profile of lambs.

MATERIALS and METHODS

1- Ethical approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the ARCIACUC committee by IACUC protocol number: ARC-AHRI-63-24.

2- **Drugs:**

A-Phytobiotic: (Orego-stim®) is Produced by Meriden Animal Health Ltd. British based Veterinary Pharmaceutical. It was distributed by Dakahlia Poultry Co., Egypt. It is present in the form of an orally administered solution. It contains Oreganum aetheroleum as the active substance. Oreganum aetheroleum is oregano etheric oil obtained by steam distillation of the leaves and flowers of the plant Origanum vulgare ssp. Hirtum. It contains many essential oils, mainly carvacrol 81.89%, yterpinrnr 5.1%, p-cymene 3.76%, and thymol 2.12%. It

was given at a dose of 0.5 ml/Liter of drinking water (**Gümüş et al. 2017**)

B-Phytase enzyme (Axtra® PHY) phytase feed enzyme is extracted from a Buttiauxella **species** bacterium and is expressed in Trichoderma reesei fungus and including 6000 unit/ gm of phytase. Produced by Danisco Animal Nutrition, UK, and distributed by Multi Vita Comp. for Animal Nutrition, Second Industrial, 6 October Governorate, Egypt.

3- Lambs

About thirteen, 4 months old, 15-20 kg male lambs from private farm in Abo Hammad City (Sharkia Province) were used in this trial, lambs were kept in the ventilated yard. All lambs received 1 ml Ivomectin Super/50 kg Bwt. against both internal and external parasites.

4-**Feeding program**

All lambs were fed on 2 kg of hay and 200 gm concentrate/lamb/day during 1st month of the experiment, besides 3 Kg hay and 300 gm concentrate/lamb/day daily during 2nd month of the experiment (basic ration). Fresh, clean water was freely available. Both hay and commercial concentrate were offered in two equal portions daily for all groups during the period of the experiment. The ration formulation and chemical analysis of the experimental diet (Tables 1&2).

5- Experimental design

Lambs are randomly divided into 3 groups (10 lambs/group). Gp (1) lambs fed basic ration only (control group), Gp (2) lambs fed basic ration in addition to 0.5 gm phytobiotic/ kg ration for 60 successive days, Gp(3) lambs fed basic ration in addition to 1gm (6000 unite phytase enzyme)/ kg ration for 60 successive days (Table 1&2).

6- Body performance

Lambs were weighed individually at the beginning and at the end of the experiment (60 days post-supplementation) and the amount of ration used for calculating body performance.

7- Blood Samples

At the 60th day post supplementation 3 blood samples were collected from the jugular vein of each lamb.

1st sample was taken on a tube containing **EDTA** for estimation leukogram (**Jain 2000**)

2nd sample was taken **in** heparnized tube for determination of phagocytic % and phagocytic index according to **Rouse et al. (1980).** and **(Woldehiwet and Rowan 1990).**

3rd sample was taken for obtain serum for estimation T protein (**Doumas et al 1981)**, albumin **Bauer (1982),** protein fractions were performed using cellulose acetate electropheresis test (**Henry et al. 1974**), AST, ALT **Reitman and Frankel (1957),** ALP, **John (1982)**, total lipid (**Knight et al. 1972**), cholesterol **White et al (1970),** triglyceride (**Wahlefeld (1974),** SOD (**Nishikimi et al. 1972)**, CAT (**Sinha 1972**) MDA (**Nielsen et al. 1997**).

8- Statistical analysis: data was obtained by using the computerized SPSS program version 16 according **to Tamhane and Dunlop (2000**).

RESULTS

Our results revealed that lambs that received phytobiotic for 60 days showed significant elevation at ($P<0.05$) in body weight, weight gain, phagocytic %, phagocytic index, Killing % (Figure 1), nonsignificant increase in RBCs, Hb and PCV, WBCs, neutrophils, and lymphocytes (Table 3&4). Significant increase at ($P<0.05$) in total protein, albumin, and total globulin (Table 5), besides nonsignificant increase at ($P<0.05$) in monocyte, basophiles, esinophiles, α, β, γ globulin (Table 4 & 5). significant elevation at ($P<0.05$) in SOD and CAT (Figure 2) coupled with non-significant reduction in AST, ALT, ALP, A/G ratio, urea, creatinine, total lipid, cholesterol, triglyceride associated with significant decrease in MDA improved in FCR in comparison to control lambs 30 and 60 days post treatment (Table 5). Lambs received phytase enzymes for 60 day showed non-significant increase at ($P<0.05$) in body weight, weight gain, RBCs, Hb, PCV, basophils, monocytes, phagocytic %, index, Killing %, total protein, albumin, α, β, γ globulin and total globulin, CAT and SOD beside

significant decrease at (P<0.05) in FCR coupled with insignificant reduction in WBCs, lymphocytes, neutrophil, eosinophils, AST, ALT, ALP, A/G ratio, urea, creatinine, total lipid, cholesterol, triglyceride and MDA in comparison to control lambs 30 and 60 days post treatment (Table 3, 4 &5) and (Figure 2&3)

Table 1.Calculated chemical analysis of Experimental diets

	Diet (1&2)	Diet (3)
Metabolisable Energy KCl/K	2512.08	2517.29
Crude Protein%	14.988	15.09
Ether Extract %	2.4	2.87
Crude Fiber%	14.77	14.434
Calcium %	1.6	1.54
available phosphorous%	0.602	0.5992

Crude protein% and Ether extract % were chemically analyzed according to the method stated by **AOAC (2002)** Calculated according to the feed composition given by **NRC (1994)**

Table 2. Composition of experimental diet

	Control diet (1&2)	Diet containing phytase 1 gm/kg (3)
Yellow corn	24.15	25.05
Alfaalfa hay	40.15	38.5
Soya been meal	5	5.65
Cotton seed cake	1.6	1.6
Wheat bran	24.5	24.5
Molases	1	1
Phytase enzyme	0	0.1
Calcium Carbonte	1.4	1.4
Calcium dibasic phosphate	1.8	1.8
Nacl	0.3	0.3
Vit. premix	0.1	0.1
Total (kg)	100	100

Vit. Premix: Muvco permix, each 2.5 kg contain vit. A(12000000 IU), vit. D3(2000000 IU)
Vit. E(10000 mg), vit. K(1000 mg), vit B1(1000 mg), vit. B2(5000 mg), vit. B6(1500 mg) Pantothenic acid(1000 mg), vit. B12(10 mg), niacin (3000 mg), folic acid(1000 mg), Biotin(50 mg) Fe(30000 mg), Mn(60000 mg), Cu(4000 mg), I (300 mg), Co(100 mg), Se(100 mg)&Zn(5000 mg)

Table 3 effect of phytobiotic and phytase enzymes on body performace of lambs (Mean+SE)

parameter	Initial body weight (kg)	Final body weight (kg)	WG (kg)	F.C. (kg)	F.C.R
Control group	18.69±0.83a	35.84±0.94b	17.15±0.87b	30	1.75
phytobiotic	18.74±0.89a	38.06±0.85a	19.32±0.55a	30	1.55
phytase	18.59±0.77a	36.55±0.69b	17.96±0.75b	30	1.67

Means with different superscripts of the same row indicate significant difference at $P < 0.05$

Table 4. effect of phytobiotic and phytase enzymes on blood picture of lambs (Mean+ SE)

Groups / Parameters	Gp (1)	Gp (2)	Gp (3)	Gp (1)	Gp (2)	Gp (3)
	30 day post treat-ment			60 day post treat-ment		
RBCs(106/mm3)	8.22 ± 0.93	8.85 ± 0.89	8.89 ± 0.79	8.39 ± 0.86	8.92 ± 0.78	8.89 ± 0.03
HB (gm/dl)	12.95 ± 0.98	13.57 ± 0.77	13.08 ± 0.75	11.51 ± 0.83	12.12 ± 0.91	11.89 ± 0.92
PCV%	35.48 ± 0.89	36.82 ± 0.96	36.20 ± 0.98	35.92 ± 0.92	36.87 ± 0.88	36.08 ± 0.87
WBCs (10^3/ mm^3)	10.92 ± 0.87	10.99 ± 0.94	10.86 ± 0.77	10.94 ± 0.91	10.16 ± 0.85	10.92 ± 0.99
Neutrophil (10^3/ mm^3)	3.02 ± 0.59	3.21 ± 0.61	2.99 ± 0.61	3.09 ± 0.38	3.05 ± 0.42	3.14 ± 0.84
Lymphocyte (10^3/mm^3)	4.07 ± 0.48	4.22 ± 0.32	3.98 ± 0.51	4.06 ± 0.59	4.01 ± 0.72	3.97 ± 0.68
Basophil (10^3/ mm^3)	0.84 ± 0.16	1.16 ± 0.19	0.89 ± 0.21	0.82 ± 0.19	1.02 ± 0.17	0.86 ± 0.17
Eosinophil (10^3/ mm^3)	0.93 ± 0.21	1.13 ± 0.16	0.90 ± 0.18	0.95 ± 0.23	0.97 ± 0.14	0.92 ± 0.11
Monocyte (10^3/ mm^3)	2.06 ± 0.41	2.27 ± 0.41	2.10 ± 0.33	2.01 ± 0.32	2.11 ± 0.38	2.03 ± 0.21

Means with different superscripts of the same row indicate significant difference at $P < 0.05$

Table 5. Effect of phytobiotic and phytase enzymes on proteingram and lipogram of lambs (Mean+ SE)

Groups Parameters	30st day post treatment			60th day post treatment		
	Gp (1)	Gp (2)	Gp 3)	Gp (1)	Gp (2)	Gp (3)
T. Protein (gm/ L)	7.72±0.21b	9.87±0.89a	7.97±0.53 b	7.75±0.87b	9.52±0.59a	7.98±0.62b
Albumin (gm/L)	4.09±0.75b	5.09±0.76a	4.20±0.77b	4.10±0.84b	5.01±0.66a	4.19±0.49b
α glubulin (gm/ L)	1.22±0.09	1.63±0.13	1.37±0.13	1.11±0.13	1.33±0.15	1.35±0.19
β glubulin (gm/ L)	1.09±0.08	1.42±0.16	1.13±0.16	1.13±0.10	1.48±0.19	1.19±0.23
Γglubulin (gm/L)	1.32±0.04	1.73±0.15	1.33±0.15	1.41±0.15	1.70±0.13	1.25±0.25
Total glubulins (gm/L)	3.63±0.66b	4.78±0.51a	3.77±0.77b	3.65±0.78b	4.51±0.69a	3.79±0.77b
A/G ratio %	1.13±0.51	1.06±0.32	1.11±0.67	1.12±0.25	1.11±0.25	1.11±0.67
Triglyceride (mg/dl)	266.93±1.13	264.03±1.55	265.19±1.28	266.89±1.38	265.12±1.89	265.06±1.78
Cholesterol (mg/ dl)	86.09±1.21	84.43±1.32	84.98±1.51	86.53±1.32	84.51±1.74	84.68±1.82
T. Lipids (mg/dl)	410.49±1.71	409.08±2.08	410.15±1.94	410.32±1.84	411.98±2.14	410.21±1.43

Means with different superscripts of the same row indicate significant difference at $P < 0.05$

Table 6. Effect of phytobiotic and phytase enzymes on some liver enzymes and kidney function tests of lambs (Mean+ SE)

Groups Parameters	30st day post treatment			60th day post treatment		
	Gp (1)	Gp (2)	Gp 3)	Gp (1)	Gp (2)	Gp (3)
AST (IU/L)	45.98 ± 0.87	45.06±01.90	44.87±0.99	45.32 ± 0.60	45.12 ± 0.59	45.09±0.21
ALT(IU/L)	32.19 ± 0.95	31.98±1.63	31.99±0.86	32.85 ± 0.85	32.21 ± 0.76	32.65±0.94
ALP(IU/L)	56.82 ± 0.83	55.99 ± 0.93	56.75 ± 0.88	56.90 ± 0.60	56.64 ± 0.96	56.80 ± 0.36
Urea (gm/dl)	23.44 ± 1.52	21.41±1.55	21.88±1.63	23.42±1.55	22.54±1.43	22.96±1.95
Creatinine (gm/ dl)	1.80±0.66	1.66±0.82	1.75±0.81	1.83 ± 0.18	1.68±0.37	1.77±0.28

Means with different superscripts of the same row indicate significant difference at $P < 0.05$

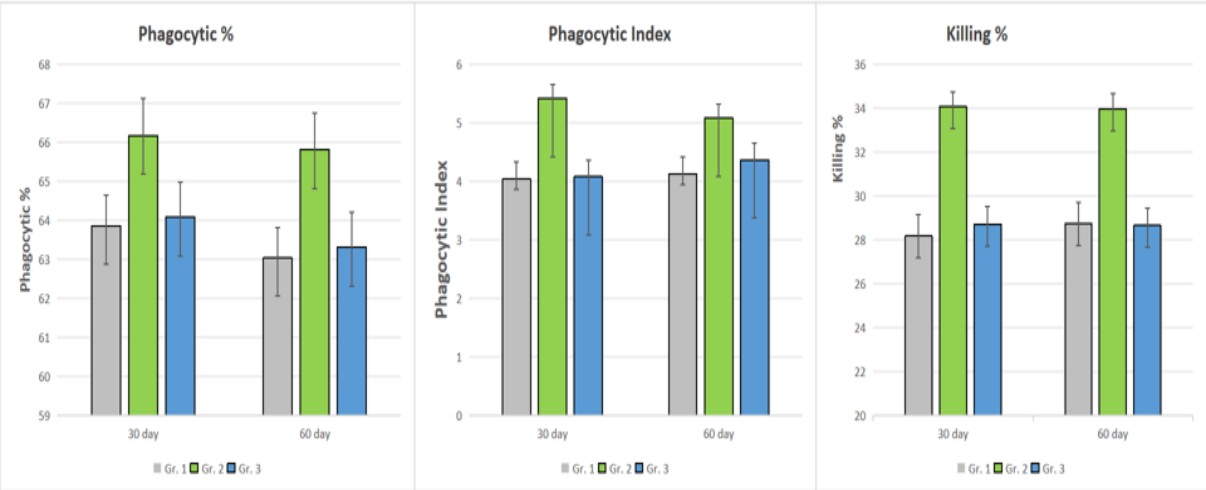

Figure (1):Effect of phytobiotic and phytase enzymes on phagocytic %, phagocytic index and killing % in lambs 30 and 60 days post supplementation.

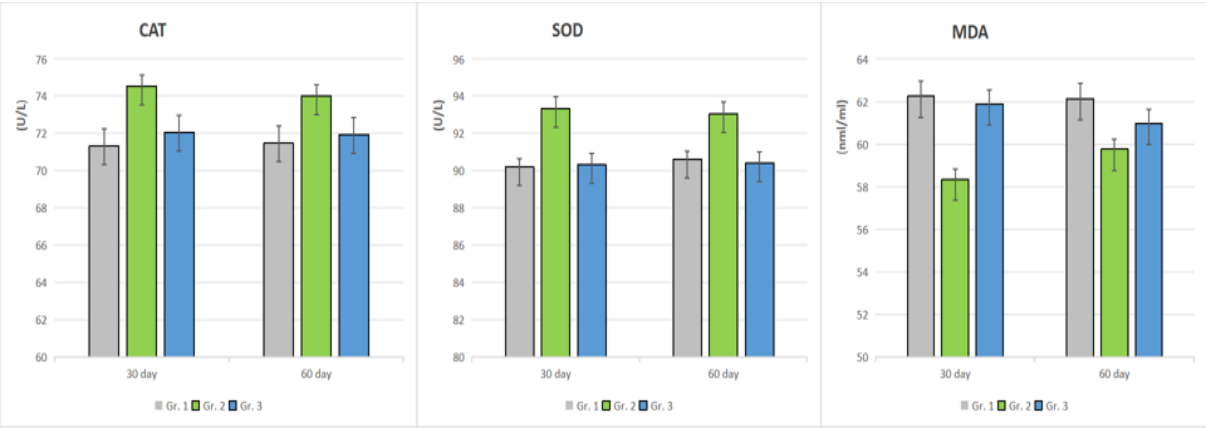

Figure (2):Effect of phytobiotic and phytase enzymes on antioxidant enzymes in lambs 30 and 60 days post supplementation

DISCUSION

Essential oils in the phytobiotic stimulate the digestive system of animals and increase the efficiency of digestive secretions. Due to these features, essential oils have a positive effect on performance parameters **(Durna Aydın et al. 2020).** In the conducted study, lambs that received phytobiotic for 60 successive days showed a significant increase in body weight, weight gain, and reduction in feed conversion. Our results go hand in hand with **Calsamiglia et al. (2007)** found that phytobiotics induced a significant increase in body weight gain and reduced feed conversion rate**.** Calves received polyhebral formulations that induced improved body performance (**Hadiya et al. 2009)**. The same results were reported by **Unal and Kocabağli (2014)** reported that lambs receiving phytobiotic revealed increased body weight gain and reduction in feed conversion rate. The recent scientific article refers to dietary supplementation with extracts of some herbal plants, indicating improvement in nutrient digestibility, body weight gain, and feed conversion rate of Cows (**Metwally et al. 2016**). Our findings are also in agreement with previous authors, **Gümüş et al. (2017)**, who found that lambs receiving phytobiotic (Orego-

stim) showed an increase in body weight gain and reduction in feed conversion rate. Results of studies by **Marwan and Mousa (2021)** indicated the beneficial effects of phytobiotic (Basil oil) on body weight gain and feed conversion rate of buffalo calves. Phytobiotic improved body performance (**Perig and Kyryli 2023)**. These results are in accordance with those recorded by **Ahmed et al (2024)**, who found that phytobiotic induce improved body performance in male goats.

The lambs received phytobiotic revealed a significant increase in phagocytic %, phagocytic index, and killing % in addition to a non-significant increase leukocytes, neutrophils, lymphocytes at 30th and 60th day post supplementation. This may be due to the immunostimulant effect of it. Phytobiotic induced an increase in WBCs, heterophils, lymphocytes, and Phagocytic % due to its antioxidant and immunological action as mentioned by **(Taniguchi et al. 1995).** Medicinal herbs (phytobiotic) induce an elevation in phagocytic activity due to the activation of macrophages by the production of lymphokines by T helper cells (**Tizard 1996**). Phytobiotic stimulates phagocyte activity in calves **(Marwan and Mousa 2021).** Similar results were obtained by **Tan and Vanitha (2004)** found that phytobiotics contain saponins that activate phagocytic activity. Our results partially agreed with those reported by **Bhatt and Singh (2001),** who mentioned that crossbred heifers receiving phytobiotic increased RBCs, Hb, PCV, WBCs, heterophils, and lymphocytes. The same results were reported by **El-Far and Abou-Ghanema (2013), and Nanda et al. (2013)** stated that goats receiving polyherbal formulations in ration induced an increase in RBCs, Hb PCV, WBCs, heterophils, and lymphocytes in buffalo and goat, respectively. Phagocytic% and killing% are stimulated by phytogenic feed additives (**Farinacci et al. 2008**).

Lambs received phytobiotic revealed insignificant reduction in AST, ALT, ALP, and A/G ratio besides hyperproteinemia, hyperalbuminemia, and hyperglobulinemia at the 30th and 60th day post supplementation. This may be due to the anti-inflammatory, antioxidant and hepatoprotective effects of phytobiotics. Herbal substance (phytobiotic) has a hepatoprotective effect and improves both liver enzymes and protein profile **(Latha et al. 1999).**

Dietary phytobiotic decreased serum liver enzyme activity, besides increasing total protein, albumin, and globulin in lamb (**Tawfik et al. 2005)**. The same improvement in protein profile and liver enzymes was observed by **Hosoda et al (2006)** in Holstein bulls fed a ration containing three different herbs (phytobiotic). Our results were comparable to **Gupta et al. (2006)** found that cows receiving a mixture of different herbs (phytobiotics) showed improvement in both protein profile and liver enzymes. Improved liver enzymes and protein profile may be due to the presence of flavonoids and phenolic compounds in phytobiotic, which have an antioxidant effect (**Ajith et al. 2007).**

Our results were supported by the results of **EL-Far and Abou-Ghanema (2013), and Karam and Bhavna (2012)** stated that phytobiotic has hepatoprotective effects, so improving liver enzymes and protein profile**.** Similar results were reported by **Unal and Kocabağli (2014)** stated that lambs receiving phytobiotic revealed increased total protein, albumin, and globulin, besides a reduction in liver enzymes. Buffalo calves received phytobiotic improved liver function, represented by a reduction in liver enzymes (AST, ALT & ALP), besides an increase in total protein, albumin, and globulin (**Marwan and Mousa 2021).**

Non-significant changes in serum total lipid, cholesterol, triglyceride, urea, and creatinine at 30^{th} and 60^{th} days post-supplementation in lambs received phytobiotics or phytase enzymes, as both have no deleterious effects on lipogram and kidney function tests. Using chamomile (phytobiotic) in sheep rations reduced serum total lipids, cholesterol, urea, and creatinine (**Tawfik et al 2005**). Flavonoids and polyphenols in ginger extract (phytobiotic) have hepatorenal protective activities due to their antioxidant effect and induce a non-significant reduction in serum urea and creatinine **(Ajith et al., 2007).** Similar results were observed by **Mandal et al. (2014), and Ghafari et al. (2015**) stated that phytobiotics show a non-significant decrease in serum total

lipid, cholesterol, and triglycerides in goats and lambs, respectively. Our results disagree with **Osawa (1999) and El-Far and Abou Ghanema (2013)** who reported that probiotics lead to a significant decrease in serum total lipid, cholesterol, and triglyceride in lamb and buffaloes respectively. **Marwan and Mousa (2021)** found that sheep and buffalo calves received basil essential oil as phytobiotic showing a reduction in total lipid, cholesterol, triglyceride, urea, and creatinine.

The oxidant-antioxidant enzymes have the potential to protect the cells against oxidative damage caused by free radicals. They decrease peroxidation by strengthening the antioxidant structure in blood and can be effective in protecting the oxidative stress which decreases the efficiency and resistance of the animals **(Durna Aydın et al. 2020).** Lambs received phytobiotic for 60 successive days revealed a significant increase in serum antioxidant enzymes (CAT, SOD) and a decrease in MDA at 30th and 60th day post supplementation. This may be due to the antioxidant effect of the phytobiotic. The same results were reported **Jha et al., (2010)** reported that phytobiotic substances induce a significant increase in serum CAT, SOD and a decrease in MDA due to antioxidant activity. These results are in accordance with that obtained by **Mahgoub et al. (2008)** found that herbal substance (phytobiotic) induces a reduction in serum MDA in sheep. The same observation was recorded by **Bhatt and Singh (2001) and EL-Far and Abou-Ghanema (2013)** showed that heifers and buffalos who received phytobiotic revealed a significant increase in serum CAT and SOD besides a decrease in MDA. Because ruminants are able to utilize nearly all of the phytate present in grains by ruminal microflora and produce phytase enzyme **(Ahmed et al. 2014)**, adding it to lamb ration in the present study, for 60 days showed a non-significant increase in body weight, weight gain with reduction in feed conversion rate as compared with control lambs. Our results agreed with **Buendía et al. (2010**) who reported that lambs received phytase enzymes in ration revealed non-significant increase in weight gain and a decrease in feed conversion rate, but disagreed with **Suttle (2010**) who found that Enzymes play an important role in improves body performance and **Buendía et al. (2014)** who mentioned that phytase enzymes in ration of lambs increased in weight gain and improve feed conversion rate. In the present experiment, lambs that received phytase enzyme for 60 successive days show an insignificant elevation in RBCs, Hb, PCV, basophils, monocytes, phagocytic%, phagocytic index and killing % besides insignificant reduction in WBCs, lymphocytes, neutrophil and eosinophils at 30th and 60th day post supplementation. The same results were reported by **Vahora and Pande (2011)** who stated that dairy cows received enzymes show insignificant changes in WBCs, neutrophil, lymphocyte, Phagocytic % and killing % and **Beigh et al (2018)** who mentioned that lambs received exogenous enzymes revealed insignificant reduction in WBCs, lymphocyte, neutrophil and eosinophils beside insignificant elevation in basophils and monocytes.

Lambs received phytase enzymes for 60 successive days revealing nonsignificant changes in AST, ALT, ALP, total protein, albumin, globulin and a decrease in A/G ratio at 30th and 60th day post supplementation. The observed results agree with **Azzaz et al. (2019)** found that phytase enzymes induce insignificant change in AST and ALP in goats. The same changes in protein profile were recorded in lactating buffaloes fed phytase enzymes (**Hassaana et al. 2022**). Our results partially agreed with **Ahmed et al. (2014**) who stated that phytase enzyme induces a significant increase in serum total protein, albumin, globulin besides non-significant decrease in serum AST and ALT.

Lambs received phytase enzyme for 60 successive days and revealed nonsignificant changes in lipid profiles and kidney function tests at 30th and 60th day post supplementation. Dairy cows received enzyme showed non-significant changes in serum total lipid, cholesterol and triglyceride **(Vahora and Pande 2011).** These findings of non-significant effects of exogenous enzymes on serum creatinine and urea levels in the present study are agreed with **El-Kady et al. (2006)** in buffalo calves and **Peters et al. (2015)** on lipid profile in cows. Phytase enzyme induces nonsignifi-

cant decrease in serum lipid profile, urea and creatinine **(Ahmed et al. 2014**). Our results agreed with **Azzaz et al. (2019)** and **Hassaana et al. (2022)** who mentioned that phytase enzymes induce non-significant changes in total lipid, cholesterol, triglyceride, urea and creatinine values in goats and buffaloes respectively. Our results disagreed with **Rivero and Salem (2015)** stated that sheep fed exogenous enzymes show a reduction in total lipid, cholesterol, triglyceride, urea and creatinine.

Lambs received phytase enzymes for 60 days revealing non-significant increase in serum CAT, SOD and a decrease in MDA. Similar findings were observed by **Officer (2000)** observed that farm animal feed enzymes revealed an insignificant increase in serum CAT, SOD and a decrease in MDA. The same results were reported by **Vahora and Pande (2011)** stated that cows who received enzyme showed non-significant increase in serum CAT and SOD besides a reduction in MDA**.**

In conclusion, phytobiotics have a good effect on body performance hematological, immuonological, and biochemical parameters and antioxidant activity in lambs, so it is good to use phytobiotic or in the ration of lambs. As, phytase enzymes produced in the rumen of lambs by ruminal microflora adding exogenous phytase to the ration has no beneficial effects.

Ethical approval: This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of the ARCIACUC committee by IACUC protocol number: ARC-AHRI-63-24. **Authors' contribution:** All authors contributed to the study conception and design, material preparation, data collection and analysis, and funding. The experimental diet and growth performance were performed by **Ghada M. El Khedr.** The hematological and biochemical investigations were performed by **Doaa I.A. Mostafa, Noha, Abd El Rahman, Mohamed E. Darwish and Nanies SE Ahmed.** All authors share in the design of the study, writing and revision of the manuscript and in the approval of the final draft of it. The first draft of the manuscript was written by all authors who commented on previous versions of the manuscript. All authors read and approved the final manuscript

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