Effect Of Digestive Enzymes On Growth Performance And Some Hematobiochemical Parameter In Pekin Duckling

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ABSTRACT

The objective of this work was design to study the effect of enzymes on body weight and some blood constituent parameters in Pekin duckling. Sixty healthy pekin ducklings, unsexed one day old,(body weight of 65.85-66.04 g) were used in this study. Ducklings were divided into three equal groups (20 each). Ducklings in the first group were fed on basal ration only (control group) but duckling in the second and third groups were fed on basal ration with 100 mg and 200 mg multienzymes / kgm ration respectively for 30 day from the 1st to the 30thday of age. All duckling were weighed individually at start of the experiment and at 1st day post supplementation where body performance was recorded. Five ducklings were slaughtered from each group at 1st and 10th day post supplementation and blood samples were taken for hemato-biochemical analysis.

Multienzyme in both doses induce improve in weight gain, feed conversion rate, significant increase in total proteins, albumin, globulin, total lipid, cholesterol, triglycerides beside insignificant increase in RBCs count, Hb content, PCV%, MCHC, basophils, monocytes, glucose, AST, ALT, ALP, GGT and insignificant decrease in MCV, MCH, leucocytic count, lymphocytes, heterophils, eosinophils, uric acid and Creatinine.

In conclusion, multienzyme in both doses induced improvement in body weight gain and feed conversion rate without adverse effect on hemato-biochemical parameters, therefore its better to use these enzymes in ration of duckling as growth promoters.

INTRODUCTION

Ducks are considered the 2nd species among poultry following chickens *(1)*. Duck farming is getting popularity day by day, as ducks are resistant to some diseases as gamboro and neucastel diseases *(2)*.

Growth promoters can be defined as substances which will increase growth rate and increase feed efficiency *(3)*. Its a chemical and biological substances (probiotics, prebiotics, enzymes, acidifiers, antioxidants, antibiotics and absorption enhancers) which are added to feed to improve growth of livestock *(4)*. Currently, enzymes have been used as a feed and water supplement in diets of different classes of poultry to enhance productive performance and immune responses (5). They initiate and accelerate rate of chemical reactions that transform dietary substrates into products of biological significance for broiler growth and production *(6)*, improve nutritive value of ration *(7)* and improving growth *(8)*. Its used to improve digestibility of mono-gastric animal ration as poultry *(9)*. Enzyme aid to increase availability of protein, fats and carbohydrate *(10)*. It improves digestion, absorption and rations utilization *(11)*.

The present study was performed to investigate the effect of multienzymes on growth performance, blood picture and some blood constituent in pekin duckling.

MATERIALS AND METHODS

Kemzyme

It is a powder mixture of enzyme (α amylase, hemicellulose, β glucanas lipase, cellulose and proteases) obtained from "Kemin Company, Egypt".

Ducklings

Sixty healthy Pekin ducklings, one day old, unsexed, body weight 65.85-66.04 g were obtained from a local hatchery. Duckling was housed under hygienic conditions and fed a balanced ration during experiment period.

Experimental design

Ducklings were divided into 3 groups (20 each). The 1st group of ducklings were fed basal ration only (control group), while the 2nd and 3rd group duckling fed on basal ration with 100mg *(12)* and 200 mg Kemzyme/kgm ration respectively. Supplementation was continuing for 30 daily from 1stday to 30day of age.

Body weight

All duckling were weighted individually at start of the study and at 1st day post supplementation for calculation body weight gain and feed conversion rate.

Sampling and analysis

At 1st and 10th day post supplementation, 5 ducklings from each group were slaughtered and two blood samples were taken, 1st sample was taken in tube containing EDTA as anticoagulant for estimation blood picture *(13)*, 2nd sample was taken without anticoagulant to obtain clear serum after centrifugated at 3000 rpm for 5 minutes for estimation of serum total protein *(14)* albumin *(15)*, globulin (calculated as difference between total protein and albumin), AST–ALT *(16)* ALP *(17)* GGT *(18)*, total lipid*(19)*, cholesterol *(20)*, triglyceride *(21)*, urea *(22)* and Creatinine *(23)*.

Statistical Analysis Obtained data was statistically analyzed using T test *(24)*.

RESULTS AND DISCUSSIONS

Multienzyme in ration induced a significant improvement in body weight gain and feed conversion rate table (1) which is in agreed with similar results in broiler *(25)* and in rabbits *(26)* respectively. Enzyme has had a better effect in weight gain and feed conversion rate in broiler *(27)*. Elevation in body weight may be due to enzymes lower viscosity of intestinal contents and improve digestibility of nutrient lead to increase in body weight *(28)* or due to effect of enzyme in metabolizable energy value that leads to improve in protein, fat and carbohydrate digestabilities. Other authors *(10,29)*. Enzymes improve nutritive value of ration.

Table 1.Effect of enzymes on body performance in duckling (n=5)

Parameter	Initial body weight (gm/bird)	Final body weight (gm/bird)	Weight gain (gm/ bird)	feed consumption (gm/ bird)	feed conversion rate(FCR)
Control duckling	65.85±0.86	643.03±15.18	577.18±9.46	1096.29	1.90
100 mg Kemzyme	66.04±0.92	720.19±12.92**	654.15±8.89 **	1050.83	1.61
200 mg Kemzyme	65.10±0.79	732.28±14.64**	667.18±14.29**	1044.17	1.57

** Significant at $P \leq 0.01$

In the present study, it has been shown that multienzymes in both doses results in insignificant increase in RBCs, Hb and PCV%, mean corpuscular hemoglobin concentration, beside insignificant decrease in mean corpuscular volume, mean corpuscular

hemoglobin in pekin duckling table, 2). Such data go hand in hand with others *(30 ,31)* who found that BCs, Hb and PCV% were within normal ranges post using enzymes in broilers ration. Another study *(32)* reported that enzymes induced insignificant increase in RBCs, Hb and PCV% in quails.

Table 2. Effect of enzymes on hemogram in duckling (n=5)

	Parameter	Control duckling	Enzymes treated duckling			
			1st day		10th day	
			100mg	200mg	100 mg	200 mg
Haemogram	RBC's (10^6/mm3)	3.72± 0.51	4.09±0.38	4.21±0.39	3.83±0.23	3.68±0.45
	Hb (g/dl)	13.80±1.93	14.69±1.60	14.89±1.33	14.10±1.42	14.06±1.06
	PCV (%)	39.07±1.73	40.12±1.55	40.56±1.40	39.23±1.37	39.30±1.40
	MCV (fL)	104.94±6.39	98.09±7.85	96.37±5.89	102.43±4.49	106.79±5.20
	MCH (pg)	37.12±0.89	35.92±0.86	35.37±0.74	36.82 ±0.69	38.55 ±0.53
	MCHC (g/dL)	3.53± 0.11	3.66± 0.17	3.67 ± 0.19	3.59 ± 0.18	3.58 ±0.21

** Significant at $P \leq 0.01$

In the current study, multienzymes in both doses results in insignificant decrease in leucocytic count lymphocytes, heterophils and eosinophils coupled with insignificant increase in basophils and monocytes in pekin duckling (table, 3). Our recorded data added further support to previous report *(33)* they found that daily addition of enzymes in rabbit ration for 30 days elicited an insignificant decrease in total leucocytic count, lymphocytes and neutrophiles. Enzymes in diet evoked insignificant increase basophils and monocytes *(34)*.

Table 3. Effect of enzymes on leukogram (10^3cu.mm) in duckling (n=5)

Parameter		Control duckling	Enzymes treated duckling			
			1st day		10th day	
			100mg	200mg	100 mg	200 mg
Total leukocytic count		12.03±1.48	11.63±1.31	11.72±1.27	12.02±1.51	12.16±1.39
Differential Leukocytic Count	Lymphocytes	4.40±0.22	4.12±0.36	4.11±0.42	4.33±0.34	4.42±0.23
	Heterophils	3.54±0.19	3.43±0.31	3.50±0.26	3.52±0.22	3.55±0.26
	Eosinophils	1.75±0.15	1.55±0.32	1.57±0.27	1.73±0.31	1.76±0.42
	Basophils	1.23±0.20	1.31±0.27	1.30±0.41	1.27±0.22	1.28±0.41
	Monocytes	1.11±0.17	1.22±0.20	1.24±0.23	1.17±0.33	1.15±0.46

Analysis of serum revealed that signific- ant increase in serum total proteins, albumin and globulin at the 1st day post feeding pekin duckling on ration containing multienzymes for 30 day (table 4). Our observation results agree with other authors *(35,31)* in broiler chickens. Broilers fed diet contain multienzymes exhibited increase in total protein and globulin *(36)*. Increase in serum total proteins, albumin and globulin may be due to increase in digestion, absorpt- ion and increase protein anabolism of birds *(11)*. Beside to enzyme aid to increase availability of protein and amino acids lead to increase protein profile in broiler *(37,38)*.

Table 4. Effect of enzymes on protein profile in duckling (n=5)

Parameter	Control duckling	enzymes treated duckling			
		1st day		10th day	
		100 mg	200 mg	100 mg	200 mg
Total protein (g/dl)	6.06±0.39	7.86±0.48*	7.99±0.57*	6.59±0.43	6.63±0.53
Albumen (g/dl)	3.42±0.22	4.32±0.24*	4.40±0.28*	3.74±0.47	3.70±0.49
Globulin (g/dl)	2.64±0.24	3.54±0.23*	3.59±0.22*	2.85±0.32	2.93±0.37
A/G ratio	1.30±0.15	1.22±0.11	1.23±0.16	1.31±0.12	1.26±0.16

*Significant at $P \leq 0.05$

Statistical analysis of the obtained results proved that dietary multienzymes in both doses caused a significant increase in total lipid, cholesterol, triglycerides and insignificant increase in serum glucose in pekin duckling (table 5). Our results were agreed with other *(39, 40)* in broiler. Elevation in triglyceride may be due to enzymes improve fat digestion and absorption *(41)*. Same change in glucose was recorded in chicken fed enzymes *(42)*. However *(43)* found that dietary multi-enzymes had no effect on serum glucose

Table 5.Effect of enzymes on lipid profile and glucose in duckling (n=5)

Parameter		Control duckling	Enzymes treated duckling			
			1st day		10th day	
			100 mg	200 mg	100 mg	200 mg
Lipid profile (mg/dl)	Total lipids	472.70±6.07	499.39±7.22*	503.63±8.43*	490.06±8.92	494.30±8.93
	Cholesterol	118.13±1.61	124.43±1.63*	125.05±1.58*	119.06±1.72	119.21±1.75
	Triglycerides	139.40±2.56	151.07±3.72*	150.73±3.41*	145.05±3.83	144.20±3.50
Glucose (mg/dl)		123.38±3.54	129.53±4.82	130.21±4.94	125.04±4.29	124.89±3.75

*Significant at $P \leq 0.05$

Dietary addition of multienzymes to pekin duckling revealed insignificant increase in serum AST, ALT, ALP and GGT activities beside insignificant decrease in uric acid and creatinine levels in duckling table (6). This result is in accordance with *(44-48)* in broilers. Decreased uric acid may be due to increase anabolic rather than catabolic pathway of birds fed diet contains enzymes *(30)*. Enzymes did not produce any alteration in serum uric acid and creatinine indicating enzymes feed additives are safe *(49)*.

Table 6. Effect of enzymes on liver enzymes and Kidney function in duckling (n=5)

Parameter		Control duckling	enzymes treated duckling			
			1st day		10th day	
			100 mg	200 mg	100 mg	200 mg
Liver enzymes (U/L)	AST	18.81±0.94	20.07±0.78	20.59±0.85	19.05±0.71	19.26±0.93
	ALT	23.65±0.88	24.16±0.78	24.72±0.91	25.14±0.87	25.03±0.71
	ALP	17.50±0.75	18.17±0.68	18.61±0.82	17.66±0.73	17.59±0.52
	GGT	18.94±0.74	20.08±0.82	20.16±0.91	19.23±0.53	19.18±0.49
Kidney Function (mg/dl)	Uric acid	5.06 ±0.25	4.63 ±0.53	4.92 ±0.42	4.28 ±0.41	4.84 ±0.19
	Creatinine	2.17±0.35	1.98 ±0.19	1.80 ±0.22	1.99 ± 0.32	1.89 ± 0.34

In conclusion, multienzyme in both doses induced improvement in body weight gain and feed conversion rate without adverse effect on hemato-biochemical parameters, so its recommended to use enzymes in ration of duckling as growth promoters.

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الملخص العربى

تأثير الأنزيمات الهاضمة على كفاءة النمو وبعض الوظائف ألهيماتوبيوكيميائية فى البط البيكينى

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أجريت هذه الدراسة لمعرفة تأثير مجموعه الانزيمات الهاضمه (الكيمزيم) على وزن الجسم وبعض القياسات البيوكيميائية فى البط البيكينى. في هذه الدراسة تم أستخدام عدد ٦٠بطه بيكينى عمر يوم واحد غير مجنسه ووزنها يتراوح بين ٦٥,١٠ ـ ٦٦,٨٥ وقسم هذا البط إلى ثلاث مجموعات متساوية(٢٠ بطه فى كل مجموعة) المجموعة الأولى بط يتم تغذيته على العليقه الاساسيه فقط (مجموعة ضابطة). المجموعة الثانية والثالثه بط يتم تغذيته على العليقه الاساسيه مضاف اليها مجموعه الانزيمات(الكيمزيم) ١٠٠مجم / كجم من العليقة و ٢٠٠ مجم / كجم من العليقة على التوالى لمده ٣٠يوم الأولي من عمر البط. يتم وزن البط فى بداية التجربة وعند اليوم الاول والعاشر من نهاية الإضافه وحساب كمية العلف المستخدمة لكل مجموعة لدراسة تأثيرات مجموعه الانزيمات على وزن الجسم ومعدل التحويل الغذائي. تم ذبح ٥ بطه عند اليوم الاول والعاشر من نهاية الإضافه ويتم اخذ عينتين دم من كل بطه وذلك لدراسة تأثير الكيمزيم على صورة الدم وبعض القياسات البيوكيميائيه.

أظهرت النتائج ان البط الذى تناول العليقه مضافاً إليها مجموعه الانزيمات بالجرعتين لمده ٣٠ يوم متتاليه أدي إلى وجود زيادة معنويه فى أوزان البط , البروتين الكلى ,الزلال, الجلوبيولين, الدهون الكليه, الكليستيرول, الدهون الثلاثيه بجانب وجود زياده غير معنويه فى العدد الكلى لكرات الدم الحمراء, الهيموجلوبين, حجم كرات الدم المضغوطه, MCHC,الخلايا القاعديه,الخلايا الملتهمه الكبيره, انزيمات الكبد (AST, ALT, ALP and GGT) مصحوبه بنقص غير معنوى فىMCV, MCH العدد الكلى لكرات الدم البيضاء,الخلايا الليمفاويه, الخلايا خلايا الهيتيروفيل, الخلايا الحامضيه, حمض اليوريك والكرياتينين وتحسن ملحوظ فى معدل التحويل الغذائى.

نستخلص من هذه الدراسة أن استخدام الانزيمات الهاضمه فى اعلاف الدواجن بجرعتيه أدى إلى تحسن ملحوظ فى وزن الجسم ومعدل التحويل الغذائى دون اى تاثيرات عكسيه على القياسات الدمويه والبيوكيميائيه. لذلك ينصح باستخدام الانزيمات الهاضمه فى مزارع تربيه البط كمحفز للنمو بامان تام.