

Some studies on the effects of kemzyme and/ salinomycin supplementation on growth performance and certain heamatological parameters in broiler chicks

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The present study was designed to investigate the effects of enzyme kemzyme; recently used multienzymes) and anticoccidial drugs salinomycin as feed additives on productive performance, metabolic and some heamatological parameters in broiler chicks. The study was carried out on 200 male one day-old Hubbard chicks. Chicks were assigned into 4 groups (50 chicks / group). 1st group was fed on a basal ration for 8 successive weeks and kept as control group, 2nd group was fed on a basal ration mixed with kemzyme at a dose of (100 ppm / kg ration). 3rd group was fed on a basal ration mixed with salinomycin powder at a dose of 100mg / kg ration). 4th group was fed on a basal ration mixed with kemzyme (100mg / kg ration) and salinomycin (100mg / kg ration). At the end of the experiment, the results showed a significant increase in average body weight, feed efficiency and a significant decrease in feed conservation ration in groups 2 and 4 in comparison to group 1 at $p \leq 0.05$. Concerning haemostatic parameters, the levels of PT and APTT were significantly lowered. On the other hand, there was an increase in levels of fibrinogen. The serum biochemical results showed a significant increase in the levels of glucose, liver glycogen and T₃ in all supplemented groups in comparison to control one at $p \leq 0.05$. However, there was a reduction in level of TSH in groups supplemented with kenzyme. There was no significant change in the level of T4 all supplemented groups. We concluded that kemzyme alone and/or in combination with salinomycin induced more pronounced effect than salinomycin alone. Supplementation of broilers feed with kemzyme could help poultry producers adapt to the forthcoming European on antibiotic growth promoters and increasing consumer demand for safe affordable food and exploit the growing demand for natural and organic poultry products.

Introduction

One of the major developmental challenges facing most developing countries is their ability to adequately feed. There is an over increasing population with the right proportion of animal protein. The development of poultry industry has been described as the fastest mean of bridging the protein deficiency problem prevailing in

most developing countries. In recent year, many efforts are directed for improving poultry industry, by increasing the number of birds produced through increasing the number of poultry farms, increasing poultry production and improvement the stock performance by selective breeding using growth performance by selective breeding using growth Performance promoters and feed additives as well as successful disease control through using effective drugs and raising immunity of birds (**Hruby, 2005**).

Most studies are directed towards ways to over come the problem of insufficient land area. Since long time ago, antibiotics have been used either alone or in combination with enzymes as growth promoters. The addition of antibiotics in poultry feed was found to improve their performance, feed conversion, and daily body gain with reduced mortality rate. These concerns make many European countries accept the use of antibiotic growth promoters.

Feeding of enzymes could help poultry producers to adapt to forthcoming European ban on antibiotic growth promoters, meet increasing consumer demands for safe affordable food and exploit the growing demand for natural and organic poultry in markets outside Europe (**Hong et al.; 2002**).

Kemzyme is a functional protein that catalyzes or accelerates the rate of specific chemical reactions. Its activity is dependent on the substrate in a random manner or at a very specific site on the substrate. Feed enzymes can improve the utilization of energy and nutrients or to degrade several undesired components. Moreover, some enzymes can be added to feed of young animals in order to support the endogenous enzyme secretions (**Bed Lored and Classen, 1993**).

Salinomycin is an ionophore anticoccidial antibiotic isolated from streptomycin alloys culture in Japan. **Nicholas and Leslie (1988)** reported that salinomycin to be one of polyether antibiotic group and was found to exert its ionophore properties on the cations transport through the cell membrane of animal tissues, bacteria and protozoa (**Barragry, 1994**).

The goal of the present study was designed to investigate the effect of kemzyme (multienzymes) and anticoccidial drug Salinomycin as feed additives on some productive performance, metabolic and hematological parameters on broiler chicks.

Material and Methods

Material:

- 1- **Kemzyme:** a commercial multienzyme feed additive containing protease, amylase, cellulase and lipase produced by "Kemin Agrifood Europe" and obtained as a powder from Kemin company Egypt".

- 2- Salinomycin: it is an ionophore antibiotic (anticoccidial) and acts as a growth promoter obtained as a powder, containing 4% active drug, from "Hoechst- Roussel Agri-Vet. Com. Frankfurt, Germany.

Methods:

The present study was carried out at physiology department, faculty of veterinary medicine, Cairo University. 200, one day old hubbard chicks were used. The chicks were obtained from "Pyramid Poultry Company for broiler production, Giza Egypt. All chicks were, apparently active healthy. The birds were reared in clean batteries under strict hygienic measures. Each group was raised in a special pen with an identifying card to record all required information. Chicks were fed and vaccinated according the ration schedule obtained form the company. Food and water are available and *ad libitum*.

Experimental design:

Two hundred chicks day old chicks divided into 4 groups 50/ chicks each. All animals were drinking and feeding formulated diet throughout the experiment period 8 successive weeks.

1st group: was fed on a basal ration according to NRC (1994) and Kept as control group.

2nd group: was fed on a basal ration mixed with kemzyme at a dose (100mg/Kg ration). (Liu, 2001).

3rd group: was fed on basal ration mixed with salinomycin at a dose. (Chapman, et al.; 1993).

4th group: was fed on basal ration mixed with kemzyme (100mg /kg ration and salinomycin (100mg/kg ration).

All chicks groups were fed on corresponding diet for 8 weeks .Over the entire period the average body weights were calculated by weighing all the birds in each group weekly at early morning before offering food. The gain in the body weight was calculated by the difference between the initial weight and final weight .The data obtained were used to calculate growth performance parameters (feed conversion ,feed efficiency).

Sampling:

At the end of the experiment, blood samples were collected (10) birds in each group by puncture of tibia vein (Davies et al.; 1976) sera were obtained for determination of certain metabolic parameters and citrated tubes to determine certain haemostatic parameters. At the end of 8 week 5 birds from each group were

slaughtered, eviscerated and samples from liver tissue were obtained and freeze-dried at –20°C for liver glycogen determination. All kits were purchased from BioMérieux.

Haemostatic Parameters:

Prothrombin time (PT) was determined according to the method described by **Poller (1980)**. Activated partial thromboplastin time (APTT) was assayed on citrated plasma according to **Muntean et al., (1992)**. Also fibrinogen concentration was measured according **Dacie and Lewis (1994)**.

Biochemical parameters:

Serum glucose was determined according to method of **Hoffmeister and Junge (1970)**, liver glycogen was also determined according method **Van Handle (1965)**.

Level of serum tri-iodothyronine (T₃), Thyroxin (T₄) were assessed according to **Sterling (1975)** while serum thyrotrophic (TSH) concentration was estimated according to **Spencer et al.; (1995)** using Radioimmunoassay kit.

Statistical analysis:

The data was statistically analyzed according to **SAS** software (2000). The significance among different groups tested by **Duncan's (1995)**. Multiple range test and data were represented as mean \pm SE.

Results and Discussion

The present study was carried out to investigate the effect of some feed additive (*Kemzyme, salinomycin*) on productive performance as well as certain metabolic and haemostatic parameters in broiler chicks. For this purpose 4 groups of broiler chicks (50 chicks each) were used.

(1) Effect on growth performance (average of live body weight, feed efficiency and feed conversion ratio).

Table (1) the results obtained from the present study indicated that all feed additives used produced a significant improvement in the average weekly body weight, feed conversion, feed efficiency as compared to control one. However the highest over all means of the average body weight were recorded in broilers supplemented with kemzyme alone or in combination with salinomycin in between groups no significant differences.

The growth promoting effect of Kemzyme (**EL Afifi, 2001 and 2004; Hong et al. 2002 and Graciat et al., 2003**) concluded that the addition of multienzymes into broiler enhanced the enzyme utilization and improved body weight gain and feed conversion ratio and enriching enzymes into poultry diet. **Adam (2001)** reported that feed enzymes might be able to replace antibiotic growth promoters in term of

improving nutrient digestibility through reducing cilia viscosity and reducing time of nutrients in the GIT and so give less opportunity for growth of pathogenic bacteria.

The growth promoting effect of salinomycin detected in the present study coincided with the reports which indicated that the addition of salinomycin at the recommended dose to broilers feed caused an improvement in weight gain and feed conversion. **Conway et al., (1993)** attributed the performance stimulating effect of salinomycin to its ability to control coccidiosis in broiler chick. Moreover, **Kyriakis et al. (1996)**, **Charlohe et al. (2007)** reported that *salinomycin* action due to its modulating effect on intestinal microflora where it reduced the prevalence of *C. perfringens* in the intestine.

2- Effect of blood levels of glucose, thyroid and thyroid stimulating hormones in broiler Chicks showed in (Table 2):

The current study showed increase in the level of glucose level in groups supplemented by kemzyme or salinomycin and or in combination this results may be attributed to **Shchrifver et al. (1999)** who found that addition of salinomycin to a grower and finisher diet improved ileac amino acids and protein digestibility, nitrogen retention and decrease nutrient excretion also. **En Gberg and He demiana (2000)** reported that salinomycin induced improvement in digestion may also be due to its ability to increase lipase in the pancreatic homogenates. At the same time no significant changes were recorded between the birds supplemented with kemzyme alone and those supplemented with kemzyme combined with salinomycin this results agree with **Saleh et al. (2006)** who found that kemzyme supplementation to the ration of growing Turkey increased significantly blood glucose levels that basis that enzyme might have stimulating anabolic rather than catabolic path way in the supplemented birds. Result obtained from (Table 2) revealed a significant increase in the content of liver glycogen in all supplemented groups .No significant variations were detected between groups .This increase was parallel accepted sequellae of the sustained increase in blood glucose level recorded in all supplemented groups .This respect **Sturkie (1986)** reported that in birds increase glucose has a stimulatory effect on release of insulin that lead to increase liver glycogen. Moreover, **Zheng kang (1997)** found that enzymes supplementation to broilers ration was associated with higher concentration of insulin and a lower concentration of glucagon .The hormonal alteration was due to the enzyme induced accelerated sugar absorption which affect the levels of insulin and glucagon and thereby indirectly regulate liver glycogen content .

Moreover, levels of T_3 , T_4 (Table 2) were significantly increased as compared to control groups in between groups there were insignificant difference these results may be due to the stimulatory effect of thyroid gland which was reflected by increasing T_3 and T_4 while decrease the level of TSH. However this

point needs further investigation furthermore, the effect of kemzyme alone and combined with salinomycin may be attributed to its ability to improve the nutrient value of poultry diets (**Zhang et al., 2000**, and **Hong et al., 2002**) digestion, absorption, utilization of proteins and fat and prevent increase indigesta viscosity which was found to impair nutrient absorption.

Effect of PT, APTT and Fibrinogen concentration were illustrated in table (3):

In the present study, it is obvious that the haemostatic mechanism of all supplemented chicks was a state of hypercoagulability was detected in broiler chicks supplemented with kemzyme alone and or in combination with salinomycin. Hypercoagulability was manifested by a significant decrease in PT, APTT, increased fibrinogen concentration the obtained results were agree with those of **Saleh et al., (2008)** who found that supplementing ration of growing turkey toms with multienzyme feed additive was associated with an obvious accelerated PT and APTT together with significant higher activation of coagulation factor.

We concluded that addition of salinomycin to kemzyme on one hand didn't add any further improvement to all measure parameter and on the other hand increase the coast of broilers ration supplementation of broilers feed with enzymes could help poultry producer adapt to the forthcoming European ban on antibiotic growth promotor, and consumer demands for natural and organic poultry products.

Table (1): Effect of kemzyme and or salinomycin feed additives on the overall means of Average body weight, Feed conversion ratio and Feed efficiency of broiler chick during 8 weeks experimental period (N=50 chicks).

Performance parameters	Control	Kemzyme	Salinomycin	Kemzyme + salinomycin
Average body weight (gm)	609.62±15.48 ^a	825±20.249 ^b	706.00±17.47 ^b	855.88±20.78 ^b
Feed conversion ratio	4.18± 0.40 ^a	3.10±0.14 ^a	3.23±0.15 ^b	2.66±0.12 ^c
Feed efficiency	0.28±0.01 ^a	0.34±0.01 ^b	0.38±0.02 ^b	0.46±0.02 ^b

Values the overall means ± SE

Values having the same letter in the same raw are significantly different at P<0.01

Table (2): Effect of blood levels of glucose, glycogen, thyroid hormone (T₃, T₄), thyroid stimulating hormones (TSH) of broiler chicks supplemented with kemzyme and /or salinomycin for 8 successive weeks supplementation.

Additives parameters	Control	Kemzyme	Salinomycin	Kemzyme + salinomycin
glucose (gm%)	218.0±6 ^a	250±6.8 ^a	252±6.6 ^b	270±8.3 ^d
Liver Glycogen (mg / gm liver tissue)	2.5±0.62 ^a	4.80±0.62 ^b	4.9±0.8 ^c	5.3±0.76 ^d
Total T ₃ (ng/ml)	1.8± 0.03 ^a	2.6±0.04 ^b	1.9±0.005 ^c	2.8±0.07 ^d
Total T ₄ (µg/ml)	14.0± 1.19	14.2±1.2	13.8±1.15	15.0±1.18
TSH (UIu/ml)	1.85±0.04 ^a	0.9±0.05 ^b	1.7±0.03 ^a	0.7±0.05 ^b

Values the overall means ± SE

Values having the same letter in the same raw are significantly different T at P<0.01

Table (3): Effect of prothrombin time (PT), Activated partial thromboplastine time (APTT) and fibrinogen concentration in broiler chicks received kemzyme and or salinomycin feed additive for 8 successive weeks.

Additives parameters	Control	Kemzyme	Salinomycin	Kemzyme + salinomycin
PT (sec)	14.45±0.36 ^a	13.0±0.8 ^a	14.4±0.48 ^a	12.5±0.65 ^a
APTT (sec)	47.9± 0.94 ^a	46.15±2.8 ^a	47.7±1 ^a	42.1±2.15 ^a
Fibrinogen (mg%)	276±4.3 ^{ab}	287.3±8.6 ^{ad}	273.5±6.8 ^{ad}	292.8±6.5 ^{ab}

Each value represents means ± SE

Means within the same column having the same letter are significantly different at P<0.01

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