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Article · July 2016

2 authors:

Eman Ramadan Kamel
faculty of veterinary medicine Benha university

Liza Sabry Mohammed
Benha University

`Alexandria Journal of Veterinary Sciences 2016, July. 50 (1): 8-17
ISSN 1110-2047, www.alexjvs.com
DOI: 10.5455/ajvs.225967

Effect of Dietary Supplementation of Probiotics, Prebiotics, Synbiotics, Organic Acids and Enzymes on Productive and Economic Efficiency of Broiler Chicks.

Eman R. Kamel[1], Liza S. Mohamed[2]
[1]Department of Animal Wealth Development, Faculty of Veterinary Medicine, Benha University, Moshtohor, Toukh 13736, Qalyubia, Egypt
[2]Department of Animal Wealth Development, Faculty of Veterinary Medicine, Benha University, Moshtohor, Toukh 13736, Qalyubia, Egypt

ABSTRACT

Key words: Organic acids, Synbiotics, Enzymes, Probiotics, Prebiotics, Economic efficiency.

This study was conducted to evaluate the effect of different feed additives (Probiotics, Prebiotic, Synbiotic, Organic acids and Enzymes) on productive and economic efficiency of Cobb and Ross broiler breeds. A total of 576 healthy unsexed one-day-old broiler chicks (Cobb and Ross breed) were allocated randomly in to 12 groups, 6 groups for each breed. Each group consisted of three replicates (total 36 replicates for all groups). The results showed that the highest body weight at 42 days of age was found for synbiotic and organic acid groups for Cobb breed (2050 and 2105.70 gm, respectively). Cobb breed showed higher body weight than Ross breed from the first day of age till the end of experiment. The value of total return was the highest for organic acid groups of both Cobb and Ross breed (L.E 27.72 and 27.41, respectively) and for Synbiotic groups (L.E 27.0 and 27.26 respectively), while the lowest value was found for the enzyme group of Cobb breed (L.E 25.16).The value of net profit was the highest for synbiotic group of Ross breed and organic acid group of Cobb breed (L.E 5.35 and 4.95 /chicken, respectively). On the basis of our results, it would be concluded that organic acids and synbiotic feed additives were better than other used feed additives, and they had an important role in improving productive and economic efficiency of broiler chicks.

Corresponding Author: **Eman R. Kamel**: eman.ramadan05@yahoo.com

1. INTRODUCTION

Currently, consumers around the world are increasingly more conscious of the nutritional value and safety of their food and its ingredients. In poultry nutrition, it is a solid fact that feeding cost is considered the most expensive item in the whole production process. Therefore, attempts are usually made to reduce feed cost without adversely affecting performance or product safety (Mona et al., 2010).

In Egypt, the main human nutritional problem is the food shortage that cannot meet the increasing population (Abdel- Lateef , 2014). Therefore, the individual share of animal protein is low (19 g / day) in comparison to the recommendations of (FAO) which reached to 30 g / day, (FAO, 2008).

Feed additives have two main groups, nutrient feed additives (NFA) and non-nutrient feed additives (NNFA). NFA, such as vitamin mix, mineral mix, and single or mixture of amino acids, are added to feed to correct the quantity of the deficient nutrients in the rations. On the other hand, NNFA, such as color and taste enhancers, appetizers, enzymes, yeast, growth promoters, and probiotics, are added to the feed to improve or to accelerate the rate of feed or nutrient utilization (Yeo et al., 1997; ZuAnon et al., 1998 and Altafur et al., 2007). Beneficial effects of dietary additives, such as probiotics, prebiotics, and organic acids, on energy and protein utilization of poultry have been reported (Angel et al., 2005; Pirgozliev et al., 2008 ;Yang et al., 2008 and Bozkurt et al.2009). Broiler chicks fed on dietary organic acids had superior improvement in live body weight, body weight gain, and feed conversion rate (Abdel Fattah e al. 2008). Enzyme supplementation (primarily Xylanase and Beta-Glucanase) improved broilers performance, daily gain, and feed conversion (Wang et al. 2005).

Costs of production and returns are the two major concerns in poultry sector. The problems of how much the bird costs and how much it gains are becoming the most important formula in poultry economics. So, poultry enterprises can be made more profitable if critical standard limits for cost of production are determined and given close attention (Romero et al., 2010).

Therefore, the objective of this study is to evaluate the effect of different feed additives (Probiotics, Prebiotic, Symbiotic, Organic acids and Enzymes) on growth performance, and economic efficiency of Cobb and Ross broiler breeds by making a comparative economic analysis to detect costs of production , returns, and net profit for each supplemented group.

2. MATERIALS AND METHODS

2.1. Experimental Chicks:

Our study was carried out at Poultry Research Farm belonging to the Department of Animal Wealth Development, Faculty of Veterinary Medicine, Benha University, Egypt, in the period from 16th June till 28th July 2014. A total of 576 healthy unsexed one-day-old broiler chicks (Cobb and Ross breed) were used. The Ross breed was purchased from El-Wadi Company and the Cobb breed was purchased from El-Watania Company.

2.2. Management and Housing:

The broiler chicks were weighed individually and wing banded, then allocated randomly in to 12 groups. Each group consisted of three replicates (total 36 replicates for all groups). They were housed in a clean, well ventilated room previously fumigated with formalin and potassium permanganate. The room was provided with heaters to adjust the environmental temperature according to the age of chicks. The floor was bedded with fresh wood shaving forming a litter with 5 cm of depth. Each compartment was provided by suitable feeders and waterers. Brooding temperature started at 35°C during the first 3 days, then 32 °C to the end of the 1st week; 30 °C for the 2nd week; 28°C throughout the 3rd week till the end of experiment (Marwa, 2013). Natural and artificial lighting was provided for 24 hours over the experimental period. Ventilation of the rooms depended on windows and negative pressure fans. The chicks were vaccinated against most common viral diseases which may infect broiler chicks.

2.3. Experimental Diets:

Chicks were fed on well-balanced diets (NRC, 1994) as described in table 3. Starter diet was given till the 14th day of age. After that, chicks were fed on grower diet which was given till the 28th day of age. After that, chicks were fed on finisher diet till the end of the experiment (42nd day of age). Chicks were allocated as the following:

1-Group 1 received the basal diet.

2-Group 2 received the basal diet supplemented with Probiotic (0.1g Baymix® Grobig™ /kg ration).
3-Goup 3 received the basal diet supplemented with Prebiotics (0.5g Cel-Max dry™ /kg ration).
4-Group 4 received the basal diet supplemented with Synbiotics (0.1g Baymix +0.5 gm celmax dry /kg ration).
5-Group 5 received the basal diet supplemented with Organic acids (1g Fylax® plus /kg ration).
6-Group 6 received a diet supplemented with enzymes (0.2g Allzyme® SSF/kg ration).
The Ingredients and the chemical composition of the diets are represented in tables 1, 2 and 3.

2.4. Studied Traits:

2.4.1 Productive Efficiency Measurements:

2.4.1.1. Growth Traits:

2.4.1.1. a. Body Weight (BW):

At the beginning of the experiment (at one day of age), the chicks were individually weighed to the nearest gram, then they were weighed weekly till the end of the experiment according to (Attia, 1995).

2.4.1.1.b. Body Weight Gain (BWG):

The gain in body weight per week was obtained by calculating the difference between two successive weights according to (Mohamed, 2014).

2.4.1.1. c. Relative Growth Rate (RGR %):

RGR (expressed in percentage) was calculated every week according to the following formula (Crampton and Lioyd, 1959): **RGR** = (W2-W1)100 / 1/2 (W2+W1)
Where: W1 = body weight at the beginning of week or period.
W2 = body weight at the end of week or period.

2.4.1.2. Feed Intake:

Daily feed intake was calculated by obtaining the difference between the offered feed weight and the remained part. The total feed consumption per day was divided on the number of birds of each group to obtain the average daily feed consumption per chick according to (Marwa , 2013) .

2.4.1.3. Feed Conversion Ratio (FCR): (Lambert et al., 1936).

FCR=Feed intake (g/chick/week) / Body Weight Gain (g/chick/week). **2.4.1.4. Mortality %:**

Mortality rate was estimated according to Vetter and Matthews (1999) by the following equation:

Mortality rate % = (Number of deaths in a specified period / Total population) × 100.

Table 1: Ingredients of starter, grower and finisher diets (Basal diet).

Ingredients(%)	Starter	Grower	Finisher
Corn grain	53.55	52.88	59.46
Soyabean (44%) protein	33.2	31.10	25.5
Corn gluten meal	5.5	5.60	5.5
Vegetable oil	2.85	5.85	5.40
Di-calcium phosphate	2.03	1.85	1.825
Limestone	1.18	1.17	0.95
L-Lysine	0.50	0. 4550	0.335
D-L methionine	0.33	0.24	0.20
Sodium chloride	0.30	0.30	0.30
Vit &min premix[(1)]	0.30	0.30	0.30
Sodium bicarbonate	0.15	0.15	0.15
L- threonine	0.12	0.10	0.08

[(1)]Purchased by AGRI-VIT 10th of Ramadan city, Egypt . Each 3 kg contains contain**:** Vitamin A = 12,000,000 IU, D_3 = 2,000,000 IU, E = 10,000 mg, K_3= 2000mg, B_1 = 1000 mg, B_2 =5000 mg, B_6 =1500 mg, $B_{12=}$ 10mg, Biotin= 50 mg, pantothenic acid= 10000 mg, Nicotinic acid = 30000 mg, Folic acid =1000 mg, Zinc = 50,000 mg, Manganese = 60,000 mg, Iron = 30,000 mg, Copper = 10,000 mg, Iodine =1,000 mg, Selenium = 100 mg, Cobalt = 100 mg, Cobalt = 1000 mg, and Calcium carbonate up to 3 Kg.

Table 2: Ingredients of starter, grower and finisher (Energy Enzyme diet) .

Ingredients(%)	Starter	Grower	Finisher
Corn grain	55.36	54.85	61.33
Soyabean (44%) protein	32.90	30.80	25.20
Corn gluten meal	5.50	5.50	5.5
Vegetable oil	1.30	4.25	3.80
Di-calcium phosphate	2.03	1.825	1.825
Limestone	1.20	1.20	0.95
L-Lysine	0.50	0. 46	0.34
D-L methionine	0.33	0.24	0.20
Sodium chloride	0.30	0.30	0.30
Vit &min premix[(1)]	0.30	0.30	0.30
Sodium bicarbonate	0.15	0.15	0.15
L- threonine	0.12	0.10	0.08
Enzyme	0.20	0.20	0.20

[(1)]Purchased by AGRI-VIT 10th of Ramadan city, Egypt. Each 3 kg contains contain**:** Vitamin A = 12,000,000 IU, D_3 = 2,000,000 IU, E = 10,000 mg, K_3= 2000mg, B_1 = 1000 mg, B_2 =5000 mg, B_6 =1500 mg, $B_{12=}$ 10mg, Biotin= 50 mg, pantothenic acid= 10000 mg, Nicotinic acid = 30000 mg, Folic acid =1000 mg, Zinc = 50,000 mg, Manganese = 60,000 mg, Iron = 30,000 mg, Copper = 10,000 mg, Iodine =1,000 mg, Selenium = 100 mg, Cobalt = 100 mg, Cobalt = 1000 mg, and Calcium carbonate up to 3 Kg.

Table 3: Chemical composition of starter, grower and finisher diets.

Item	Starter	Grower	Finisher
Crude protein**%**	22	21	19
M En (kcal/kg)	3000	3177	3225
Lysine**%**	1.35	1.27	1.05
Methionine+ cysteine**%**	1.05	0.94	0.85
Calcium **%**	1.05	1.00	0.90
Available phosphorus **%**	0.50	0.46	0.45
Chloride **%**	0.22	0.22	0.22
Na **%**	0.17	0.17	0.17

Calculated according to NRC, 1994.

2.4.2. Economic Efficiency Measurements:

2.4.2.1. Costs of production: were classified into total fixed costs, total variable costs, and total costs.

2.4.2.2. Total Variable Costs (TVC): included feed costs and feed additives costs. It was calculated with Egyptian pound per each chick during the period of the experiment according to (Atallah, 1997).

2.4.2.3. Total Fixed Costs (TFC): included labor, litter, total veterinary management (drugs, vaccine, and veterinary supervision), water and electricity, building and equipments depreciation. So these parameters were considered as a fixed value for all the experimental groups; each chick in different experimental groups took the same TFC value according to (Fardos, 2009).

The depreciation rates were calculated for the building to serve for 25 years and for the equipment to be used for 5 years. The straight line method implied by Sankhyan (1983) was used for calculation of depreciation rates according the following equation: Equipment depreciation = (Value of equipment(L.E)/Number of years/Number of project cycles per year) /Total number of chicks

2.4.2.4. Total Costs (TC):

TC = TFC + TVC.

2.4.2.5. Returns parameters:

2.4.2.5. a. Total Returns (TR): (Mohamed , 2014)

-TR = Litter sale + Broiler sale.

-Litter sale = Litter sale price / No. of broilers at end of the experiment.

-Broiler sale = Body weight with grams at the end of experiment (6^{th} week) x Gram price.

2.4.2.5. b. Net Profit (NP): It was calculated according to (Atallah, 1994 and 1997) using the following equation: NP= TR – TC.

2.4.3. Economic efficiency measurements:

- Percentage of total returns to total costs (TR/TC).
- Percentage of net profit to total costs (NP/TC).

2.5.Statistical Analysis:

Differences of productive and economic efficiency parameters between studied groups and breeds were analyzed by using One-Way ANOVA and Duncan's multiple comparison Post Hoc tests (Duncan, 1955).

Statistical analysis was performed using the statistical software package SPSS for Windows (version 20.0; SPSS Inc., Chicago, IL, USA). Statistical significance between mean values was set at ($P< 0.05$). Data were reported as means and standard error of mean.

3. RESULTS AND DISCUSSION:

3.1. Effect of different treatments among different breeds on productive efficiency measurements:

Result in table (4) clarifies that body weight (BW), body weight gain (BWG), relative growth rate (RGR %), feed intake, and final feed conversion rate (FCR) differed significantly ($p<0.05$) among different groups and breeds.

Concerning the initial body weight, it was differed among the two experimental breeds, Cobb breed showed higher initial body weight than Ross breed (46.32 and 41.13 g, respectively). Similar results were obtained by Abdel Raheem and Abd Allah (2011), they found that body weight at 1^{st} day of age was the highest for Cobb breed.

Results in table (4) showed that for both Cobb and Ross groups, the highest final body weights in the 6^{th} week of age were those of synbiotic and organic acid groups: for Cobb (2050 and 2105.70 g, respectively), and for Ross (2070.20 and 2081.50 g, respectively), and the lowest value was found for Cobb enzyme group (1908.50 g).

The synergism between probiotic and prebiotic causes synbiotics to have greater benefits in diets than using probiotic or prebiotic alone because, in the combination, the prebiotic may enhance the growth or activity of the used probiotic species (Bozkurt et al.,2009).

The beneficial effect of organic acids might be attributed to the improvement of protein digestion, by stimulating pancreatic enzyme secretion (Mellor, 2000). Dietary organic acids suppress the growth of pathogenic bacteria, encourage the growth of beneficial microflora, and activate digestive enzymes (Dibner, 2004 and Lückstadt, 2005).

The above results are in accordance with those obtained by (Abdel Fattah et al., 2008; Adil et al., 2010; Houshmand et al., 2012 and Azza et al., 2014). They found that BW at 6^{th} week of age was higher in organic acid group than control group. Similar results were obtained by Abdel Raheem and Abd Allah, (2011) who reported that BW at 42^{th} day of age was the highest in synbiotic group compared to control, probiotic and prebiotic groups .On the other hand, the lowest value for enzyme group was in agreement with Garipoglu et al. (2006).

BW differed among the two experimental breeds; Cobb breed showed higher body weight than Ross breed from the first day of age till the end of experiment. These results were in agreement with (Weis et al., 2010).

Concerning the study of final BWG, Cobb breed groups (prebiotics, synbiotics and organic acid) were the highest compared to control group, while Ross breed showed increase in BWG for symbiotic and organic acid group in comparison to control group.

Supplementation of the prebiotic to the diet, either alone or combined with the organic acid or probiotic, significantly increase BW compared to the control groups ,as prebiotics are able to increase digestive enzymes (Xu et al. ,2003).

The previous results are in agreement with those reported by Dizaji et al. (2013) who found that BWG increased in prebiotics and synbiotic groups in comparison to the control group. Similar results were obtained by Chowdhury et al. (2009) and Ghazalah et al. (2011) who concluded that organic acid supplementation caused a significant increase on BW in broiler chickens.

On the other hand, Awad et al. (2009) reported that the addition of probiotic did not show any significant effect on BW compared to the control group.

Regarding final RGR%, it was the highest for organic acid group of Ross breed (192.14%). For Cobb breed treated groups, prebiotics, symbiotic, and organic acid showed higher value than the control group, and the lowest value was found for enzyme treated group (190.47%).

Generally the positive effect of organic acids on growth performance may be due to decreasing pH values in digestive tract, which act as a barrier against pathogenic microorganisms. These microorganisms are highly sensitive to low pH values, and consequently enhance the growth of desirable microflora in the intestine and increase digestive enzyme activity and utilization of essential minerals and amino acids (Ghazalah et al., 2011).

Concerning feed intake, the organic acid group of Cobb breed showed the highest value (3.87 kg), and the lowest value was found for the synbiotic group of Ross breed (3.65 kg). These results agreed with Akoy (2015) and Fernandes et al. (2014). They found that feed amount was high in prebiotic and organic acid groups compared to the control group, while the lowest values were found in synbiotic and probiotic treated groups.

On the contrary, Abd El-Hakim et al. (2009) found a low feed intake value with organic acid supplementation.

For the final FCR, all treated Cobb groups - except enzyme group - showed lower values than the control one, and the lowest value was found for synbiotic group(1.87). For Ross breed, all treated groups recorded higher value than the control one, except synbiotic and organic acid groups (1.82 and 1.89 respectively).

These findings agreed with Dizaji et al. (2013), Fernandes et al., (2014) and Akoy (2015). They reported that FCR was low in all treated groups compared to the control group, and the lowest value was found for the synbiotic group. In contrast to this finding, Khooshechin et al. (2015) reported that FCR value increased with the addition of organic acid in comparison to the control group of Ross breed.

3.2. Effect of different treatments among different breeds on feed cost, feed additives cost and total cost (L.E /chick):

Result in table (5) clarified that, feed cost differed significantly ($p<0.05$) for both Cobb and Ross breeds.

Concerning total feed cost, the highest value was found for organic acid group of Cobb breed (L.E 15.64/chicken), while the lowest value was found for enzyme group of Cobb breed (L.E 14.52/chicken). These results agreed with Aya et al. (2013); and Costa et al. (2008). They found that supplementation of enzymes resulted in reduction of feed cost due to reduction of the amount of corn needed in the diets of the chicks by about 31% and 52% at the starter and finisher phases.

Regarding additive cost, it differed according to the type and the cost of each gram of feed additive used. They were about (L.E 0.22) for synbiotic groups of both breeds, (L.E 0.13) for prebiotic group of Ross breed, and about (L.E 0.10) for probiotic group and enzyme groups of both breeds, and the value for organic acid group ranged from (L.E 0.11 to L.E 0.12) for Ross and Cobb breed respectively.

Chick price varied from breed to another: it was about (L.E 4.0) for Cobb breed and about (L.E 3.95) for Ross breed. Value of total cost (Table 7) showed non-significant difference among Cobb and Ross breeds, it was the highest for the organic acid group of Cobb breed (L.E 22.77) ,while the lowest value was found for the enzyme group of Cobb breed (L.E 21.63).

Table (4): Effect of different treatments among different breeds on productive efficiency measurements (Mean ± SE) .

Breed	Group	Initial BW	Final BW	BWG	RGR%	Feed Intake	FCR
Cobb	Control	46.91^{a} ±0.56	2016.40^{ab} ±23.79	1969.50^{abc} ±23.70	190.85^{de} ±0.14	3.81^{b} ±0.02	1.948^{abc} ±0.03
	Probiotic	46.25^{a} ±0.59	2004.40^{ab} ±35.37	1958.10^{abc} ±35.42	190.85^{de} ±0.20	3.74^{de} ±0.0005	1.937^{abcd} ±0.03
	Prebiotic	45.94^{a} ±0.57	2015.80^{ab} ±32.07	1969.90^{abc} ±32.01	191.01^{cde} ±0.17	3.72^{de} ±0.01	1.910^{bcd} ±0.03
	Synbiotics	46.25^{a} ±0.67	2050.00^{ab} ±35.27	2003.80^{ab} ±35.07	191.08^{cd} ±0.17	3.69^{ef} ±0.01	1.871^{cd} ±0.03
	Organic Acids	46.88^{a} ±0.57	2105.70^{a} ±40.50	2058.50^{a} ±40.42	191.11^{cd} ±0.18	3.87^{a} ±0.03	1.907^{bcd} ±0.03
	Enzymes	45.73^{a} ±0.61	1908.50^{c} ±29.85	1862.40^{c} ±29.80	190.47^{e} ±0.19	3.70^{e} ±0.01	2.008^{ab} ±0.03
	Total	**46.32^{A} ±0.24**	**46.32^{A} ±0.24**	**1970.30^{A} ±13.84**	**190.90^{B} ±0.07**	**3.75^{A} ±0.01**	**1.93^{B} ±0.01**
Ross	Control	40.63^{b} ±0.46	2023.70^{ab} ±41.32	1983.00^{abc} ±41.43	191.96^{ab} ±0.20	3.79^{bc} ±0.01	1.952^{abc} ±0.04
	Probiotics	41.67^{b}± 0.52	1918.80^{c} ±35.94	1877.30^{c} ±35.91	191.39^{bcd} ±0.24	3.76^{cd} ±0.01	2.039^{a} ±0.05
	Prebiotics	40.94^{b} ±0.64	1948.90^{b} ±50.16	1907.60^{bc} ±50.26	191.46^{bcd} ±0.27	3.81^{b} ±0.02	2.054^{a} ±0.06
	Synbiotics	41.77^{b}± 0.48	2070.20^{a} ±35.38	2028.40^{a} ±35.42	191.98^{ab} ±0.16	3.65^{f} ±0.004	1.825^{d} ±0.03
	Organic acids	40.94^{b}± 0.51	2081.50^{a} ±37.24	2040.40^{a} ±37.31	192.14^{a} ±0.18	3.82^{b} ±0.02	1.899^{bcd} ±0.04
	Enzymes	40.83^{b}± 0.52	1927.10^{c} ±45.49	1886.30^{bc} ±45.41	191.52^{bc} ±0.22	3.74^{d} ±0.01	2.037^{a} ±0.05
	Total	**41.13^{B}± 0.21**	**41.13^{B}± 0.21**	**1954.30^{B} ±17.16**	**191.74^{A} ±0.09**	**3.76^{A} ±0.01**	**1.97^{A} ±0.02**

Means within the same column carrying different superscripts are significant at (*P* ≤ 0.05).

Table (5): Effect of different treatments among different breeds on feed cost (L.E/chick) and feed additives cost (Mean ± SE).

Breed	Group	Chick price	Feed cost	Additive cost
		Mean±SE	Mean±SE	Mean±SE
Cobb	Control	4.0	15.38^{b}±0.10	-
	Probiotic	4.0	15.08^{de}±0.10	0.10^{i}±0.001
	Prebiotic	4.0	15.03^{de}±0.05	0.12^{d}±0.004
	Synbiotics	4.0	14.91^{e}±0.02	0.22^{a}±0.003
	Organicacids	4.0	15.64^{a}±0.13	0.12^{e}±0.001
	Enzymes	4.0	14.52^{g}±0.01	0.10^{h}±0.001
Total		**4.0^{A}**	**15.09^{A}±0.03**	**0.13^{A} ±0.003**
Ross	Control	3.95	15.30^{bc}±0.05	-
	Probiotics	3.95	15.16^{cd}±0.03	0.10^{i}±0.002
	Prebiotics	3.95	15.37^{b}±0.07	0.13^{c}±0.006
	Synbiotics	3.95	14.74^{f}±0.02	0.22^{b}±0.003
	Organicacids	3.95	15.42^{b}±0.07	0.11^{f}±0.005
	Enzymes	3.95	14.69^{f}±0.04	0.10^{g}±0.003
Total		**3.95^{A}**	**15.10^{A}±0.03**	**0.13^{A} ±0.003**

Means within the same column carrying different superscripts are significant at (*P* ≤ 0.05).

Table (6): Effect of different treatments among different breeds on total return (L.E /chick)(Mean ± SE).

Breed	Group	Broiler sale	Litter sale	Total Return
Cobb	Control	26.21^{abc}±0.31	0.35	26.56^{abc}±0.31
	Probiotic	26.06^{abc}±0.46	0.35	26.40^{abc}±0.46
	Prebiotic	26.21^{abc}±0.42	0.35	26.55^{abc}±0.42
	Synbiotics	26.65^{ab}±0.46	0.35	27.00^{ab}±0.46
	Organic acids	27.37^{a}±0.53	0.35	27.72^{a}±0.53
	Enzymes	24.81^{c}±0.39	0.35	25.16^{c}±0.39
Total		**26.22^{A}±0.18**	**0.35**	**26.57^{A} ±0.18**
Ross	Control	26.31^{abc}±0.54	0.35	26.66^{abc}±0.54
	Probiotics	24.94^{c}±0.47	0.35	25.29^{c}±0.47
	Prebiotics	25.34^{bc}±0.65	0.35	25.68^{bc}±0.65
	Synbiotics	26.91^{a}±0.46	0.35	27.26^{a}±0.46
	Organic acids	27.06^{a}±0.48	0.35	27.41^{a}±0.48
	Enzymes	25.05^{c}±0.59	0.35	25.40^{c}±0.59
Total		**25.94^{B}±0.22**	**0.35**	**26.29^{B}±0.22**

TR: Total Return.
Means within the same column carrying different superscripts are significant at ($P \leq 0.05$).

Table (7): Effect of different treatments among different breeds on net profit and efficiency measurements (L.E /chick) (Mean ± SE).

Breed	Group	TR	TC	NP	TR/TC	NP/TC
Cobb	Control	26.56^{abc} ±0.31	22.39^{bc} ±0.10	4.17^{abc} ±0.33	1.19^{ab} ±0.01	0.19^{abc} ±0.01
	Probiotic	26.40^{abc} ±0.46	22.18^{d} ±0.00	4.22^{abc} ±0.46	1.19^{abc}±0.02	0.19^{abc} ±0.02
	Prebiotic	26.55^{abc} ±0.42	22.16^{d} ±0.05	4.39^{abc} ±0.40	1.20^{abc} ±0.02	0.20^{abc} ±0.02
	Synbiotics	27.00^{ab} ±0.46	22.14^{d} ±0.02	4.86^{ab} ±0.45	1.22^{ab} ±0.02	0.22^{ab} ±0.02
	Organicacids	27.72^{a} ±0.53	22.77^{a} ±0.13	4.95^{ab} ±0.48	1.22^{ab} ±0.02	0.22^{ab} ±0.02
	Enzyme	25.16^{c} ±0.39	21.63^{f} ±0.01	3.53^{bc} ±0.39	1.16^{bc} ±0.02	0.16^{bc} ±0.02
Total		**26.57^{A} ±0.18**	**22.21^{A} ±0.03**	**4.36^{A} ±0.17**	**1.20^{A} ±0.01**	**0.20^{A} ±0.01**
Ross	Control	26.66^{abc} ±0.54	22.26^{cd} ±0.05	4.40^{abc} ±0.53	1.20^{abc}±0.02	0.20^{abc} ±0.02
	Probiotics	25.29^{c} ±0.47	22.21^{d} ±0.03	3.08^{c} ±0.47	1.14^{c} ±0.02	0.14^{c} ±0.02
	Prebiotics	25.68^{bc} ±0.65	22.45^{b} ±0.07	3.24^{c} ±0.65	1.14^{c} ±0.03	0.14^{c} ±0.03
	Synbiotics	27.26^{a} ±0.46	21.91^{e} ±0.02	5.35^{a} ±0.46	1.24^{a} ±0.02	0.24^{a} ±0.02
	Organicacids	27.41^{a} ±0.48	22.49^{b} ±0.07	4.92^{ab} ±0.50	1.22^{ab} ±0.02	0.22^{ab} ±0.02
	Enzyme	25.40^{c} ±0.59	21.75^{ef} ±0.04	3.65^{bc} ±0.57	1.17^{bc} ±0.03	0.17^{bc} ±0.03
Total		**26.29^{B} ±0.22**	**22.17^{A} ±0.03**	**4.12^{B} ±0.22**	**1.19^{B} ±0.01**	**0.19^{B} ±0.01**

TR: Total Return, TC: Total Cost, NP: Net profit, TR/TC: Total Return/Total Cost,
NP/TC: Net Profit/Total Cost.
Means within the same column carrying different superscripts are significant at ($P \leq 0.05$).

These results were in agreement with Torres et al. (2003), Eustace and Bina (2005); Costa et al. (2008) and Aya et al. (2013). They found that the highest total cost value was recorded for organic acid treated groups. This may be due to the increase of feed consumption. They also found that broiler diet contained enzymes resulted in the reduction of feed cost and production cost.

3.3. Effect of different treatments among different breeds on total return and net profit (L.E /chick):

Result in table (6) clarified that total return from broiler sale and litter sale differed significantly ($p<0.05$) among different groups, the highest value was found for organic acid groups of both Cobb and Ross breed (L.E 27.72 and 27.41, respectively) and for Synbiotic groups (L.E 27.0 and 27.26 respectively), while the lowest value was found for the enzyme group of Cobb breed (L.E 25.16).

The total return result for organic acid group agreed with Adil et al., (2010); Azza et al., (2014). They reported that feed diet supplemented with organic acids had superior improvement in live BW. Concerning the value of Synbiotic group, our results agreed with Zhang et al. (2006) and Nayebpor et al.(2007). They reported that synbiotic can improve the weight of chicks.

Net profit results, were differed significantly ($p<0.05$) among all treated groups, synbiotic group of Ross breed and organic acid group of Cobb breed recorded the highest net profit values (L.E 5.35 and 4.95 /chicken, respectively). These results were in agreement with Hassanein (2006) and El-Faham et al. (2015) who reported that synbiotic displayed a greater efficiency as growth promoters for broiler, and gave the best total net revenue and economic efficiency.

The lowest net profit value was recorded for probiotic group of Ross breed, which was in accordance with those obtained by Abd El-Latif et al. (2002) and Kefali et al. (2007), who found that diets supplemented with probiotic had lower NP.

Also, the percentage of Total Return / Total Cost and Net Profit / Total Cost differed significantly ($p<0.05$) for both Cobb and Ross breeds, the highest value for was found for synbiotic group (1.24%, 0.24%, respectively) of Ross breed.

These results are in agreement with those reported by Saiyed et al. (2015) who reported that the economic efficiency measurement value was higher for the synbiotic group.

Acknowledgment

The authors are grateful to the Faculty of Veterinary Medicine, Benha University (www.bu.edu.eg).

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