Mandarah Male Chicks Productive Performance and Organs Weight as Affected by Using Various Routes of Synbiotics Treatments

Youssef, I. M.[1*]; A. M. Abdel-Ghany[2]; E. G. Ahmed[2] and S. M. Mahmoud[1]

[1] Department of Poultry Breeding, Animal Production Research Institute, Agriculture Research Center, Egypt

[2] Department of Animal Production and Fisheries, Faculty of Agriculture, Suez Canal University, Egypt

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Abstract: The current study was conducted to investigate the effects of using various routes of Synbiotics administrations on the productive performance and organs weights of developed Mandarah Male chicks. Two hundred and ten of one-days old male chicks of the indigenous Mandarah strain were assigned randomly into seven treatments (three replicates/treatment each of 10 chicks; 30 chicks/treatment). All groups were kept under the same conditions as regard to managerial; feeding a grower diet containing 19.56% crude protein, 2856 Kcal/kg Metabolize energy (ME) and 3.65% crude fiber and veterinary-health- and vaccination-program- procedures. Feed and water were offered *ad libitum*. Route and dosage of the one-time Synbiotics' treatments to one-day old chicks were as follow: 1- Basal diet chicks with no treatment (control; G1-no treatment); 2-Spraying with 0.25 ml Synbiotics (containing 5×10^7 CFU-G2-single dose); 3-Spraying With 0.50 ml Synbiotics (containing 5×10^8 CFU-G3-double dose); 4-Drinking water with 0.25 ml Synbiotics (containing 5×10^7 CFU-G4-single dose); 5-Drinking water with 0.50 ml Synbiotics (containing 5×10^8 CFU-G5-double dose); 6- Mouth drops with 0.25 ml Synbiotics (containing 5×10^7 CFU-G6-single dose) and 7-Mouth drops with 0.50 ml Synbiotics (containing 5×10^8 CFU-G7-double dose). At 16th week of age three birds from each treatment (this gives rise to a total of 21 birds) were slaughtered to determine carcass characteristics and relative weight (g) of lymphoid organs. Results indicated that body weight, body weight gain, feed intake, feed conversion ratio and livability rate were significantly improved ($P\leq0.01$) and highest/best values when using Synbiotics in drinking water (G4-single dose) compared with the control and the other treated groups. However, carcass and Lymphoid organs (g) were not affected by treatments ($P\geq0.05$). Nevertheless, the chickens administered by 0.25 ml Synbiotics via mouth/oral drops (G6) showed a significant increase ($P\leq0.05$) in spleen weight than that of the control (G1-no treatment) and the other treated groups.

Keywords: Synbiotics, Mandarah, growth performance, carcass, lymphoid organs.

INTRODUCTION

The Egyptian poultry industry contributes in a large part of the country supplies of animal protein (white meats and eggs). The use of feed additives such as antimicrobials and antioxidants has been an industry important part as growth promoters and for improving the productivity (Hashemi *et al.,* 2012).

Recently, the strive for safe alternatives to produce antibiotic-free poultry intended for countering the risk factor of cross-resistance acquisition by harmful bacteria using preparations such as the pro-, pre-and syn-biotic substances which have a beneficial effect on the host organism through the development intensification of healthy intestinal microbial strains and the elimination of pathogenic strains (Dankowiakowska *et al.,* 2013). This process is called competitive occupation of intestinal sites between beneficial and harmful bacteria.

Animal performance directly correlates with health status, in particular with the health status of the digestive tract. Compared to standard health animals, the growth rate of animals in a germ-free environment is higher. Consequently, performance of standard health animals is higher compared to animals facing pathogenic challenges (Awad *et al.,* 2009). The gastrointestinal tract (GIT) is a highly complex system which is greatly affected by feed, water, microorganisms and contaminants ingested by the animals. Therefore, intestinal immunity and intestinal barrier function play a crucial role, covering around 70-80% of the total immune system. Dysbiosis (*i.e.* reduced nutrient digestibility) and impaired barrier function are examples of the several challenges related to gut health that can affect growth and immunity, resp. that put pressure on farm profitability and explain, at least in part, the motivations for sub-therapeutic application of antibiotics for disease prevention and growth promotion as antibiotics enabled animals to grow faster and gain weight more efficiently through reducing inflammation and modulating gut Microbiota.

Considerations regarding safety and efficacy of the sub-therapeutic use of antibiotics in animal nutrition have led to a legal ban of these substances in the European Union, Korea and California and to discussions in several other countries like India and China. Teillant *et al.* (2015) report that antibiotic growth promoters (AGPs) lost productivity in the post-2000 era compared to earlier studies. This might be a result of increasing antibiotic resistance levels among microorganisms, which is not only affected by antibiotic use in livestock, but also in human medicine. In addition to the fact that antibiotic resistance triggers an increase in production costs, antibiotic resistance in animals may affect human disease control. Therefore, besides holistic approach (better management, vaccination programs, biosecurity measurers, and feeding strategy) significant effort has been paid to novel growth promoters (NGPs) in order to reduce usage of AGPs in animal husbandry.

*Corresponding author e-mail: islamyoussef1190@gmail.com

Synbiotics have been proven to promote gastrointestinal health and immune function. Synbiotics are a relatively new class of feed additives, defined as a mixture of probiotics and prebiotics that beneficially affects the host by activating the metabolism and survival of one or a limited number of health promoting bacteria and/or by selectively stimulating their growth in ways that can assist and improve the host's well-being and prosperity (Dizaji *et al.,* 2012; Abdel-Hafeez *et al.,* 2017). Synbiotics referred to nutritional supplements combining probiotics and prebiotics, which then act synergistically in the intestine of the host animal where the probiotic organisms are established in the intestine and the prebiotic acts as a substrate to these probiotics (Gibson and Roberfroid, 1995). The concept behind probiotics is to boost good bacteria and restrain bad bacteria in the animal gastrointestinal tract while prebiotics further support the growth of favorable bacteria in the lower intestine, they are primarily sort of fibers naturally found in food (Akoy *et al.,* 2014).

However, studies on ways that can be used to applying Synbiotics in poultry industry, especially in Indigenous Egyptian strains, are limited. Thus, this study was designed to investigate the use of Synbiotics by different methods of administration on growth performance, and organs weight of developed male Mandarah chicks.

MATERIALS AND METHODS

Birds and experimental treatments

A total of 210 one day old sexed-male Native Mandarah chicks obtained from the Poultry Research Experimentation Station at Anshass, El-Sharkia Governorate, Egypt were used. Chicks were housed from day of hatch, during February 2016, on a deep wheat-straw-litter floor system at an experimental chamber-partitioned-house at the same Poultry Research Experimentation Station. All chamber partitions, feeders, drinkers and heaters were cleaned and disinfected a week before beginning the study. Environmental temperature was adjusted according to the age using fine-tuned Gas Heaters. It was set at 32˚C for the first week of age, and then decreased by 2˚C per week until reaching 22˚C and kept this way afterwards. Birds were provided 24 hours of illumination light during the first two weeks and 4 hours darkness thereafter. Feed on a grower diet and water was provided *ad libitum.* The composition the grower diet is as shown in Table (1).

The chicks were assigned randomly into seven treatments (each of 30 chicks) and each treatment was subdivided into three replicates, each of 10 chicks.The Route and dosage of the one-time Synbiotics' treatments of different groups of one-day old chicks were as follow:

1- Basal diet chicks with no treatment (control; G1-no treatment);

2-Spraying with 0.25 ml Synbiotics (containing 5×10^7 CFU-G2-single dose);

3-Spraying With 0.50 ml Synbiotics (containing 5×10^8 CFU-G3-double dose);

4-Drinking water with 0.25 ml Synbiotics (containing 5×10^7 CFU-G4-single dose);

5-Drinking water with 0.50 ml Synbiotics (containing 5×10^8 CFU-G5-double dose);

6- Mouth drops with 0.25 ml Synbiotics (containing 5×10^7 CFU-G6-single dose) and

7- Mouth drops with 0.50 ml Synbiotics (containing 5×10^8 CFU-G7-double dose).

The synbiotics used in this experiment (PoultryStar® Sol) is an international Product of Biomin Singapore Pte, Ltd, Biomin GmbH purchased from an Egyptian Veterinary Medicine Dealer Company. According to Biomin, each one gram of the used Synbiotics contains 0.9 g Fructo-oligoscharides (pure soluble inulin, chicory) and 0.1 g blend of probiotic bacteria [*Enterococcus faecium* (3×10^9 CFU/g), *Bifidobacterium animalis* (5×10^8 colonies forming unit per gram, CFU/g), *Pediococcus acidilactici* (1.3×10^9 CFU/g), *Lactobacillus reuteri* (1×10^8 CFU/g) and *Lactobacillus salivarius* (1×10^8 CFU/g)].

Table (1): Basal diet ingredients and calculated chemical analysis

Ingredients	%	Calculated composition	%
Yellow corn	63.90	**Crude protein (%)**	19.56
Soybean meal (CP, 44%)	32.10	**Metabolize energy (ME), Kcal/kg**	2856.00
Vitamin Premix *	0.30	**Crude fiber (%)**	3.65
NaCl	0.30	**Calcium (%)**	1.00
Di Calcium Phosphate	1.80	**Phosphorus (%)**	0.48
Limestone	1.40	**Lysine (%)**	1.03
DL-Methionine (Meth%)	0.20	**Methionine (%)**	0.31
Total	100.00	**(Methionine + Cyctine)%**	0.64

* Composition of premix in 3 kg is: Vit. A 10.000.000 IU, Vit. D_3 2.000.000 IU, Vit. E 10.000 mg, Vit. K_3 1.000mg, Vit. B1 1.000 mg, Vit. B_2 4.000 mg, Vit. B_6 1.500 mg, Vit. B_{12} 10 mg; Niacin 20.000 mg, Pantotenic acid 10.000 mg, Folic acid 1.000 mg, Biotin 50 mg, Choline chloride 500.000 mg, Cu 3.000 mg, Iodine 300 mg, Fe 30.000 mg, Mn 40.000 mg, Zn 45.000 mg and Selenium 100 mg.

Productive Performance parameters

Starting from 1st week to 16th week of age, weekly individual live body weight and gain in weight as well as per replicate feed intake, feed conversion ratio and livability rate were determined. Feed intake was calculated by the difference of supplied feed and feed left in each feeder. Feed conversion ratio was then weekly calculated from the ratio between total feed intake and total per replicate gain in weight. Livability rate were calculated by dividing the number of alive birds (not dead) throughout the corresponding period by the initial number of birds housed at the start of the experimental work and multiplying the result by 100.

Some internal organs weight

At the end of experiment, three birds per treatment were randomly chosen and slaughtered. Birds, after that, were scalded, de-feathered and carcasses were eviscerated. The gizzard, heart, liver, spleen and thymus were excised and weighted.

Statistical analysis

One-way- ANOVA, was applied using SPSS 22 (2012). Differences among means were detected using Duncan's New Multiple Range test (Duncan, 1955).

RESULTS

As for live-body-weight-traits, there was significant Synbiotics treatment effect ($P \leq 0.0001$) at all studied ages (Table 2). However, there was no detectable, but sporadic, trend as for the superiority of Synbiotics treatment (*i.e.* route and level of administration). In spite of this, the superiority was for drinking water 0.25 ml at the 1st, 2nd, 8th and 10th wks of ages. Nevertheless, superiority was for spray 0.25 ml at the 4th and 6th wk of age and for spray 0.50 ml at 12th wk of age. Finally, superiority was for mouth drops 0.50 ml at the 14th and 16th wks of age. Surprisingly, there was no apparent superiority at all for 0.25 ml mouth drops. Considering inferiority, the control group the least values at most ages except that at the 1st and 2nd wk of age where inferiority was for drinking water 0.50 ml.

Having the status of body weight gain traits, there was significant Synbiotics treatment effect ($P \leq 0.0001$, $P \leq 0.01$, $P \leq 0.05$) at most studied ages, except that at the 2nd - 4th week of age period (Table 3). However, there was no detectable, but sporadic, trend as for the superiority of Synbiotics treatment (*i.e.* route and level of administration). In spite of this, the superiority was for drinking water 0.25 ml at the Hatch-1st and6th-8th wks of age's periods. Nevertheless, superiority was for spray 0.25 ml at the 2nd - 4th and 4th - 6th wks of age periods and for spray 0.50 ml at 6th - 8th and 8th - 10th wks of age periods. Finally, superiority was for mouth drops 0.50 ml at the 10th - 12th, 14th - 16th and the whole period (Hatch-16th) wks of age. Surprisingly, there was single time superiority for 0.25 ml mouth drops at 12th - 14th wks of age period. Considering inferiority, the control group the least values at most ages except that at Hatch-1st for drinking water 0.50 ml and 4th - 6th for 0.25 ml mouth drops, while it was at 6th - 8th, 12th - 14th and 14th - 16th for spray 0.25 ml.

As for feed intake, there was no significant Synbiotics treatment effect at all studied ages except that at the 1st and 4th wks of age there were significant differences ($P<0.01$, $P<0.05$) as shown in Table (4). However, there was no detectable, but sporadic, trend as for the superiority of Synbiotics treatment (*i.e.* route and level of administration). In spite of this, the superiority was for drinking water 0.25 ml at the 1st wks of ages. Nevertheless, superiority was for spray 0.50 ml at the 2nd wks of age and for mouth drops 0.25 ml at 4th, 6th and 12th wks of age. Finally, superiority was for mouth drops 0.50 ml at the 8th, 10th, 14th and 16th wks of age. Surprisingly, there was no apparent superiority at all for spray 0.25 ml. Considering inferiority, the control group the least values at most ages except that at the 1st wks of age where inferiority was for spray 0.50 ml.

Feed conversion ratio (g), there was significant Synbiotics treatment effect ($P \leq 0.0001$, $P<0.05$) at most studied ages, except that at the 2nd, 4th, 8th and 16th week of age (Table 5). However, there was no detectable, but sporadic, trend as for the superiority of Synbiotics treatment (*i.e.* route and level of administration). In spite of this, the best was for drinking water 0.25 ml at the 1st and 10th wks of ages. Nevertheless, the best was for spray 0.25 ml at the 2nd, 4th, 6th and 12th wks of age and for mouth drops 0.25 ml at 14th wks of age. Finally, the best was for mouth drops 0.50 ml at the 8th and 16th wks of age. Surprisingly, there was no apparent superiority at all for 0.50 ml drinking water and spray 0.50 ml. Considering inferiority, the control group the poorest values at most ages except that at the 1stfor drinking water 0.50 ml, 4th wks of age for 0.50 ml mouth drops and at 6th for 0.25 ml mouth drops while it was at 8th for spray 0.50 ml.

Also, livability rate showed that there were a significant ($P<0.05$) differences between groups in livability rate at 2nd, 4th and 6th weeks of age due to Synbiotics treatments results revealed that the drinking-water then spray have generally best livability rate compared to controls as shown in Table (6).

The means of internal organ's weight for experimental groups are summarized in Table (7). Liver weight, heart weight, gizzard weight and Thymus weight did not show any significant difference ($P>0.05$) between the experimental groups. On the other hand, there were significant differences ($P \leq 0.05$) among the different groups in spleen weight. The 0.25 ml Synbiotics as mouth-drops had significantly ($P \leq 0.05$) the highest spleen weight compared to other administration-procedures.

Table (2): Effects of Synbiotics treatment (*i.e.* administration route and level) on the live-body-weight traits (g) of native Mandarah male chicks during the growing period from the first till the 16th week of age

Weeks	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	P. Value
1st	48.43ab ±0.721	45.73c ±0.866	45.20c ±0.868	49.00a ±0.874	44.87c ±0.483	45.10c ±0.470	46.40bc ±0.704	0.000
2nd	81.5ab ±1.974	82.26ab ±2.624	82.03ab ±1.645	84.43a ±2.488	78.00b ±1.513	79.86ab ±1.541	81.20ab ±1.812	0.000
4th	155.70c ±4.269	208.57a ±7.479	200.33ab ±5.186	206.80ab ±6.562	202.77ab ±5.219	199.50ab ±3.865	190.90b ±5.078	0.000
6th	259.90d ±6.632	325.07a ±7.820	306.70b ±4.041	297.27bc ±5.425	290.10c ±3.912	283.73c ±3.933	283.30c ±4.695	0.000
8th	373.48c ±8.450	405.87b ±8.195	451.21a ±8.426	466.41a ±7.272	441.11a ±7.945	439.00a ±6.171	446.45a ±14.012	0.000
10th	511.60c ±11.045	561.29b ±13.958	629.89a ±13.214	638.64a ±9.431	609.07a ±12.903	609.81a ±7.118	608.52a ±18.488	0.000
12th	669.79c ±15.260	762.75b ±20.794	820.44a ±12.828	807.00ab ±12.970	802.15ab ±15.054	798.59ab ±11.694	815.70a ±18.665	0.000
14th	872.52c ±18.680	967.68b ±19.500	1029.52a ±15.069	1012.56ab ±15.154	1020.81a ±13.140	1029.23a ±12.942	1049.42a ±18.802	0.000
16th	1101.14d ±18.962	1172.21c ±15.632	1264.04b ±14.045	1233.52b ±12.603	1245.35b ±11.188	1260.00b ±10.960	1311.20a ±19.448	0.000

a,b,c Means within the same row with different superscripts are significantly different (P≤0.0001).using Duncan's Multiple Range Test.

Table (3): Effects of Synbiotics treatment (*i.e.* administration route and level) on the gain-in-weight traits (g) of native Mandarah male chicks during the growing period from the first till the 16th week of age

Period in Weeks	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	P. Value
Hatch- 1st	12.87b ±0.651	10.00c ±0.747	9.57c ±0.760	15.47a ± 0.702	9.53c ±0.379	9.70c ±0.371	10.47c ±0.626	0.000
1st- 2nd	33.07 ±1.743	36.53 ±2.078	36.83 ±1.148	35.43 ±1.924	33.13 ±1.266	34.77 ±1.203	34.80 ±1.285	0.495
2nd- 4th	41.50c ±2.111	57.00a ±4.878	52.00ab ±3.070	53.93ab ±3.093	53.00ab ±3.190	54.57ab ±2.765	45.17b ±3.550	0.012
4th- 6th	60.10ab ±2.608	61.37a ±3.070	51.87c ±3.461	49.07c ±3.137	49.13c ±3.386	47.07c ±2.513	50.43c ±2.833	0.002
6th- 8th	60.93b ±3.939	43.13c ±3.696	73.21ab ±6.149	80.97a ±5.418	68.32ab ±5.129	69.48ab ±3.650	75.45ab ±6.528	0.000
8th- 10th	69.24b ±3.906	81.14ab ±7.023	93.79a ±5.912	85.36ab ±4.614	73.19b ±5.667	82.33ab ±4.650	82.97ab ±4.692	0.044
10th- 12th	79.92b ±6.547	105.54a±6 .742	98.48a ±6.477	80.86a ±3.924	103.92b ±3.770	101.40a ±5.095	105.85a ±4.216	0.000
12th- 14th	97.56bc ±4.507	94.18c ±6.685	116.33ab ±6.680	105.85abc ±6.529	107.78abc ±5.260	123.85a ±7.724	116.12ab ±6.228	0.012
14th-16th	103.10cd ±8.649	87.04d ±7.979	109.96bc ±4.652	112.26bc ±2.599	110.73bc ±4.200	127.76ab ±4.921	134.76a ±7.963	0.000
Whole period	1065.52d ±18.97	1136.42c ±15.55	1228.42b± 13.98	1200.19b ±12.49	1210.15b ±11.14	1224.60b ±11.03	1275.16a ±19.51	0.000

a,b,c Means within the same row with different superscripts are significantly different (P≤0.0001, 0.05).using Duncan's Multiple Range Test

Table (4): Effects of Synbiotics treatment (*i.e.* administration route and level) on the feed intake (g) of native Mandarah male chicks during the growing period from the first till the 16th week of age

Weeks	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	P. Value
1st	333.33^{ab} ±17.638	250.00^{c} ±17.320	243.33^{c} ±8.819	356.67^{a} ±29.627	280.00^{bc} ±15.275	263.33^{c} ±21.858	243.33^{c} ±12.018	0.003
2nd	676.67 ±170.326	886.67 ±53.644	913.33 ±18.559	880.00 ±45.825	856.67 ±12.018	903.33 ±43.333	866.67 ±8.819	0.336
4th	846.67^{b} ±259.829	1226.67^{a} ±63.595	1260.00^{a} ±37.859	1260.00^{a} ±20.816	1326.67^{a} ±63.595	1460.00^{a} ±87.177	1236.67^{a} ±18.559	0.048
6th	990.00 ±327.871	1240.00 ±30	1410.00 ±49.328	1330.00 ±36.055	1433.33 ±56.960	1620.00 ±47.258	1423.33 ±78.810	0.108
8th	1333.33 ±504.16	1383.33 ±72.648	1983.33 ±109.29	1966.67 ±218.58	1933.33 ±60.092	1953.33 ±129.14	2030.00 ±145.71	0.411
10th	1386.66 ±523.36	1986.67 ±46.66	2366.67 ±103.65	2036.67 ±55.47	1883.33 ±109.29	1926.67 ±81.92	2190.00 ±195.19	0.154
12th	1513.33 ±589.5	2500.00 ±264.57	2323.33 ±136.17	1983.33 ±60.092	2463.33 ±91.34	2550.00 ±96.43	2476.67 ±222.43	0.134
14th	1696.67 ±678.48	2266.67 ±116.66	2633.33 ±133.33	2500.00 ±243.31	2550.00 ±168.62	2216.67 ±349.20	2746.67 ±307.15	0.411
16th	2013.33 ±1068.10	2166.67 ±176.38	2616.67 ±44.09	2680.00 ±141.89	2583.33 ±60.09	2850.00 ±86.60	2983.33 ±8.819	0.646

a,b,c Means within the same row with different superscripts are significantly different (P≤0.05).using Duncan's Multiple Range Test.

Table (5): Effects of Synbiotics treatment (*i.e.* administration route and level) on chickens feed conversion ratio (FCR) weekly of native Mandarah male chicks during the period the 1st till the 16th week of age

Weeks	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	P. Value
1st	2.59^{ab} ±0.093	2.49^{c} ±0.143	2.57^{ab} ±0.206	2.31^{c} ±0.035	2.93^{a} ±0.064	2.70^{ab} ±0.135	2.32^{c} ±0.115	0.040
2nd	2.59 ±0.061	2.42 ±0.034	2.48 ±0.092	2.49 ±0.082	2.58 ±0.037	2.59 ±0.092	2.49 ±0.045	0.473
4th	2.66 ±0.089	2.19 ±0.225	2.42 ±0.071	2.35 ±0.128	2.54 ±0.211	2.68 ±0.103	2.73 ±0.071	0.135
6th	2.23^{c} ±0.015	2.04^{c} ±0.165	2.73^{b} ±0.137	2.76^{b} ±0.223	2.91^{b} ±0.020	3.45^{a} ±0.148	2.84^{b} ±0.121	0.000
8th	3.12 ±0.013	3.23 ±0.273	2.89 ±0.346	2.514 ±0.062	3.06 ±0.176	2.91 ±0.102	2.79 ±0.090	0.224
10th	3.26^{a} ±0.181	2.66^{c} ±0.126	2.74^{c} ±0.205	2.55^{c} ±0.031	2.86^{ab} ±0.044	2.62^{c} ±0.165	2.74^{c} ±0.058	0.038
12th	3.15^{a} ±0.011	2.54^{c} ±0.017	2.62^{ab} ±0.057	2.62^{ab} ±0.019	2.63^{ab} ±0.036	2.79^{b} ±0.009	2.59^{ab} ±0.164	0.000
14th	3.15^{a} ±0.167	2.58^{b} ±0.043	2.52^{ab} ±0.068	2.63^{b} ±0.035	2.63^{b} ±0.036	2.07^{c} ±0.359	2.74^{bc} ±0.088	0.014
16th	4.034 ±0.81	2.75 ±0.076	2.77 ±0.202	2.65 ±0.057	2.69 ±0.039	2.68 ±0.131	2.65 ±0.032	0.430

a,b,c Means within the same row with different superscripts are significantly different (P≤0.05).using Duncan's Multiple Range Test

Table (6): Effects of Synbiotics treatment (*i.e.* administration route and level) on chickens livability rate weekly of native Mandarah male chicks during the period the 1st till the 16th week of age

Livability (Wks.)	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	P. Value
1st	97±0.033	100±0.00	100±0.00	100±0.00	100±0.00	100±0.00	100±0.00	0.426
2nd	83±0.069	97±0.033	97±0.033	100±0.00	100±0.00	100±0.00	100±0.00	0.002
4th	77±0.078	97±0.033	93±0.046	97±0.033	100±0.00	97±0.033	97±0.033	0.004
6th	70±0.085	93±0.046	87±0.063	93±0.046	93±0.046	93±0.046	90±0.056	0.040
8th	70±0.085	93±0.046	87±0.063	90±0.056	90±0.056	90±0.056	90±0.056	0.135
10th	70±0.085	90±0.046	87±0.063	90±0.056	87±0.063	90±0.056	90±0.056	0.235
12th	67±0.087	90±0.056	87±0.063	90±0.056	83±0.069	87±0.063	87±0.063	0.180
14th	67±0.087	90±0.056	87±0.063	87±0.063	83±0.069	83±0.069	83±0.069	0.303
16th	63±0.089	90±0.056	83±0.069	87±0.063	83±0.069	83±0.069	83±0.069	0.179

Table (7): Effects of Synbiotics treatment (*i.e.* administration route and level) on carcass and organs weight of native Mandarah male chicks

	Control	Spray 0.25	Spray 0.50	Drinking Water 0.25	Drinking Water 0.50	Mouth Drops 0.25	Mouth Drops 0.50	p. Value
Eviscerated Carcass	741 ±74.036	759 ±13.203	773.33 ±69.335	820 ±40	837.33 ±87.757	885.67 ±48.772	838.67 ±43.321	0.599
Liver	33.30 ±1.322	35.46 ±2.016	43.26 ±0.284	40.90 ±3.675	40.80 ±1.732	33.83 ±3.456	37.53 ±3.279	0.091
Heart	5.3 ±0.378	4.5 ±0.057	4.9 ±0.360	5.3 ±0.405	5.8 ±0.484	5.7 ±0.208	5.6 ±0.578	0.241
Gizzard	29.76 ±2.117	25.46 ±1.179	19.46 ±0.202	23.60 ±2.426	31.16 ±5.716	29.56 ±2.733	27.40 ±2.079	0.118
Spleen	7.73^{ab} ±0.317	4.10^{bc} ±0.503	5.30^{c} ±0.723	7.70^{ab} ±0.888	7.63^{ab} ±0.837	8.83^{a} ±1.257	7.00^{ab} ±0.953	0.018
Thymus	2.56 ±0.176	0.90 ±0.115	1.53 ±0.949	0.96 ±0.409	2.36 ±1.146	1.33 ±0.851	1.00 ±0.404	0.47

a,b,c Means within the same row with different superscripts are significantly different ($P \leq 0.05$).using Duncan's Multiple Range Test

DISCUSSION

In the present study, using different methods of Synbiotics improved chicks' performance, as shown by the higher growth rates and better feed conversation ratio (FCR) compared with the control birds. The improvement in FCR was a result of differences in feed intake, and possibly due to higher feed digestibility.

These results may be due to the elimination of undesirable bacteria from the gastrointestinal tract through the mechanism of occupational competition on guts related sites. Moreover, it may be due to an improvement in the health of the intestinal mucosa that contributes to a better digestion and absorption besides it may be due to reduction of the stress on the mucosa by the presence of additive supplementations to the diet. Because, the key reason for decreased nutrient absorption is the presence of pathogenic bacteria, which can increase the rate of passage of the digesta and interfere with intestinal cell healthy satisfactory turnover rate and through the thickening of intestinal mucosa as a protective process against harmful and toxic substances produced by those pathogenic microorganisms. the reason for the inconsistent and fluctuating additive effect of synbiotics supplementations in literature may be due to dissimilarity in gut microflora, environmental conditions, also dose rate, basal diet and strains used of probiotic (Mahdavi *et al.,* 2005) as well as types of used prebiotic.

Lactic acid bacteria may enhance digestion by increasing enterocyte production (Banasaz *et al.,* 2002). The gut microflora affects the digestion, absorption and the metabolism of dietary carbohydrates, protein, lipids and minerals and the synthesis of vitamins (Jin *et al.,* 1997). Maintaining the balance of good gut health is a key aspect of ensuring the best bird performance, live liness and vigor. If an imbalance in gut intestinal microbiota occurs, nutrient digestion and absorption possibly will be affected which, in turn, may feasibly affect bird health and performance. This balance of the intestinal microbiota also can extensively be affected by bird management and environment. (Gunal *et al.,* 2006) reported that when chicks were housed in a clean environment a probiotic may possibly influence animal performance.

The results of carcass traits in the present study were in agreement with Toghyani *et al.* (2011) who reported that carcass yield and relative organ weights were not influenced by probiotic and prebiotic dietary treatments of broiler chicks. Also, Abdel-Hafeez *et al.* (2017) and Huwaida *et al.* (2016) reported that the effect of probiotics or Synbiotics on carcass traits did not reveal any significant (P>0.05) on carcass and organs weight. This study is not about the antibiotic ban as applied in the European Union (and many other countries). Alternatively, it will be discussing about no-antibiotics-ever native fowl production. This implies that even sick birds will receive no antibiotics, no matter what. Such birds are already marketed with a hefty margin enough to absorb the extra cost of mortality increases. However, in imitation of what goes in real life, wild birds do not receive antibiotics, but they eat a lot of fibre to maintain a super-healthy balanced gut microbiota for a more vulnerable gut system. More fibre means less efficient/less Protein diets which in turn birds will never grow to their full potential, but this is a discussion better left for welfare advocates but responding to food safety challenges, and it implies using high levels of all feed-grade amino acids. Therefore, in such work there may be positive control in which antibiotics should be used to determine the degree of performance scarification under no-antibiotics-ever production formulas, the case that is not actually available here. This feed strategy has to use feed additives of the concept of boosting immunity or indirect elimination of harmful pathogens like *Salmonella*, clostridia, coccidia *Colibacteria*, *etc*.

In this study, there were significant differences among the different groups on spleen weight and percent. Spleen provides the chicken body with the microenvironment required for antigens presentation and concentrating them in the white pulps where T and B cells interact. However, mouth Drops 0.25 ml., was the treatment which had been significantly ($P \leq 0.05$) superior in Spleen weight and percent judged against to other routes and levels of administrations

CONCLUSION

In conclusion, using various routes of Synbiotics administrations improved live-body-weight, body weight gain, feed intake and feed conversion ratio of chicks. These results of the present study suggest that Synbiotics may be a suitable alternative to antibiotics as a growth-promoter for improving chicks' performance.

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الأداء الإنتاجي ووزن الأعضاء لذكور كتاكيت المندرة كتأثير للطرق المختلفة للمعاملة بالسينبيوتيكس

اسلام محمد يوسف[١]، أحمد محمود عبد الغنى[٢]، السيد جمال أحمد[٢]، صبري موسى محمود[١]

[١] قسم تربية الدواجن، معهد بحوث الإنتاج الحيواني، مركز البحوث الزراعية – مصر

[٢] قسم الإنتاج الحيواني والثروة السمكية، كلية الزراعة، جامعة قناة السويس - مصر

أجريت هذه الدراسة بغرض تقييم الطرق المختلفة لاستخدام السينبيوتيكس على الأداء الإنتاجي ووزن الأعضاء لذكور كتاكيت سلالة المندرة. تم استخدام ٢١٠ كتكوت ذكر عمر يوم من سلالة المندرة, وتم تقسيمهم إلى ٧ معاملات (٣ مكررات للمعاملة, كل مكررة ١٠ كتكوت). كل المجاميع تم تربيتهم تحت نفس الظروف الصحية ونفس ظروف الرعاية وغذيت الطيور على عليقة نامية تحتوى على ١٩.٥٦٪ بروتين خام, ٢٨٥٦ كيلو كالورى طاقة ممثلة لكل كجم و٣.٦٥٪ ألياف خام. وكانت الجرعات المستخدمة من السينبيوتيكس للكتاكيت عمر يوم مرة واحدة كالتالي: ١- الكونترول بدون أي إضافات. ٢- الرش بـ ٠.٢٥ مل سينبيوتيكس (٥×١٠ ^{٧} CFU) مرة واحدة. ٣- الرش بـ ٠.٥٠ مل سينبيوتيكس (٥×١٠ ^{٨} CFU) مرة واحدة. ٤- الإضافة في ماء الشرب بـ ٠.٢٥ مل سينبيوتيكس (٥×١٠ ^{٧} CFU) مرة واحدة. ٥- الإضافة في ماء الشرب بـ ٠.٥٠ مل سينبيوتيكس (٥×١٠ ^{٨} CFU) مرة واحدة. ٦- التقطير في الفم بـ ٠.٢٥ مل سينبيوتيكس (٥×١٠ ^{٧} CFU) مرة واحدة. ٧- التقطير في الفم بـ ٠.٥٠ مل سينبيوتيكس (٥×١٠ ^{٨} CFU) مرة واحدة. عند الأسبوع ١٦ تم اختيار ٣ طيور من كل معاملة للذبح لتقدير صفات الذبيحة ووزن الأعضاء الليمفاوية. أكدت النتائج أن وزن الجسم, وزن الجسم المكتسب, الغذاء المأكول, معدل التحويل الغذائي ومعدل الحيوية اختلفت معنويا ($P \leq 0.01$) عند استخدام السينبيوتيكس في ماء الشرب مقارنة بالكنترول والمعاملات الأخرى. ومع ذلك, صفات الذبيحة ووزن الأعضاء الليمفاوية لم تتأثر معنويا ($P \geq 0.05$) بالمعاملات ولكن استخدام السينبيوتيكس عن طريق التقطير في الفم بمستوى ٠.٢٥ مل أظهر زيادة معنوية في وزن الطحال عن الكنترول والمعاملات الأخرى.