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RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Effects of different levels of symbiotic, TechnoMos on broilers performance

Mohammad Reza Sojoudi[1], Mohammad Dadashbeiki[2], Mehrdad Bouyeh[1]

[1]Department of Animal Science, Rasht Branch, Islamic Azad University, Rasht, Iran
[2]Department of Veterinary Science, Rasht Branch, Islamic Azad University, Rasht, Iran

Abstract

This experiment was designed to evaluate the effects of different levels (0.1, 1.5, 0.2 and 0.25%) of probiotics (TechnoMos) in broilers (Ross 308). A total of 200 day old broiler chicks were divided into five treatments groups in a completely randomized design. One group served as a control while other groups were fed different levels of prebiotics. The results showed that total feed intake (TFI), total consumed energy (TCE) and total consumed protein (TCP) were significantly high in 0.1% prebiotics treated groups. Significant increase weight gain (WG) was found during 5th week in 0.25% probiotics fed group. Similarly, feed intake (FI), mean consumed energy (MCE) and consumed protein (CP) were significantly high in all treated groups particularly in 0.1% probiotics supplemented group during 1st to 4th week and also in starter and grower phases. The results indicated that 0.1% of TechnoMos had the most favourable effect on chicks' performance.

Keywords: prebiotics; performance; feed efficiency; production

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Introduction

Among the several growth stimulants, antibiotics are widely known in the world. Antibiotics were used for the first time by Moor et al. (1946) in the broiler chicks' diet to increase their growth. Using antibiotics as growth stimulants improve body weight gain, feed conversion ratio and reduces mortality (Moor et al., 1946). Beside positive effects, antibiotics have negative effects such as resistance to pathogen bacteria (Sinovec et al., 2005). Antibiotics have been prohibited in poultry nutrition in the European Union and many other countries since 2006 (Botsoglu and Fletouris, 2001). The ban on antibiotics not only resulted in decline in feed efficiency but also higher rate of mortality and disease prevalence in flocks (Huyghebaert, 2003). To find appropriate alternative as growth stimulant seemed to be necessary to restore poultry production (Panda et al., 2001).

Today additives like probiotics and prebiotics are being used as growth stimulants. These compounds have beneficial effects on gut's microflora and increase performance in animal (Zareh Zhahneh et al., 2007). Probiotics can have direct effects, never the lees, most of their effects are indirect by producing metabolites including short chain fatty acids, lactate, polyamines and bacteriocins (Collins, 1999) or production of volatile fatty acids like acetate, propionate, butyrate, lactate and some gases like carbon dioxide, methane and hydrogen (Jenkins, 1999). Prebiotics, TechnoMos, is an active biological substance which is derived from *Saccharomyces cerevisiae* and contains effective compounds such as b-1, 3-glucan and mannan oligosaccharides (Biochem, 2009). This research was designed to study the effects of prebiotics 'TechnoMos' in broiler chicks.

Materials and Methods

A total of 200 one day old broiler chicks (Ross 308) were divided into five treatments (4 replicates) by completely randomized design in a window sided house with controlled ventilation and temperature. The experiment lasted for 42 days. The

Corresponding author: Mohammad Reza Sojoudi, Department of Animal Science, Rasht Branch, Islamic Azad University, Rasht, Iran

treatments in this experiment included:
Treatment 1: basic diet with 0.1% of prebiotics TechnoMos
Treatment 2: basic diet with 0.15% of prebiotics TechnoMos
Treatment 3: basic diet with 0.2% of prebiotics TechnoMos
Treatment 4: basic diet with 0.25% of prebiotics TechnoMos
Treatment 5: basic diet without prebiotics (control)

Experimental diets for three periods (starter, growth and finisher) were designed according to the recommendation of Ross 308 broiler chicks guide (catalogue). Composition of consuming food and compost for starter, growth and final periods are shown in tables 1 and 2. Water was available *ad libitum*.

Table 1: Composition of basal diet

Ingredient	Starter	Grower	Finisher
Corn (%)	54.5	58.5	62.7
Soybean (%)	37.5	33.5	29.5
Sunflower oil (%)	4	4	4
Calcium carbonate (%)	1.2	1.2	1.1
Dicalcium phosphate (%)	1.6	1.5	1.5
Common salt (%)	0.23	0.26	0.25
Mineral mix (%)	0.3	0.3	0.3
Vitamin mix (%)	0.3	0.3	0.3
Baking soda (%)	0.12	0.14	0.1
DL-Metionine (%)	0.18	0.21	0.15
L-Lysine (%)	0.07	0.09	0.1
Total (%)	100	100	100

Table 2: Nutrients Analysis of used diets during experimental periods

Ingredient	Starter	Grower	Finisher
Energy (kcal/kg)	3010	3050	3100
Protein (%)	21.04	19.60	18.18
Lysine (%)	1.27	1.10	0.97
Met+Cys (%)	0.94	0.84	0.76
Methionine (%)	0.47	0.42	0.36
Arginine (%)	1.31	1.14	1.02
Tryptophan (%)	0.20	0.18	0.16
Calcium (%)	1.05	0.90	0.85
Available Phosphorus (%)	0.5	0.45	0.42
Magnesium (%)	0.05	0.06	0.05
Sodium (%)	21.04	19.60	18.18
Chloride (%)	0.17	0.17	0.16
Potassium (%)	0.5	0.40	0.40
Copper (mg/kg)	16	16	18
Iodine (mg/kg)	1.25	1.25	1.25
Iron (mg/kg)	40	40	40
Manganese (mg/kg)	120	120	120
Selenium (mg/kg)	0.3	0.30	0.30
Zinc (mg/kg)	100	100	100
Vitamin A (IU/kg)	11000	9000	9000
Vitamin E (IU/kg)	75	50	50
Vitamin K (mg/kg)	3	3	2
Vitamin B12 (mg/kg)	0.016	0.016	0.010
Vitamin B2 (mg/kg)	8	6	5

In each experimental unit, feed intake and body weight gain were measured on weekly basis as well as in starter, grower and finisher periods. Feed conversion ratio for the desirable time in the rearing period was calculated by this formula:

Feed conversion ratio = feed intake in the total period/ Increase of weight in the total period

The amount of metabolizable energy (ME) was calculated from the amount of the feed intake and by proportion for each treatment repetition in each week and each period. The ME efficiency shows the amount of necessary kilocalorie to produce 1 gram of live weight and was calculated by this formula:

The ME efficiency = The average ME in the total period/The average weight at the end of period

The amount of the protein intake was calculated from the feed intake and by proportion for each treatment's repetition in each week and each period.

The protein efficiency shows the necessary amount of protein to produce 1gram of live weight and was calculated by this formula:

Protein efficiency = The average protein intake ÷ The average weight at the end of the period

Production index = Insolubility percent × Average weight ÷ The days of rearing × conversion ratio ÷ 10

Statistical Analysis

This experiment was done in a complete random pattern. Data was statistically analyzed by the SPSS software and the averages were compared with each other by Duncan Test at 0.05 level.

Results

Live weights (LW), total weight gain (TWG), feed conversion ratio (FCR), total feed intake (TFI) total consumed energy (TCE), production index, protein efficiency (PE) and total consumed protein (TCP) of control and treated groups are given in Table 3. Total feed intake (TFI), total consumed energy (TCE) and total consumed protein (TCP) were significantly high in 0.1% prebiotics treated groups (Table 3). Significant increase in weight gain (WG) was found during 5th week in 0.25% probiotics fed group (Table 4). Similarly, feed intake (FI), mean consumed energy (MCE) and consumed protein (CP) were significantly high in all treated groups particularly in 0.1% probiotics supplemented group during 1st to 4th week and also in starter and grower phases (Table 5-7).

Discussion

In the previous reports, feeding prebiotics has caused improvement in feed intake in broilers. Sabouni

Table 3: Mean ± SE of live weights (LW), total weight gain (TWG), feed conversion ratio (FCR), total feed intake (TFI), total consumed energy (TCE), production index, protein efficiency (PE) and total consumed protein (TCP) of control and treated groups

Treatments	LW (gm)	TWG (gm)	FCR	TFI (gm)	TCE (kcal)	PI	PE	TCP (gm)
0.1% Prebiotics	2421.25 ±91.43^{a}	1946.85 ±105.82^{a}	2.41 ±0.10^{a}	4682.57 ±54.52^{a}	14401.58 ±168.91^{a}	11115.41 ±125.04^{a}	21.81 ±1.00^{a}	89.14 ±0.97^{a}
0.15% Prebiotics	2288.75 ±62.29^{a}	1867.42 ±85.08^{a}	2.37 ±0.05^{a}	4423.22 ±118.80^{a}	13605.71 ±367.01^{a}	10000.66 ±535.43^{ab}	22.02 ±0.55^{a}	84.68 ±2.09^{ab}
0.20% Prebiotics	2517.50 ±119.10^{a}	1814.20 ±95.00^{a}	2.47 ±0.08^{a}	4460.37 ±74.03^{a}	13719.08 ±228.02^{a}	10349.70 ±344.43^{ab}	21.23 ±0.79^{a}	85.32 ±1.27^{ab}
0.25% Prebiotics	2422.50 ±61.11^{a}	1954.80 ±63.25^{a}	2.30 ±0.08^{a}	4498.95 ±55.45^{a}	13836.02 ±170.71^{a}	10682.37 ±136.49^{ab}	22.74 ±0.79^{a}	85.97 ±0.97^{a}
Control	2337.50 ±80.99^{a}	1841.20 ±95.89^{a}	2.23 ±0.14^{a}	4092.25 ±179.13^{b}	12600.79 ±545.51^{b}	9716.03 ±430.20^{b}	22.88 ±1.04^{a}	80.45 ±2.17^{b}

Table 4: Mean ± SE weight gain (WG) of control and experimental broilers at different stages

Treatment	1st Week WG (gm/week)	2nd Week WG (gm/week)	3rd Week WG (gm/week)	4th Week WG (gm/week)	5th Week WG (gm/week)	6th Week WG (gm/week)	Starter WG (gm)	Grower WG (gm)	Finisher WG (gm)
0.1% Prebiotics	86.60 ±1.58^{a}	259.37 ±4.43^{a}	278.45 ±10.12^{a}	346.37 ±11.41^{a}	511.72 ±27.75^{b}	464.32 ±82.57^{a}	179.65 ±3.08^{a}	791.05 ±20.24^{a}	976.05 ±86.82^{a}
0.15% Prebiotics	83.27 ±1.21^{a}	242.75 ±7.48^{a}	265.07 ±17.60^{a}	344.75 ±33.42^{a}	528.92 ±12.54^{b}	402.70 ±53.35^{a}	170.35 ±3.80^{a}	765.40 ±32.34^{a}	931.62 ±60.36^{a}
0.2% Prebiotics	88.97 ±3.22^{a}	253.60 ±9.01^{a}	242.97 ±25.84^{a}	342.62 ±12.97^{a}	494.10 ±28.46^{b}	391.95 ±39.62^{a}	179.92 ±6.45^{a}	748.15 ±43.44^{a}	886.05 ±52.02^{a}
0.25 % Prebiotics	88.72 ±2.86^{a}	253.70 ±6.13^{a}	257.20 ±13.01^{a}	357.30 ±26.83^{a}	610.62 ±17.86^{a}	388.25 ±36.76^{a}	178.75 ±5.03^{a}	777.07 ±30.92^{a}	998.87 ±35.77^{a}
Control	79.95 ±4.70^{a}	236.35 ±10.53^{a}	215.32 ±42.41^{a}	393.05 ±11.69^{a}	465.37 ±36.31^{b}	451.15 ±22.63^{a}	164.72 ±8.17^{a}	759.85 ±55.67^{a}	916.52 ±33.58^{a}

Means in each column followed by the same letters are not significantly different at $P<0.05$

Table 5: Mean ± SE feed intake (FI) of control and experimental broilers at different stages

Treatment	1st Week FI (gm/week)	2nd Week FI (gm/week)	3rd Week FI (gm/week)	4th Week FI (gm/week)	5th Week FI (gm/week)	6th Week FI (gm/week)	Starter FI (gm)	Grower FI (gm)	Finisher FI (gm)
0.1% Prebiotics	126.45 ±5.59^{a}	380.75 ±3.14^{a}	615.72 ±12.31^{a}	967.20 ±17.37^{a}	1188.90 ±25.67^{a}	1403.60 ±30.60^{a}	249.80 ±4.62^{a}	1840.27 ±29.87^{a}	2592.50 ±56.27^{a}
0.15% Prebiotics	114.85 ±2.30^{ab}	361.95 ±5.80^{a}	586.47 ±28.29^{a}	883.65 ±39.49^{a}	1130.27 ±54.99^{a}	1346.12 ±62.00^{a}	227.67 ±3.67^{b}	1719.15 ±71.35^{a}	2476.40 ±116.95^{a}
0.2% Prebiotics	122.02 ±1.77^{ab}	364.35 ±3.16^{a}	597.15 ±15.51^{a}	891.00 ±15.32^{a}	1134.30 ±23.13^{a}	1351.60 ±23.26^{a}	235.65 ±2.33^{ab}	1738.82 ±29.77^{a}	2485.90 ±46.34^{a}
0.25 % Prebiotics	124.12 ±3.43^{ab}	374.70 ±3.90^{a}	608.72 ±8.66^{a}	912.22 ±17.11^{a}	1132.07 ±18.81^{a}	1347.17 ±18.81^{a}	245.72 ±3.18^{ab}	1773.97 ±26.52^{a}	2479.25 ±37.62^{a}
Control	113.00 ±3.67^{b}	285.40 ±41.42^{b}	398.32 ±78.70^{b}	744.40 ±81.00^{b}	1168.35 ±28.75^{a}	1382.85 ±31.54^{a}	206.75 ±11.75^{c}	1334.30 ±186.70^{b}	2551.20 ±60.28^{a}

Means in each column followed by the same letters are not significantly different at $P<0.05$

Table 6: Mean ± SE consumed mtabolizable energy (CME) of control and experimental broilers at different stages

Treatment	1st Week CME (kcal/week)	2nd Week CME (kcal/week)	3rd Week CME (kcal/week)	4th Week CME (kcal/week)	5th Week CME (kcal/week)	6th Week CME (kcal/week)	Starter CME (kcal)	Grower CME (kcal)	Finisher CME (kcal)
0.1% Prebiotics	380.61 ±16.82^{a}	1156.29 ±9.53^{a}	1877.95 ±37.57^{a}	2949.95 ±52.99^{a}	3685.59 ±79.58^{a}	4351.16 ±94.86^{a}	83.17 ±2.64^{a}	83.17 ±2.64^{a}	83.17 ±2.64^{a}
0.15% Prebiotics	345.69 ±6.93^{ab}	1099.30 ±17.61^{a}	1788.74 ±86.31^{a}	2695.13 ±120.46^{a}	3503.85 ±170.47^{a}	4172.98 ±192.22^{a}	83.17 ±2.64^{b}	83.17 ±2.64^{a}	83.17 ±2.64^{a}
0.2% Prebiotics	367.29 ±5.34^{ab}	1106.64 ±9.58^{a}	1821.30 ±47.33^{a}	2717.54 ±46.72^{a}	3516.33 ±71.71^{a}	4189.96 ±72.13^{a}	83.17 ±2.64a^{b}	83.17 ±2.64^{a}	83.17 ±2.64^{a}
0.25 % Prebiotics	373.59 ±10.35^{ab}	1137.83 ±11.81^{a}	1856.61 ±26.43^{a}	2782.28 ±52.19^{a}	3509.43 ±58.31^{a}	4176.24 ±58.31^{a}	83.17 ±2.64a^{b}	83.17 ±2.64^{a}	83.17 ±2.64^{a}
Control	340.12± 11.07^{b}	866.63 ±125.79^{b}	1214.89 ±240.04^{b}	2270.41 ±247.05^{b}	3621.88 ±89.13^{a}	4286.83 ±97.78^{a}	83.17 ±2.64^{c}	83.17 ±2.64^{b}	83.17 ±2.64^{a}

Means in each column followed by the same letters are not significantly different at $P<0.05$

Table 7: Mean ± SE consumed protein (CP) of control and experimental broilers at different stages

Treatment	1st Week CP (gm/week)	2nd Week CP (gm/week)	3rd Week CP (gm/week)	4th Week CP (gm/week)	5th Week CP (gm/week)	6th Week CP (gm/week)	Starter CP (gm)	Grower CP (gm)	Finisher CP (gm)
0.1% Prebiotics	2.16 ±0.11[a]	7.64 ±0.06[a]	12.06 ±0. 24[a]	19.64 ±0.21[a]	21.61 ±0.46[a]	25.51 ±0.55[a]	5.25 ±0. 09[a]	36.75 ±0.47[a]	47.13 ±1.02[a]
0.15% Prebiotics	2. 41 ±0.04[ab]	7.25 ±0.11[a]	11.49 ±0.55[a]	18.49 ±0.55[b]	20.54 ±1.00[a]	24.47 ±1.12[a]	4.79 ±0.07[b]	34.87 ±1.17[a]	45.02 ±2. 12[a]
0.2% Prebiotics	2.56 ±0.03[ab]	7.30 ±0.06[a]	11.70 ±0.30[a]	18.55 ±0.18[b]	20.62 ±0.42[a]	24.57 ±0.42[a]	4.95 ±0.04[ab]	35.16 ±0.48[a]	45.19 ±0.84[a]
0.25 % Prebiotics	2.61 ±0.0 7[ab]	7.51 ±0.07[a]	11.93 ±0.17[a]	18.84 ±0.18[ab]	20.58 ±0.34[a]	24.49 ±0.34[a]	5.17 ±0.08[ab]	35.73 ±0.38[a]	45.17 ±0.68[a]
Control	2.73 ±0.07[b]	5.72 ±0.83[b]	7.80 ±1.54[b]	18.16 ±0.27[b]	21.24 ±0.52[a]	25.14 ±0.57[a]	4.35 ±0.24[c]	29.72 ±2.07[b]	46.38 ±1.09[a]

Means in each column followed by the same letters are not significantly different at P<0.05

et al. (2010) found that adding prebiotics had significant effect on feed intake (P<0.05). Similarly, Konca et al. (2009), Onifade et al. (1999), Kumprechtova et al. (2000), Santin et al. (2001) and Celk and Ozturcan (2001) found improvement in feed intake when prebiotics was added into the feed of the broilers. The results of this experiment agreed with the findings of Waldroup et al. (2003) and Baurhoo et al. (2007) who found no significant effect on FCR and BWG after adding mannan oligosaccharides into the broilers feed. Hog (2004) showed that adding 0.2 percent of mannan oligosaccharide improved BWG and FCR.

Gut microflora changes actively by adding prebiotics and significantly reduces gut's pH which improves chicks performance through influencing gut microbial population (Rahmani and Speer, 2005). Prebiotics increase useful microorganism (Spring et al., 2000) and improves bird's immunity (Shashidhara and Devegowda, 2003). Consequently, improves body weight gain in the total rearing period (Parks et al., 2001). Hooge (2004) reported that positive effects of mannan oligosaccharides on chicks' performance could be more visible during stressful, high temperature, high density and week management conditions.

Prebiotics are potential alimentary supplements which reduce harmful effects of putrefactive factors and increases nutrition output (Fooks and Gibson, 2002). When the bird's digestion system is infected by pathogen bacteria, lymphocytes aggregate in that position and mucosa layer's thickness increases, thus absorbance of nutrients reduces (Gunal et al., 2006). So prebiotics consumption is effective on feed intake and improvement of production through reducing pathogen bacteria population. Also it has been reported that using prebiotics increases nutrient absorbance area via increasing gut length and thus improves bird's performance (Santin et al., 2001).

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References

Abrishami, M.H., Khaksar Zareha, V., Kermanshahi, H. and Pilevar, M. 2010. Study of Different Levels Prebiotics (Fermacto®) and Probiotic (cecal cultured) Effects on Growth Performance, Microbial Population of Digestive System in Broiler. Proceeding of 4th Congress on Animal Science. Pp: 699-702.

Ashayerizadeh, A., Dabiri, N., Mir Zade, K.H. and Ashayerizadeh, A. 2010. Comparison effect of antibiotic probiotic and prebiotics on performance responses and hematological indices of broiler chicken on their 42st day of life. Proceeding of 4th Congress on Animal Science. Pp: 786-789.

Bashtani, M., Zeinali, H., Naeemipour, H., Karimi Torshizi, M.A. and Farhangfar, H. 2010. Competition of growth in broiler chicks fed with probiotic and/or prebiotics on Gompertz non linear function. Proceeding of 4th Congress on Animal Science. Pp: 496-499.

Baurhoo, B., Phillip, L. and Ruiz-Feria, C.A. 2007. Effects of purified lignin and mannan oligosaccharides on intestinal integrity and microbial populations in the ceca and litter of broiler chickens. *Poultry Science*, 86: 1070-1078.

Botsoglu, N.A. and Fletouris, D.J. 2001. Drug resistant in foods. Pharmacology, Food Safety and Analysis. NewYork, Marcel Dekker, Inc. Pp:541-548.

Celk, K., Del, M. and Ozturcan, A. 2001. The effect of Saccharomyces cerevisiae and flavomycin on broiler growth performance. *Pakistan journal of Biological Science*, 4(11): 1415-1417.

Collins, M.D. and Gibson, G.R. 1999. Probiotics, prebiotics, and synbiotics: approaches for modulating the microbialecology of the gut. *American Journal of Clinical Nutrition*, 69(1): 1042S–1057S.

Esteve-Garcia, E., Brufau, J., Perez-vendrell, A., Miquel, A. and Duven, K. 1997. Bioefficacy of Enzyme Preparations Containing b-Glucanase and Xylanase Activities in Broiler Diets Based on

Barley or Wheat, in Combination with Flavomycin. *Poultry Science*, 76: 1728-1737.

Fooks, L.J. and Gibson, G.R. 2002. Probiotics as modulators of the gut flora. *British Journal Nutrition*, 88(1): 39-49.

Gunal, M., Yayli, G., Kaya, O., Karahan, N. and Sulak, O. 2006. The effects of Antibiotic growth promoter, probiotic or organic acid supplementation on performance, intestinal microflora and tissue of broiler. *International Journal of Poultry Science*, 5: 149-155.

Hamidi, M.S. 2005. Management and economic breeding of ostrich in Iran. Sepehr publication. 2:116.

Huyghebaert, G. 2003. Replacement of antibiotics in poultry. Eastern Nutrition Conference. Pp: 55-78.

Hooge, D. 2004. Meta-analysis of broiler chicken pen trials evaluating dietary mannan oligosaccharide, 1993-2003. *International Journal of Poultry Science,* 3(3): 163-174.

Jenkins, D.J.A., Kendall, C.W.C. and Vuksan, V. 1999. Inulin, oligofructose and intestinal function. *Journal Nutrition*, 129: 1431S–1433S.

Jouybari, S., Goli, S. and Rezaei, N. 2010. Effect of Dietary Prebiotics, Probiotic, Organic Acid, and Antibiotic Supplementation to Diets on Performance and ileal population of lactobacillus in broiler. The 4th Congress on Animal Science. Pp:1033-1036.

Konca, Y., Kirkpinar, F. and Mert, S. 2009. Effects of Mannan-oligosaccharides and Live Yeast in Diets on the Carcass, Cut Yields, Meat Composition and Colour of Finishing Turkeys. *Asian-Australian Journal of Animal Science,* 22(4): 550-556

Kumprechtova, D.K., Zobac, P. and Kumprecht, I. 2000. The effect of Saccharomyces cerevisiae sc47 on chicken broiler derformance and nitrogen output. *Czech Animal Science*, 45: 169–177.

Moor, P.R., Evension, A., Lucky, T.D. and Hart, E.B. 1946. Use of sulfasuxidine, stretothricin and streptomycin in nutritional studies with chick. *Journal Biological Chemistry*, 165: 437-441.

Mosenthin, R. and Bauer, E. 2000. The potential use of prebiotics in pig nutrition. *Asian-Australia Journal of Animal Science*, 13: 315-325.

Razavi, S.H., Aghdam Shahriar, H., Ebrahim Nezhad, Y., Ahmadzadeh, A., Ghaderi Jouybari, M., Goli, S. and Rezaei, N. 2010. Effect of Dietary Prebiotics, Probiotic, Organic Acid, and Antibiotic Supplementation to Diets on Performance and ileal population of *lactobacillus* in broiler. Proceeding of 4th Congress on Animal Science. Pp: 1033-1036.

Sabooni, S., Eila, N., Salehi, M. and Gholamhoseini, B. 2010. Effects of Dietary Probiotic (Primalac) and Aspergillus Meal Prebiotics (Fermacto) on Performance and Ileal Microbiota, Morphology of Broiler Chicks. Proceeding of 4th Congress on Animal Science. Pp: 1370- 1379.

Santin, E., Maiorka, A., Macari, M., Grecco, M., Sanchez, J.C., Okada, T.M. and Myasaka, A.M. 2001. Performance and intestinal mucosa development of broiler chickens fed diet containing Sccharomyces cerevisiae cell wall. *Journal of Applied Poultry Research*, 10: 236-244.

Shashidhara, R.G., and G. Devegowda. 2003. Effect of dietary Mannan Oligosaccharide on broiler rearing production traits and Immunolity. *Journal of Poultry Science*, 82: 1319-1325.

Shivazad, M. and Seidavi, A.R. 2006. Nutrition of the Chicken. University of Tehran press. P: 422.

Silva, L.P. and Nornberg, J.L. 2003. Prebiotics. *Brazilian Journal of Poultry Science*, 33: 983-990.

Sinovec, Z. and Markovic, R. 2005. Using Prebiotics in poultry nutrition. Biotechnology in animal husbandry. Institute for animal husbandry, Belgrade-zemun. Pp:235-239.

Spring, P., Wenk, C., Dawson, K.A. and Newman, K.E. 2000. Effect of mannan oligosaccharide on different cecal parameters and on cecal concentration on enteric bacteria in challenged broiler chicks. *Poultry Science*, 79: 205-211.

Onifade, A., Odunsi, A.A., Babatunde, G.M., Olorede, B.R. and Muma, E. 1999. Comparison of the supplemental effects of saccharomyces cervisiae and antibiotics in low-protein and high-fiber diets fed broiler chickens. *Archive Animal nutrition*, 52(1): 29-39.

Panda, A.K., Reddy, M.R. and Praharaj, N.K. 2001. Dietary supplementation of probiotic on growth, serum cholesterol and gut microflora of broilers. *Indian Journal of Animal Science*, 71(5): 488-490.

Parks, C.W., Grimes, J.L., Ferket, P.R. and Fairchild, A.S. 2001. The effect of mannanoligosaccharides, bambermycins, and virginiamycin on performance of large white male market turkeys. *Poultry Science*, 80: 718–723.

Pelicano, E.R.L., Souza, P.A., Souza, H.B.A., Leonel, F.R., Zeola, N.M.B.L. and Bioago, M.M. 2004. Productive traits of broiler chicken fed diets containing different growth promoters. *Brazilian Journal of Poultry Science*, 6: 177-182.

Pelicia, K., Mendes, A.A., Saldanha, E.S.P.B., Pizzolante, C.C., Takahashi, S.E., Moreira, J., Garcia, R.G., Quinterio, R.R., Paz, R.C.L.A. and Komiyama, C.M. 2004. Use of prebiotics and probiotics of bacterial and yeast origin for free-range broiler chickens. *Brazilian Journal of Poultry Science*, 6: 163-169.

Piray, A.H., Kermanshahi, H., Tahmasbi, A.M. and Bahrampour, J. 2007. Effects of Cecal Cultures and *Aspergillus* Meal Prebiotics (Fermacto) on Growth Performance and Organ Weights of Broiler Chickens. *International Journal of Poultry Science*, 6(5): 340-344.

Waldroup, P.W., C.A. Fritts and F. Yan. 2003. Utilization of biomos mannan oligosaccharide and Bioplex1 cooper in broiler diets. *International Journal of Poultry Science*, 2: 44-52.

Willis, W.L., Isikhuemhen, O.S. and Ibrahim, A. 2007. Performance assessment of broiler chickens given mushroom extract alone or in combination with probiotic. *Poultry Science*, 86: 1856-1860.

Yeo, J. and Kim, K. 1997. Effect of feeding diets containing an antibiotic, a probiotic, or Yucca extract on growth and intestinal urease activity in broiler chicks. *Poultry Science*, 76: 381-385.

Zare Shahneh, A., Shawrang, P. and Sadeghi, A.A. 2007. Biotechnology animal sciences. Aeeizh publication. P: 224.

Zulkifli, I., Abdullah, N., Azrin, N.M. and Ho, Y.M. 2000. Growth performance and Immunole response of two commercial broiler strains fed diets containing Lactobacillus cultures and oxytetracycline under heat stress conditions. *British Poultry Science*, 41: 593-597.