THE EFFECTS OF SUPPLEMENTATION OF EFFECTIVE MICROORGANISMS ON EGG PRODUCTION TRAITS, QUALITY PARAMETERS AND CHEMICAL ANALYSIS DURING THE LATE LAYING PERIOD IN HENS

M. H. El-Deep, K. Amber* and M. A. M. Sayed

Animal Prod. Inst. Agric. Res..Center , Ministry of Agric, Egypt.
Poultry Production Dept, Faculty of Agric, Kafr El-Sheikh Univ, Egypt.*

SUMMARY

The effects of effective microorganisms (EM) on the Egg production traits, Egg quality and egg chemical analysis of layers were studied. Five hundred and fourty Inshas layers (a local Egyptian chicken strain) were randomly divided into 6 groups with 90 layers in each group. Layers in group 1 were fed a control diet. The remaining groups received the control diet that contained 2.5, 5.0, 7.5 or 10.0 ml of EM/ kg, and 20 mg of zinc bacitracin/kg respectively. The obtained results clarified improvements in egg production (Egg number and Egg mass/ hen) and Egg quality (($P < 0.01$) of ayers when EM was added to the diets. The results also showed that, egg yolk cholesterol was significantly decreased in chicks that fed diets with different levels of EM as compared with the control diet , while egg protein percentage was significantly ($p \leq 0.05$) increased in birds fed diets with different levels of EM.

INTRODUCTION

The poultry industry has become an important economic activity in many countries. In large-scale rearing facilities, where poultry are exposed to stressful conditions, problems related to diseases and deterioration of environmental conditions often occur and result in serious economic losses. Prevention and control of diseases have led during recent decades to a substantial increase in the use of veterinary medicines. However, the utility of antimicrobial agents as a preventive measure has been questioned, given extensive documentation of the evolution of antimicrobial resistance among pathogenic bacteria. So, the possibility of antibiotics ceasing to be used as growth stimulants for poultry and the concern about the side-effects of their use as therapeutic agents has produced a climate in which both consumer and manufacturer are looking for alternatives. Probiotics are being considered to fill this gap and already some farmers are using them in preference to antibiotics [1].

Effective Micro-organisms (EM) is a microbial preparation developed by Professor T. Higa of University Of The Ryukyus in Japan. The EM is composed of different microbes that include bacteria, yeasts and/or fungi. Some of the benefits claimed to accrue from the use of EM include improved meat and manure quality, improved animal health, reduction of foul smells and absence of toxic effects on bird growth [2]. Increased egg production and egg weight and improvements in gross margins by up to 28.5 % have also been reported [2]. Use of EM in Africa is a new innovation and novel idea. There is no available literature regarding use of microbial preparations in broiler production.Therefore, this experiments was designed to investigate the possibility of using probiotic namely, (EM) effective microorganism (instead of using antibiotics) to Inshas chickens (Egyptian local strain) , and to evaluate its effects on egg production trats, quality parameters and chemical analysis of egg.

MATERIAL AND METHODS

A total number of 540 unsexed vaccinated Inshas (local Egyptian chicken strain) one day-old-chicks were weighed , wing banded and randomly divided into six experimental groups (three replicates each group) . The birds were placed in a room (floor pens) maintained at a constant temperature of 28+/-3 oC and a relative humidity of 70+/-3% .Food and water were always available *ad libtum* . The basal diet was formulated to meet the nutrient needs suggested by the NRC, 1994. Total cholesterol content was determined by colorimetric cholesterol assay according to [3]. Eggs were collected and recorded daily. Egg production was expressed as hen-day production The eggs were weighed (nearest gram)daily and immediately after collection **.** At the last week in the experiment, 30 eggs from each replicate were collected for egg quality analysis. This was measured according to the next formula presented by [4].The experimental design consisted of six dietary treatments as follows; (T1) Basal diet (control), (T2) Basal diet + EM (2.5 ml/kg diet), (T3) Basal diet + EM (5.0 ml/kg diet), (T4) Basal diet + EM (7.5 ml/kg diet), (T5) Basal diet + EM (10.0 ml/kg diet) and (T6) Basal diet + Zinc bactracin (500 mg/kg).. The results obtained were statistically analyzed using Duncan's Multiple Range Test {17}. Statements of statistical significance are based on $P<0.05$.

RESULTS AND DISCUSSION

Egg production performance

Egg Production traits: It is generally observed that laying rate of Inshas hens was low during the first 90 day Fig (1) as compared to laying rates of commercial strain.The addition of EM with different levels and Zinc bactracin improved (P ≤0.001) egg number during laying period . Egg number was significantly increased by 28% in the hens fed T5 diet as compared with control diet. There are no significant differences between T5, T4, T3 and T2 diets. Egg mass /hen value for all treatments are shown in Table (10) .Since variations in average egg weight were not as great as those of egg number, so it was logic to find that egg mass results are closely related to the records of egg number .The highest values were found in the hens fed T5, T4, and T3 diets followed by those fedT2 and T6 diets.

Egg quality: Data presented in Fig (2) show of the effect of the different dietary treatments on some egg quality traits. It is clearly evident that feeding birds on diets supplemented with different levels of EM and Zinc bactracin significantly affected on egg quality traits.This improvement may attribute to produce lactic acid which alters pH of chickens gut making it improper media for harmful bacteria such as *salmonella* and pathogenic species of *E.coli* [5], improve nutrient availability and absorption [6], produce specific antibacterial compounds such as hydrogenperoxide [7] and compete with other microbes for adhesive sites [8]. In addition, dietary supplementation of yeast during heat stress caused egg production than control as reported by [9].

Egg chemical analysis

Egg cholesterol: Egg yolk cholesterol was significantly decreased in chicks fed diets containing different levels of EM as compared with the control diet Fig (3). Generally, it could be seen that yolk cholesterol was decreased (P ≤0.001) by 32.3 % as the level of EM increased from 0 to 10 ml / kg in the diets. These results are in agreement with, [2] .This reduction may be explained as mentioned by [10] who attributed that to these bacteria and presume that, this type of bacteria convert feed cholesterol to coprostanol, which is absorbed poorly by gastrointestinal tract. However, some lactobacillus have a direct effect on cholesterol levels by assimilation and removed from the growth medium [11]. Also, similar trend was obtained by [12] with Gimmizah and Matourh strains and [13] who reported that a significant decrease in total cholesterol and insignificant decrease in total lipids at 6 weeks of age with adding lacto sacc and yea sacc in Japanese quail diet. Also, [14] found that the addition of lactobacillus acidophilus culture significantly reduced the levels of serum cholesterol.

Egg protein: Results obtained showed that egg protein percentage was significantly (p≤0.05) increased in birds fed diets with different levels of EM. The highest values of egg protein was observed in chicks fed T5 diet followed by T4 diet followed by T3 diet and also, T2 diet . While, the lowest values was found in chicks fed control or T6 diets.Statistical analysis of the results obtained proved that EM addition to chick diets significantly increased the egg protein more than Zinc bacitracin supplemention.

The increases in the previous parameters may indicate that an enhancement of immunity occurred corresponding to feeding either probiotics, prebiotics or both synbiotics as a result of improving feed conversion, absorption and utilization of nutrients. Similarly, [12] with Gimmizah and Mandarh strains and [13] with Japanese quail reported that addition of microbial probiotic caused higher level of plasma total protein as well as albumin and globulin fractions than those of control group it is lead to increase the protein in egg.

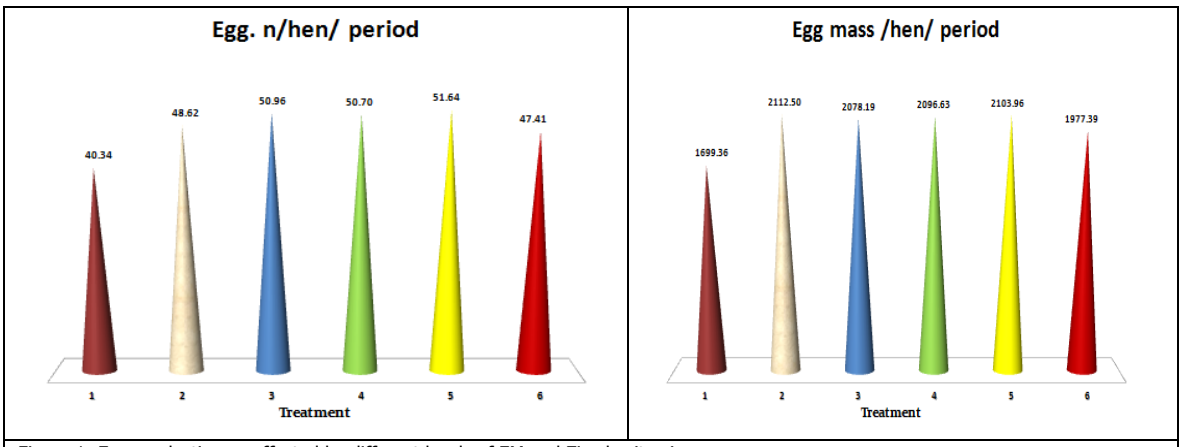

Figure 1: Egg production as affected by different levels of EM and Zinc bacitracin.

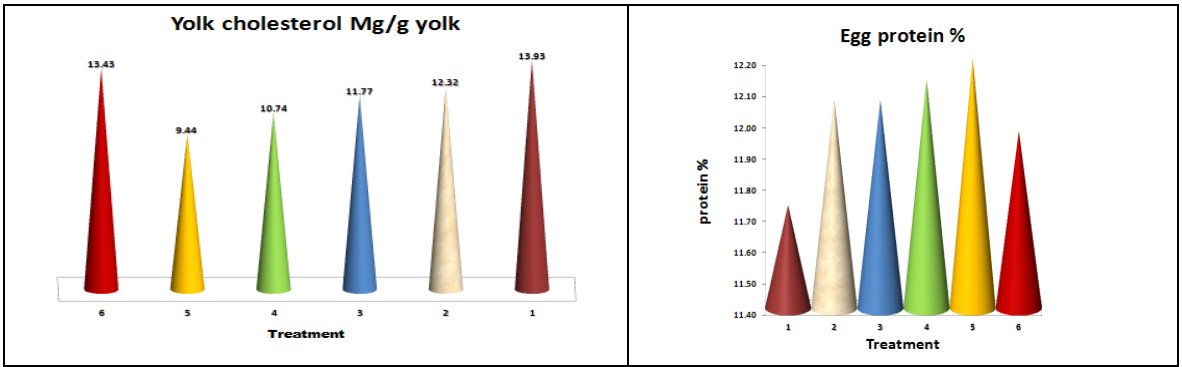

Figure 2: Egg chemical analysis of chicks as affected by different levels of EM and Zinc bacitracin.

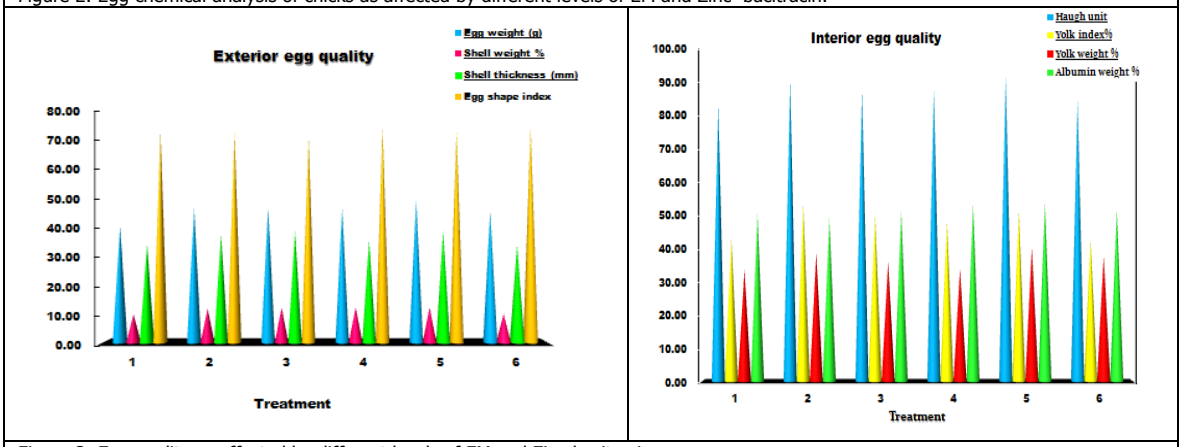

Figure 3: Egg quality as affected by different levels of EM and Zinc bacitracin.

REFERENCES

1. **Nava, G.M.; Bielke, L.R.; Callaway, T.R.; Castaëda, M.P. (2005):** Probiotic alternatives to reduce gastrointestinal infections: The poultry experience. Animal Health Res. Rev. **6**:105-118.
2. **Zhang, X.; Lou-Hua, Li-JianLiang.; Xie-DongXia, Xu-Jin.; Huo-CuiMei, Cui-YanShun. (2007):** A study on the benefit of feeding Hy-line white egg with fermented feed. Southwest-China-Journal-of-Agricultural-Sciences. **20**(3): 529-533.
3. **Watson, D. (1960):** Method for determination of cholesterol. Clin. Chem.. Acta. **5** : 637.
4. **Washburn, K. W.; Nix, D. F. (1974):** A rapid technique for extraction of yolk cholesterol. Poultry scince . **53**: 1118-1122.
5. **Leesson, S.; Major, D. (1990).** As biotechnology grains momentum Canadian researchers study need for feed criteria. Feed stuffs. **62**: 23–30.
6. **Zeweil, H. S.; Ahmed, M. H.; Zetitoun, M. A.; El-Sheikh, H. M.(2007):** Effect of probiotic supplementation to broiler diets on performance, carcass and sensory evaluation. XVIII European Symposium on the Quality of poultry Meat , September 2-5/ 2007, prague, The Czech Republik.
7. **Collins, E.B.; Aramaki, K. (1980):** Production of hydrogen peroxide lactobacillus acidophilus. J. Dairy Sci. **63** : 353 – 357.
8. Dunham, H. J., C. William, F. W. Eden, I. A. Casa, and W.F. Dobrogoz. 1993 . Lactobacillus reutei immunodulation of stressor-associated Disease in newly hatched chickens and turkeys. Poult. Sci. **72**:103 (Abstr.).
9. **Tollba, A. A. H.; El-Nagar, A. H. I. (2008):** Increasing stocking density of Egyption laying hens by using: 1- antioxidants and live yeast. Egypt. Poult. Sci. **28**:575-598.
10. **Tortuero, A.; Bres, A.; Rioperez, J. (1975):** The influence of intestinal (caeca) flora on serum and egg yolk cholesterol levels in laying hens. Poult. Sci. **54** : 1935 – 1943
11. **Fuller, R. (1989):** Probiotics in man and animals. J Appl Bacteriol **66**: 365–378.
12. **Sayed, M.A.M.; Abou Khashaba, H.A.; Ibrahim, M.A. Nofal, M. E. (2003):** Effect of using probiotic on local strains performance. Egypt. Poult.Sci. **23**: 259-282.
13. **Abd El-Azeem, F. (2002):** Digeston, Neomycin and yeast supplementation in broiler diets under Egyptian summer conditions. Egypt. Poult. Sci. **22**: 23– 257.
14. **Haddadin, M. S. Y.; Abdulrahim, S. M.; Hashlamoun, E. A. R.; Robinson, R. K. (1996):** The effect of *Lactobacillus acidophilus* on the production and chemical composition of hen's eggs. Poult. Sci. **75**:491–494.