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Effect of Effective Microorganisms (EM®) on the Growth Parameters of Fayoumi and Horro Chicken

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Abstract: The study was conducted to determine growth promoter effects of Effective Microorganisms (EM) on Horro and Fayoumi chickens. This study was conducted at Agricultural Research Center and National Veterinary Institute (Debre Zeit). A total of 450 chickens (225 from each breed) were used in this study. Birds were grouped according to treatment groups: EM-treated (with feed, with water, with feed and water) and non-treated (only SRBC treated and Non-EM, Non-SRBC) controls. EM was given daily from the 3rd week of age for 5 weeks. Daily feed intake and weekly body weight measurements were made. The finding shows that: (1) EM supplementation had no observable effect on mortality, weight gain and FCR in both breeds but Fayoumi had inherently higher body weight than Horro. This study did not consider the cellular arm of the immune response and EM response to infections with specific pathogens was not investigated, collectively demanding further research in these and other issues if EM has to be used as good feed additive.

Key words: Effective microorganism, Horro, Fayoumi, growth parameters, hummoral response

INTRODUCTION

Poultry rearing is considered to create rural employment, improve nutritional status of the people, generate family incomes and play a significant role in the social, cultural and religions lives of the society (Tadelle and Ogle, 2001; Halima *et al*., 2009). Despite the huge population and though poultry meat and eggs could be affordable sources of animal protein, the per capita egg and chicken meat consumption in Ethiopia are very low. Major problems in poultry production systems in this regard are disease, low nutrition, poor management and poor genetic performance (Tadelle and Ogle, 2001; Halima *et al*., 2009).

Available experimental data show that our indigenous birds have limited genetic capacity for both egg and meat production (Negussie, 1999). However, local chickens have several invaluable characteristics appropriate to traditional low input/low output farming systems, which are not found in any exotic breed. These allow them make the best use of locally available resources, hatch their own eggs, brood their offsprings and tolerate, at least to some extent, the common local poultry diseases (Tadelle, 2003).

Studies in other areas have already shown that the use of probiotics and Effective microorganisms could improve growth parameters: feed intake, weight gain, feed conversion ratio in Broilers (Chantsawang and Watcharangkul, 1999; ZuAnon *et al*., 1998; Patidar and Prajapati, 1999; Ergun *et al*., 2000; Kumprechtova *et al*., 2000; Safalaoh, 2006; Jagdish and Sen, 1993; Alvarez *et al*., 1994; Silva *et al*., 2000; Vicente *et al*., 2007; Higgins *et al*., 2007). But there are also studies which indicated that use of Probiotics and Effective Microorganisms did not bring positive or significant effect in broilers (Vicente *et al*., 2007; Samanta and Biswas, 1995; Gohain and Sapcota, 1998; Panda *et al*., 2000; Ergun *et al*., 2000; Mohit *et al*., 2007; Ahmad, 2004) with respect to growth parameters and mortality. This study was therefore conducted to study the effect of Effective Microorganisms on the growth parameters and mortality of Horro and Fayoumi chickens.

MATERIALS AND METHODS

Study animals: 500 fresh and clean eggs of less than 7 days were selected from each of the parental groups (Fayoumi and Local Horro) and incubated. The eggs were hatched at the facility of the center strictly following standard hatchery practices. After the hatching, the chicks were checked for presence of any physical deformity that might later on affect the performance of the birds.

Housing and feeding of experimental chicks: All chicks were randomly assigned to experimental pens and reared in floor pens filled with hay as litter material with a density of 6 birds/meters square. The feed were formulated using appropriate feed formulation computer software (Feed-win). The birds were provided with a starter feed and water *ad libitum* till 8 weeks of age (end of experimental study). Standard bio-security protocol was employed throughout the experimental period; however, the chicks were not vaccinated for any of the prevalent diseases.

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Supplementation of effective microorganisms (EM®): The different EM preparations used in this study were made following the guidelines prepared by EM research organization (EMROSA, 2003). Birds were provided with EM with feed, with water or with feed and water daily starting from the age of 3 weeks till the end of the experiment (week 8). For this, 1% EM-Bokashi in feed was made for EM with feed, 0.1% EM-activated solution in water for EM in water and half of the above concentrations for EM supplemented in both feed and water. Control groups (F-NT-C, F-SRBC, H-NT-C and H-SRBC) did not receive EM.

Growth parameters and mortality: Data on the weight gain, feed intake, feed conversion ratio and mortality of chickens were weekly recorded starting from the 4th week of age till the end of the experiment. Body weight was taken by weighing birds of the same replication together and the average was taken as the weight of the group. Feed intake was determined by subtracting the weight of feed refused from that of feed offered for each replication and the average was taken for the group. Feed conversion ratio was determined as the ratio of the amount of feed consumed per weight gain. Mortality was recorded as it occurred.

Statistical analysis and model: The parameters including body weight gain, feed conversion ratio were monitored. All data were analyzed by ANOVA with the repeated model mixed procedure of SAS software (2000) and compared by least square means. Significance of observed mortality was tasted by chi-square statistics. Least square means were considered statistically different at $p<0.05$.

RESULTS

Growth parameters

Mortality: Mortality of Fayoumi and Horro chickens was recorded throughout the experimental period. There was no significant difference between breeds, between EM-treated and Non-treated controls and between the different modes of EM supplementation for each breed (Table 1).

Weight gain and FCR: The initial weight of chicks on week 4 (immediately before SRBC treatment) varied between individuals in different groups and the two breeds. Therefore, weight gain is presented by subtracting week 4 weight from measurements registered each week after SRBC treatment. Accordingly, in all treated and control groups weight gains show a general linear pattern (Fig. 1). The Fayoumi breed demonstrated significantly higher weight gain than the Horro for both treated and control groups ($p<0.05$). At week 8 (end of the experiment), supplementation of EM with water caused significantly lower weight gain than controls and other EM modes of supplementation in both breeds at $p<0.05$. On the other hand, the Feed Conversion Ratio (FCR) showed no regular pattern and no significant variation between groups and between breeds was seen (Data not shown).

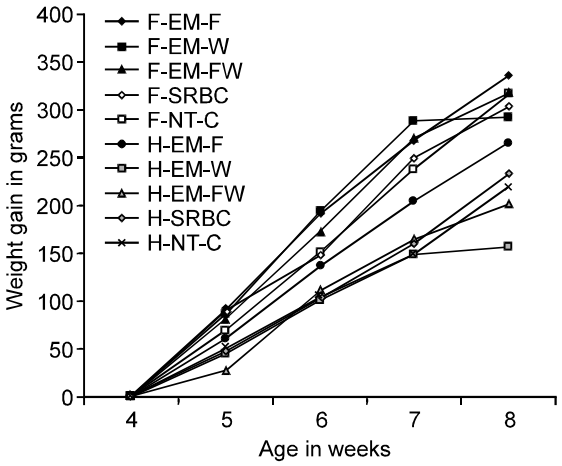

Fig. 1: Weekly weight gains (in grams) taking weight at week 4 as reference. Fayoumi (F) and Horro (H) chicken groups supplemented with EM in feed (EM-F), in water (EM-W), in feed and water (EM-FW), non-treated control (C) and SRBC groups are compared

Table 1: Experimental groups of Fayoumi and Horro chickens with different modes of EM treatment. Each group is composed of three replications of 15 birds

Group	No. animal/group	NAS	wk 3	wk 4	wk 5	wk 6	wk 7	wk 8
F-EM-F	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
F-EM-W	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
F-EM-FW	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
F-SRBC	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
F-NT-C	45	10	Serum	Serum	Serum	Serum	Serum	Serum
H-EM-F	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
H-EM-W	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
H-EM-FW	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
H-SRBC	45	10	Serum	Serum, SRBC	Serum	Serum, SRBC	Serum	Serum
H-NT-C	45	10	Serum	Serum	Serum	Serum	Serum	Serum

F-EM-F = Fayoumi given EM in feed (*3), F-EM-W = Fayoumi given EM in water (*3), F-EM-FW = Fayoumi given EM in both feed and water (*3), F-SRBC = Fayoumi SRBC treated control (*3), F-NT-C = Fayoumi non-treated control (*3), H-EM-F = Horro given EM in feed (*3), H-EM-W = Horro given EM in water (*3), H-EM-FW = Horro given EM in both feed and water (*3), H-NT-C = Horro non-treated control (*3), H-SRBC = Horro SRBC treated control (*3). NAS = No. Animal Sampled

Table 2: Total observed mortality of Fayoumi and Horro chicken in different groups during the experimental period (week 4-8)

Group	No. chicks/group	No. of birds died
F-EM-F	45	2
F-EM-W	45	2
F-EM-FW	45	1
F-SRBC	45	6
F-NT-C	45	5
H-EM-F	45	4
H-EM-W	45	3
H-EM-FW	45	4
H-SRBC	45	6
H-NT-C	45	4

DISCUSSION

Effect of EM on growth parameters: The mortality rate was not improved after EM supplementation in both Fayoumi and Horro and breed difference was not significant. In agreement with our finding, Yoruk *et al.* (2004) found that mortality of hens fed with control diet was not different from those fed probiotic diets. During our study period, there was no outbreak of any known disease in which the effect of EM could have been tasted to arrive at a definitive conclusion. Therefore, it is only possible to say that it did not significantly reduce the effects of unidentified causes of mortality during the study period. On the contrary, other studies have shown that probiotics significantly reduced mortality in chickens (Vicente *et al.*, 2007), *Salmonella* colonization in one day-old broiler chicks (Higgins *et al.*, 2007) and mortality in turkeys (Vicente *et al.*, 2007). The duration of the study may be one of many factors that may have caused differences between the results of ours and others. Recently, in a study in turkey poults with idiopathic diarrhea conducted by Higgins *et al.* (2007), administration of three doses of this probiotic culture was reported to improve body weight gain similar to the response obtained with therapeutic. Throughout the study period, Fayoumi chicks had higher gain in terms of weight than the Horro chicks. This was true both between treated groups and between control groups. Therefore, it seems that the difference between the two breeds is governed by inherent factors rather than due to the application of EM. The FCR was measured as the ratio of the amount of feed consumed per weight gain. There was no observable variation or appreciable pattern for FCR between breeds, between treatment groups within a breed and between EM treated and non-treated groups. Therefore, it appears that EM has little effect on FCR as both breeds have similar FCR at least during the early periods of their development. Feed conversion ratio as affected by probiotics is the subject of controversy. Similar to the present findings, several previous works suggested that supplementation of probiotics does not influence feed conversion ratio significantly or no such effect on FCR (Samanta and Biswas, 1995; Gohain and Sapcota, 1998; Panda *et al.*, 2000; Ergun *et al.*, 2000; Mohit *et al.*, 2007; Ahmad, 2004). Similarly supplementation of probiotics had no effect on the performance of broiler chicks (ZuAnon *et al.*, 1998; Patidar and Prajapati, 1999; Ergun *et al.*, 2000; Kumprechtova *et al.*, 2000). On the other hand, there are reports which state that EM fed birds had significantly higher weight gain and lower FCR than Non-EM groups (Safalaoh, 2006; Jagdish and Sen, 1993; Alvarez *et al.*, 1994; Silva *et al.*, 2000). EM supplementation had little effect on growth parameters such as weight gain, mortality and FCR. The difference in weight gain between Fyoumi and Horro appear to be due to breed difference rather than due to an EM effect. However, this study was conducted with limited number of chicks and with relatively young birds (less than two months of age). Therefore, to arrive at better understanding and conclusion on the role of EM and its future utilization in poultry farming the following points need to be addressed in future researches. As a novel area of research in our country, the findings of the present study are encouraging. However, it needs to be strengthened by similar works that involve large number of animals for prolonged period of time so that more plausible conclusion could be drawn for its future application in animal farms.

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