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Studies on the Effects of Reducing the Period of Using Starter Mesh and Application of Probiotics to Broiler Chickens

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Abstract: Two sets of 150 day old broiler chickens were fed with starter mesh for 14 and 21 days respectively and there after given grower mesh until day 35 after which both were fed on finisher until day 42. There was no significant difference in the final carcass mass of both ($p>0.05$). Another trial was set up to investigate the effect of application of probiotics as liquid and as powder on 2500 birds per treatment and a control with no probiotics was also set up. The results showed that probiotics applied as liquid had the best effect on PEF and FCR. The experiment to determine the best time to apply probiotics was conducted on 2000 birds per treatment. The results showed that the best performance was obtained when application of probiotics was started at 14 days The PEF was also highest on birds which started probiotics on day 14.

Key words: Broiler, probiotics, feed starter mesh, grower mesh

INTRODUCTION

Poultry is one of the major sources of animal protein for man today and as a result there has been efforts to maximize production by selecting breeds that have high efficiency, at the same time developing feed formulas that hasten growth (Saleh *et al.*, 1996; Nyachoti *et al.*, 1996; Okumura and Emmans, 1990). As has been established in human studies diseases such as hypertension, gout, diabetes, arthrosclerosis and others have been exacerbated by diet changes (Djarova *et al.*, 2006). Similarly changes in the diet of broilers has brought new challenges on the physiology of these birds (Julian *et al.*, 1992). Probiotics such as lactozym favorably alter the intestinal microflora balance, inhibit the growth of harmful bacteria, promote good digestion, boost immune function and increase resistance to infection. Livestock with flourishing intestinal colonies of beneficial bacteria are better equipped to fight the growth of disease-causing bacteria. More specifically Lactobacilli and bifidobacteria maintain a healthy balance of intestinal flora by producing organic compounds-such as lactic acid, hydrogen peroxide, and acetic acid that increase the acidity of the intestine and inhibit the reproduction of many harmful bacteria (Abdulrahim, 1999; Bird, 1968; Bunyan *et al.*, 1977; Dutta and Devriese, 1982). Probiotic bacteria also produce substances called bacteriocins, which act as natural antibiotics to kill undesirable microorganisms (Bird, 1968; Bunyan *et al.*, 1977).

Since the start of the modern broiler industry, feed efficiency has been one of the major criteria used in defining the performance of broiler chickens. In North America, feed efficiency is described as feed intake:

weight gain. In Europe, the calculation is usually reversed, being described as weight gain: feed intake. What ever system is used, the idea is to obtain a measure of how efficiently the feed is being utilized, which is obviously of economical importance because feed represents about 65% of total cost of production (Moss and Trenholm, 1987; North, 1972; Esteve-Garcia *et al.*, 1997; Salsbury and Williams, 1975; Even, 1998). Feed is used by the bird for two basic reasons, namely for growth and for maintenance. In young birds most feed is used for growth and little is used for maintenance and so efficiency is very good. Over time efficiency deteriorates because the broiler has an ever-increasing body mass to maintain (Nyachoti *et al.*, 1996; Saleh *et al.*, 1996; Leeson and Caston, 1996a; Page, 2003). Over the years we have seen a steady improvement in feed efficiency from around 2.2 in the early 1960's to 1.75 today under certain situations. This continually improving situation is due to improved genetic potential and the fact that more feed is directed towards growth (and less for maintenance) as days to market decline (Leeson and Caston, 1996a; Page, 2003; Goerzen *et al.*, 1996; Leeson and Caston, 1996b). Performance efficiency factor is used by some poultry producers as it takes into account the liveability of the birds which is affected by the environment.

The aim of this study was to determine how effective, altered feed period with starter mesh and probiotics were on the performance of broilers.

MATERIALS AND METHODS

All the birds used for the experiments were healthy, kept under high hygiene and vaccinated and dewormed to

remove interference from pathogens. Feed was administered as follows starter mesh for three weeks except where specified; growers mesh for three weeks and finisher for one week. Fresh water and feed were provided daily *ad libitum*. Results obtained were subjected to a statistical evaluation with the two-way analysis of Variance and Student's t test to examine statistical significance of differences in performance between the controls and the birds on treatment. All experiment were conducted on a commercial farm North of Bulawayo.

Experiment 1: This was set up to investigate the effects of feeding starter mesh for 14 days and 21 days on broiler performance. One hundred and fifty birds were used for each group. The birds on starter mesh for 14 days were thereafter given grower mesh and then finisher on the last week. Growth curves were based on the mass of 15 randomly selected birds for each group taken weekly.

Experiment 2: This was set up to investigate the effect administering a commercially constituted probiotic called lactosym to day old broiler chicks as powder and in liquid form. This was done daily for the entire life of the birds. A group of birds had no probiotics included in their diet and these were used as the control. Each treatment was performed on 2500 birds. Performance parameters such as live weights, mortality and feed intake were measured. Growth curves were based on the mass of 100 randomly selected birds for each group taken weekly.

Experiment 3: This was set up to investigate the effects of feeding lactosym at different stages on broiler performance. Lactosym was administered in water. The first set of birds received lactosym from the first day of life. The second lot received lactosym for the first time after 14 days of life. The third lot received lactosym for the first time after 28 days of life The birds used as controls received no lactosym. Each treatment was performed on 2000 birds. Performance parameters like live weights, mortality and feed intake were measured. Growth curves were based on the mass of 100 randomly selected birds for each group taken weekly.

RESULTS

Experiment 1: Performance parameters for birds fed on starter mesh for 14 days and 21 days are shown on Table 1. The growth curves of the same bird measured weekly are in Fig. 1. There was no significant difference in growth and performance parameters ($p>0.05$).

Experiment 2: The birds that received lactosym in water had the highest production efficiency factor of 212, followed by birds in feed that had 207 and then the control at 125. Other growth and performance parameters are shown in Table 1. During the trial there

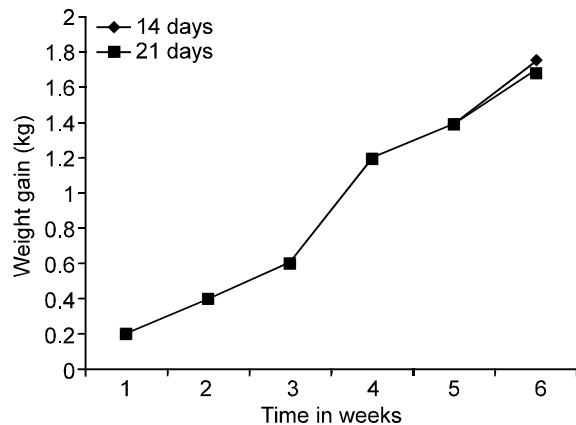


Fig. 1: Changes in average mass of 150 chickens, one lot fed on starter mesh for 14 days and the other lot receiving starter mesh for 21 days. The starter mesh is more expensive than grower mesh

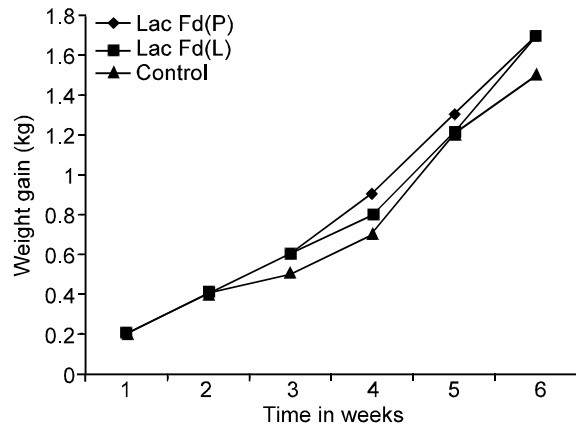


Fig. 2: Changes in average mass of 2000 chickens per batch one lot fed on lactosym as powder Lac fd (P) another one on lactosym as liquid Lac fd (L) and the other lot receiving no lactosym (control)

was an out break of *Mycoplasma* and *E coli* the birds that received lactosym showed some resistance to infections while the control developed respiratory symptoms caused by these organisms. The growth curves of the birds measured weekly are in Fig. 2.

Experiment 3: Lactosym when administered in water at one day, 14 days and 28 days old chicks, the best performance was obtained at day 14 of application where the performance efficiency factor was 221. At day 28 PEF was 216 at day 1 it was 213 where as in the control birds the PEF was 209.

DISCUSSION

Feeding broiler chicken with starter mesh for 21 days followed by feeding with grower for two weeks and finisher for one week is a tradition established over many decades whose origin and advantages can no

Table 1: Summary performance parameters obtained for various treatments. Batches whose trial were at different times have different control experiments

	Initial weight	Final weight	Weight gain	Feed intake	FCR	PEF	Mot-Cum	n	Time
Experiment 1									
Starter for 14 days	0.16±0.02	1.76±0.05	1.6±0.09	2.94±0.1	1.67±0.07	248±3.03	1.31	150	42
Starter for 21 days	0.15±0.02	1.74±0.06	1.59±0.09	2.94±0.1	1.69±0.16	240±2.91	1.96	150	42
Experiment 2									
Lac in feed(P)	0.12±0.03	1.81±0.03	1.69±0.1	3.73±0.2	2.06±0.07	207±2.75	2.30	2500	42
Lac in feed(L)	0.13±0.02	1.82±0.06	1.70±0.1	3.62±0.09	1.99±0.10	212±2.72	2.52	2500	42
*Control	0.13±0.03	1.61±0.07	1.48±0.07	4.73±0.2	2.94±0.10	125±2.65	3.9	2500	42
Experiment 3									
Lac to 1 DOC	0.12±0.02	1.78±0.07	1.66±0.09	3.42±0.4	1.92±0.09	213±2.13	3.19	2000	42
Lac to 14 DOC	0.13±0.02	1.8±0.09	1.67±0.09	3.38±0.3	1.88±0.08	221±2.83	2.89	2000	42
Lac to 28 DOC	0.12±0.03	1.74±0.06	1.62±0.08	3.22±0.2	1.85±0.08	217±2.81	3.19	2000	42
**Control	0.12±0.02	1.74±0.05	1.62±0.06	3.36±0.3	1.93±0.07	209±2.76	2.25	2000	42

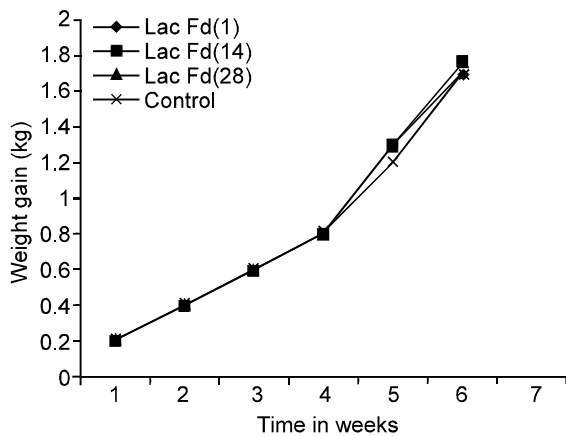


Fig. 3: Changes in average mass of 2000 chickens per batch, one lot fed on lactosym as liquid Lac fd (1) from day one another lot started on lactosym as liquid on day 14 Lac fd (14). another lot started on lactosym as liquid on day 28 Lac fd (28) and the other lot receiving no lactosym (control)

longer be accurately traced (Saleh *et al.*, 1996; Salsbury and Williams, 1975). Since the inception of broiler industries, the machinery for grinding and mixing feed have changed for the better. The genetic make up of the birds has improved through careful selection of properties that confer physiological advantages. Feed holding utensils and water dispensing systems have also greatly improved. The hygiene of poultry farmers and precautions against diseases have also greatly improved (Saleh *et al.*, 1996; Leeson and Caston, 1996b; Nyachoti *et al.*, 1996). The above developments call for a revision and reevaluation of our feed profiles in light of the birds we are handling whose properties have significantly altered. Our results showed that there was no significant difference between birds fed with starter mesh for 21 days and those fed for 14 days. This tallies with studies done earlier where it was found that feed period could be reduced by 7 days and still achieve maximum growth at 33 days instead of the traditional 42 days (Leeson and Caston, 1996b; Nyachoti *et al.*, 1996;

Even, 1998). The only problem highlighted by Lesson (2008) was that of the skeleton not being sufficiently developed to allow processing of the chickens. The cost of starter mesh is more expensive and cutting it by week and replacing it with grower is of great financial advantage to the farmer.

The genetic and consequently the physiological properties of the current birds could have contributed to feed period alteration by 7 days having no significant difference on the final mass achieved.

Administration of probiotics is better as liquid than powder. This is in agreement with others who have pointed out that dust such as powder are likely to trigger respiratory complications in some birds which may affect liveability (Swart, 1988; Foster, 1972; Griffin, 1979). Birds on probiotics had a higher PEF which is consistent with other studies (Abdulrahim, 1999; Dutta and Devriese, 1982; Foster, 1972; Page, 2003). The resistance to mycoplasma and *E. coli* outbreaks while it was not planned for was an indicator that application of probiotics is an added advantage to large scale poultry farmers.

Broiler day old chicks start life at one day with a GIT that is sterile, the volume and digestive surface area are not fully developed. Fermentative digestion can not begin at that time (Bird, 1968; Bunyan *et al.*, 1977; Abdulrahim, 1999). The pH of the gut is changing with growth. This is the most likely reason probiotics in this study were effective after day 14. Application of probiotics at day 28 is also too late as at that time most digestive systems have reached maturity and stability. This explains why application of probiotics at 28 days has no significant changes during our experiments.

Nutrition is a key element in broiler production. It is only with an adequate knowledge of nutrient requirements and supplements at each growth stage of the broiler that the correct formulations and supplements can be developed.

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