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A Comparative Economic Analysis of Mash and Pelleted Feed in Broiler Production under Deep Litter Housing System

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Abstract: The study examined the economic effects of using mash and pelleted feed on Cobb 500 broilers. Two treatments, comprising 120 broilers were conducted under similar environmental conditions over a period of 4 months. Data on weight gain, feed quantities consumed, feed wastage as well variable costs such as feed and labour costs was collected using document analysis and direct observations. Analytical tools used included ANOVA, comparative gross margin analysis and t-tests. The study found out that there was no significant difference in terms of growth rate during the early stages of growth up to 32 days for birds fed on mash and those fed on pellets. However significant differences in growth rate were noted from 32 to 42 days. No significant difference was noted in the gross margins between pellet and mash fed birds. The study recommends that either mash or pelleted feed can be used depending on the farmer's preferences.

Key words: Cobb 500, pellets, mash, gross margins

Introduction

The intermittent droughts characterizing most tropical countries pose challenges for the poultry industry given that feeds are mostly derived from crops such as maize, sorghum and other grain crops. As a consequence, feed ingredients need to be acquired from distant supply areas and this has resulted in problem of high cost of feed. Nyoupayou (1990) argued that the high cost of feeds is an important problem affecting smallholder broiler production in Africa because of inadequate financial resources.

About 75% of the costs of production in raising or maintaining broilers are attributed to feed costs with three-fourths of this cost being allotted to maintenance needs and the remainder for productive purposes (Nyoupayou, 1990). This is a true fact experienced by many producers in Zimbabwe. The increase in feed costs has also negatively affected broiler production in Zimbabwe causing it to drop by 20% from year 2001 to 2003 (Mutetwa, 2001).

Researches have been undertaken since the 1930s on ways of enhancing feed efficiency, such that growth rate may be improved to boost up broiler meat yield. Trials have been done using pelleted and mash feed to find out the most efficient form of feed that yields high growth rate and reduced production cost. The question of the best form of feed that can yield high productivity remains unanswered. The evidence that about 60% of all the broiler projects being undertaken in Zimbabwe, are using mash feed, and 40% pelleted feed, provides a gap for research in assessing the most economic form of feed that can yield high profits (Mutetwa, 2001).

Mash feed is obtained by grinding feed ingredients using a hammer mill into very fine particles. Whereas

pelleted feed is that form of feed that has been grounded and then compressed into pellets (McDonald *et al.*, 1987). Research shows that pelleted feed improves feed efficiency but it is not clear whether there is a significant impact on profitability (McDonald, 1987).

Problem statement: High costs of feed emanating from the volatility in the macro environment and general unavailability of feeds, has resulted in declining productivity and profitability for intensive broiler production systems. This scenario has resulted in supply bottlenecks forcing an upsurge in the price of broiler products in Zimbabwe.

Given the central importance that feeds play in intensive broiler systems, it becomes imperative to identify least cost feed options for the farmer. Thus the crux of the matter in this study was to ascertain the economic effects of exposing broilers to the same type of feed in terms of Crude Protein (CP) content but administered in pelleted and mash forms.

Main objective: The main objective of the study was to determine the most economic form of feed which gives the highest returns per dollar invested.

Studies on effect of feed form (mash vs. pellets) on broiler performance: Many researches have been carried out on improving feed intake using mash and pelleted feed. In some reported experiments, variation in the texture of feed brought about differences in performance of broiler. Mutetwa (2001) observed that feed intake increased as particle size increased resulting in increased growth of birds.

They concluded that pelleted feed is consumed readily

and easily than mash feed. Mash feed tends to stick to the inside of the chicken's beak, resulting in a fall in food intake and consequently reduced rate of growth (McDonald, 1987).

In another study, Mutetwa (2001) reported that there was no significant difference in terms of growth and feed consumed between birds fed on mash and pellets during the first two weeks. However, when the chickens were two to three weeks of age, they tended to be selective in feeding by consuming 40 % more of hard textured feed than mash feed.

Similar results were reported by Banerjee (1987) that feed intake is stimulated by granulation of the feed. Birds fed on pellets consumed their feed in a shorter time than birds fed on mash.

Studies on cost and benefits of mash and pelleted feed on broiler production: According to Hoffman (1963), valuing benefits and costs of pellets and mash feed is important because it assists in deciding on which resource is worth conserving and investing in. In analyzing the costs and benefits of each feed form, they showed that mash was the cheapest method of feeding compounded rations when considered in terms of price per tonne.

Banerjee (1987), showed that pelleted feed resulted in 7% increase in revenue compared to mash feed.

Materials and Methods

Description of the study site: The study was carried out at Irvine's Day Old Chicks Company that is located about 10km from Harare City Center. Irvine's Company is an Agribusiness firm located in natural region 2 of Zimbabwe. It is one of the major poultry companies in Zimbabwe. The company supplies its products to most parts of the country and regional countries like Botswana, Malawi, Zambia and Democratic Republic of Congo (DRC).

Sampling procedure: A sample of 120 birds was drawn from a population of 400 Cobb 500 broilers. Cobb 500 was used since it is the breed available at Irvine's. Two treatments with 2 replicates were used for the analysis. The first replicate was conducted in September 2004 while the second was conducted in December 2004. Birds were exposed to the same environmental conditions and automated feeders were used.

Data collection: Data was collected from company records through document analysis and direct observations from treatments 1 and 2.

Data on price of feed ingredients, feed consumed, labour costs, transport cost, wastages costs, handling costs was collected from the Income and Expenditure statements.

Data analysis: Two way Analysis of variance, gross margin analysis and the t-test were used as analytical tools for the study.

Results

Mean weights: The graph (Fig. 1) shows that from day old up to day 32 there is no significant difference ($p < 0.05$) in growth rate between birds fed on pellets and those fed mash feed. However, after day 32, birds fed on pellets showed a higher growth rate than those fed on mash up to the day of slaughter (day 42).

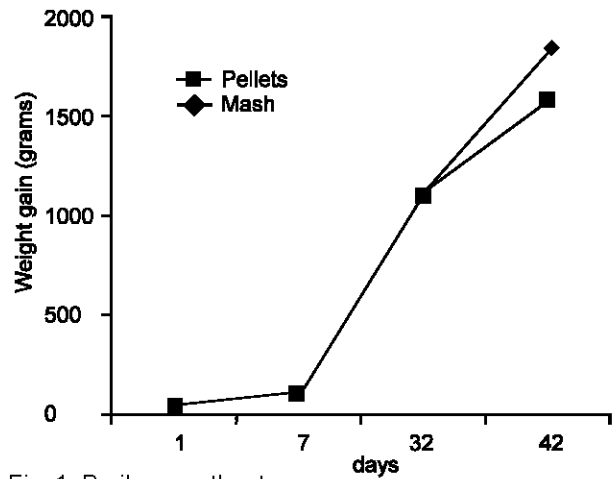


Fig. 1: Broiler growth rate

Analysis of variance: The results from Analysis of Variance (ANOVA) as shown in Table 1. It shows that there is a significant variation ($p < 0.05$) in growth rate between birds fed on mash and those fed on pelleted feed. However, there is an interaction between feed form and time period, that is, from day 32 up to day 42 shown by a significant P value of (0.010).

There is no significant difference between the two treatments from day 1 to day 32.

Gross margin analysis

Feed wastages: 23% and 5% feed wastage was experienced for mash and pelleted feed respectively (Table 2).

Gross margin analysis: The returns show a mean gross margin of \$29341.44 and \$25086.23 per bird for pellet and mash fed respectively.

There is no significant difference in gross margin between birds fed on pellets and mash feed ($P < 0.05$) (Table 3).

Discussion

The study revealed that there was no significant difference in terms of growth rate for birds on pellets and mash feed up to 32 days. This is consistent with Mutetwa (2001), who found out that there is no effect on

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Table 1: Anova

Source	F	SIG (P value)
Feed form	5.793	0.027
Time	860.151	0.000
Feed form*Replicate	0.714	0.409
Feed form*Time	5.042	0.010

Table 2: Feed wastages

Feed form	Percentage loss
Pelleted feed	5
Mash	23

Table 3: Testing for significance difference means using t-test

	T	DF	Sig (2-tailed)
Gross margin-Equal variances assumed	3.717	2	0.065

weight gained resulting from pelleted and mash feed during the early stages of broiler growth. According to them this observation seems to be justified on the ground that during the early stages of the bird, the bird consumes more of mash than pelleted feed. But after attaining the age of 28 days, the birds tend to respond well to pelleted feeds as compared to mash.

This augurs well with Mutetwa (2001) who observed that feed intake increased as particle size increased resulting in increased growth rate for birds fed pellets and those fed mash feed. He also stated that feed conversion efficiency increases when pelleted feed is used instead of mash.

There was no significant difference in terms of gross margin despite there being a significant difference in final weight at the point of slaughter. This supports Nkomo (2001), who found out that there is no significant difference between mash and pelleted feed in terms of gross margin.

Conclusions and recommendations: Pelleted feed results in higher growth rate compared to mash feed though there is no significant difference between the two forms of feed in terms of economic returns to real resources.

Broiler producers can use either pelleted or mash feed since there is no significant economic gains obtained from changing from one feed form to the other.

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