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THE EFFECT OF FEED ENERGY LEVELS AND PARTICLE SIZE ON PERFORMANCE OF BROILERS IN DEVELOPING COUNTRIES UNDER FARMERS MANAGEMNT

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Key words: Farmer, feed combination, feed particle size, energy level, east-west orientation, ventilation ridge, deep litter, ascites, flip-over, fast weight gain, using mash at a cost, developing countries.

Background:
Feeding broilers is still a problem in developing countries (Adegbola, 1988). Feed takes about 65-70% of the total rearing cost (Reddy, 1996). Emphasis has been on fast weight gain without considering factors such as climatic conditions, level of farm investment and knowledge in broiler rearing at farm level. Feeds come in the form of crumbs, mash and pellet with different energy levels. Pelleting improves efficiency of chick feed utilization than mash (Heywang and Morgar, 1940). Increase in feed energy content and pelleting can overcome reduced growth rate due to heat stress (Siegel, 1997). But fast growing birds fed on high energy feed develop ascites (Lister, 1997) which can be controlled by using mash though at a cost (Dale, 1986). There is scanty data on the effect of combining different feed energy levels and particle size on meat quality, farmers' earnings, incidence of ascites and flip-over under farmer's management conditions in developing countries.

Objectives:
The objective of the study was to identify the best feeding program suitable for rearing broilers in developing countries under farmer management conditions.

Methods:
30,000-day-old Arbo Acres chicks were randomly divided into ten batches of 3,000 and placed with ten farmers. The sheds measured 100*30 feet on an East-West orientation with ventilation ridge on the roof and sides. Deep litter system with wood shavings was used. Birds were reared for six weeks and weighed weekly. Feeding and watering was adlibitum using tube feeders and chick founts/basins at a ratio of 1:50 and 1:60 respectively. Starter and finisher rations were given for twenty-one days each. The feed combinations used were Batch 1 (B1): High-energy broiler starter crumbs and high-energy broiler finisher pellets. Batch 2 (B2): High-energy broiler starter crumb and high-energy broiler finisher mash. Batch 3 (B3): High-energy broiler starter crumb and low-energy broiler finisher pellet. Batch 4 (B4): High-energy broiler starter crumb and low-energy broiler finisher mash. Batch 5 (B5): Low energy broiler starter crumbs and high-energy broiler finisher pellets. Batch 6 (B6): Low energy broiler starter crumb and high-energy broiler finisher mash. Batch 7 (B7): Low energy broiler starter crumb and low-energy broiler finisher pellet. Batch 8 (B8): Low energy broiler starter crumb and low-energy broiler finisher mash. Batch 9 (B9): Low energy broiler starter mash and low-energy broiler finisher mash. Batch 10 (B10): High-energy broiler starter mash and High-energy broiler finisher mash. Brooding was done at 30^0-32^0, 28^0-30^0 and 25^0-28^0 C. in the first, second and third weeks respectively using six charcoal stoves. All birds were vaccinated against Infectious Bronchitis (IB), New Castle Disease (NCD) and Infectious Bursal Disease (IBD) or Gomboro. IB+NCD was given through the eye on days ten and twenty-one as a combined vaccine. Gumboro was given orally on day eighteen. Dead birds with distended belly full of water, birds lying on their backs and birds with other symptoms were classified under water belly (ascites), flip-over and others respectively. Processing was done in a factory with an electric stunner, scolder set at 56^0C, mechanical plucker and a conveyor system. Humane killing was by severing the jugular vein according to Muslim faith (Halal). Birds were eviscerated manually and washed in a water chiller at 15^0C. Mortality, live weight, daily weight gain, feed conversion ratio (F.C.R); breast muscle output and profitability were used to evaluate performance. The experiment was based on a completely randomized design (ANOVA). Results however, were discussed on descriptive statistics due to the large size (3000) of the sample.

Results and discussions:

Mortality
Mortality was between 15% and 4.1% (Fig.1&2). The highest (15%) was in B1 on birds fed on all high-energy starter and finisher crumb/pellet. Combining pellet and mash gave lower mortalities in batches 2 (6.4%), 4 (4.4%), 6 (5.7%) and 8 (5.4%). Mortality on pellet was higher than mash regardless of energy level. This observation suggests the use of mash to control mortality in pelleted feed regimes which supports the findings of Dale, (1994). Mortality on pellet fed birds increased from week 4 (Fig. 1).

Ascites and flip-over
Ascites was prevalent in pellet than mash fed birds with mortality between 8.3 and 0.6% (Fig. 2). Slow growing birds fed on low energy pellets also had ascites contrary to the findings of Lubritz, (1995). The incidence of ascites in birds fed on low energy pellet can be due to high feed intake since pellets are compact. This makes birds drink excess water, which cannot be lost through the normal excretory and evaporative routes. Excess water then finds its way into the abdominal cavity. Flip-over too was common in pellet than mash fed birds. The mortality due to other diseases was between 4.4% and 1.6%.

Daily weight gain
Average live weight at cropping varied between 1679 and 980 grams and dependent on energy and particle size. This resulted in a daily weight gain between 40 and 23.3 grams (Fig. 3). High-energy and pelleted feed produced higher daily weight gain than low energy and mash. This support Farrell *et al* (1973) who found that the time required reaching a given weight was dependent on the energy level of the diet. Combining mash and pellet improved weight gain on mash fed birds.

Feed conversion ratio (FCR)
All high-energy mash (B10) gave better FCR (2.16) than all high-energy pellet (2.34) (B1). Replacing pellets in B1 with mash improved the FCR (2.24) (B2). The highest FCR (3.22) was in B7 with all low energy pellet. Replacing pellet in B7 with mash

improved FCR to 2.87 (B8). Better-feed conversion on mash ration could be attributed to both low mortality and low feed consumption (Fig. 3).

Breast meat output, Second grades, rejects and gross profit

Breast meat yield was between 16.4% and 9.2% (Fig. 3). Better yields were obtained with high energy and pelleted than with low and mash. Second grades varied between 3.8% and 0.3% while the range on reject was 7.1% and 0.1%. B9 (All low energy mash) and B1 (All high-energy pellet) produced the highest second grades and rejects. Gross profit per bird placed was between 42 and 3.50. High-energy crumb and mash (B2), all high energy mash (B10) and all high energy pellet (B1) resulted in a profit of 42, 40 and 34.9 respectively. Good performance of all mash rations may be due to the low mortality.

Conclusion:

The following conclusions can be drawn from this study. 1, Pelleted feed lead to better weight gain but higher incidence of both water belly and flip-over regardless of the energy levels. 2, Fine ground mash can be used to control both ascites and flip-over without affecting profit margins 3, Attainment of high average life weight without associated low mortality leads to reduced gross profit. 4, Mash rations can be used to circumvent the stress factors associated with rearing broilers under hot climatic conditions.

References:

Adegbola, A. A. (1988). The structure and problems of the poultry industry in developing countries in "Poultry Production Worldwide". *African Farming*. Nov/Dec. 1988. Pp. 11-13.

Dale, N. (1994). Nutrition influences ascites in broilers. *Poultry. 2* NO. 3 1986. Pp 40-43.

Farrell, D. J., Cumming, R. B. and Hardaker, J. B. (1973). The effect of dietary energy concentration on growth rate and conversion of energy to weight gain in broiler chickens. *British Poultry Science*. 14: 329-340.

Heywang, B. W. and Morgan, R. B. (1944). Comparison of a pelleted and unpelleted all mash diet for growing chickens. *Poultry Science*. 23: 16-20.

Liester, S. (1997). Broiler ascites: a veterinary viewpoint. *World Poultry Science*. Vol. 53 March, 1997. Pp 65-67.

Lubritz, (1995). An ascites overview. *Journal of Applied Poultry Research*. 3:171-178.

Reddy, C. V. (1996). Soya bean meal in poultry diets. *Poultry International*, May, 1996 :35: 5. Pp 66-70.

Siegel, S. (1997). Improving poultry production. *Poultry International*, January, 1997. Pp 60-64.

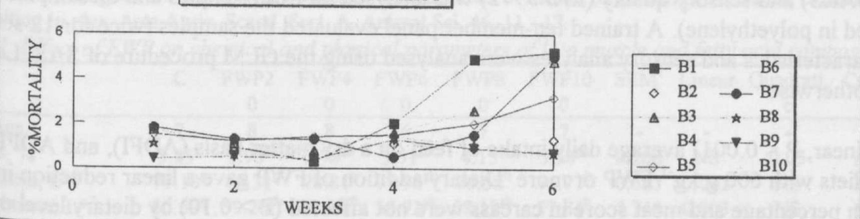

FIGURE1.WEEKLY MORTALITY

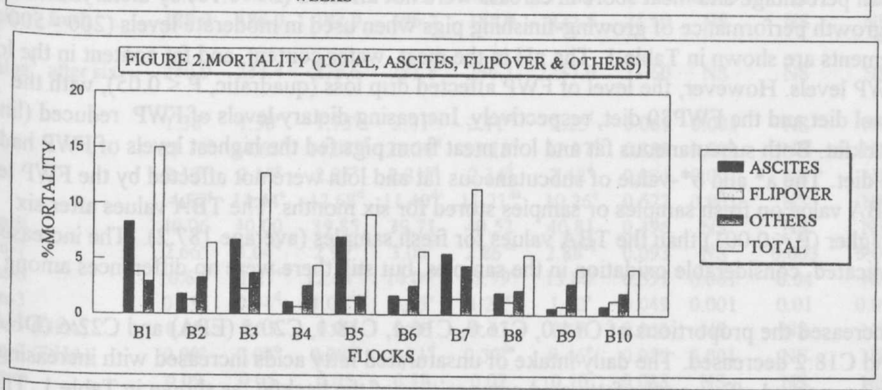

FIGURE 2.MORTALITY (TOTAL, ASCITES, FLIPOVER & OTHERS)

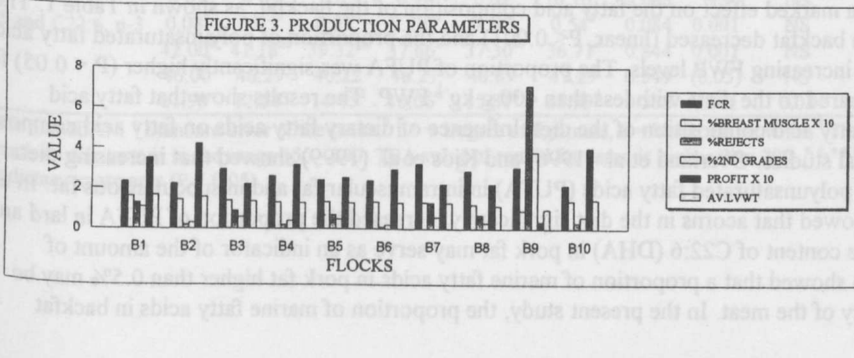

FIGURE 3. PRODUCTION PARAMETERS