Lalahan Hay. Araşt. Enst. Derg. 1988
28 (1-4) 51-59

THE INTERACTIONS BETWEEN FEED TEXTURE AND FEEDER SPACE ALLOWANCES CONSIDERING BROILERS

Yem doku ve yemlik tahsisatı arasında broiler performansı yönünden interaksiyonlar

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ÖZET

Yem dokusu ve yemlik tahsisatı arasında broiler performansı yönünden interaksiyonlar olabileceği ihtimali üzerinde literatür araştırması yapılmıştır.

Yem dokusu ve yemlik tahsisatı arasında, biri 28-56 ncı günler arasındaki dönemde ağırlık kazancında ($P<0.05$) ve diğeri 42-56 ncı günler arasındaki dönemde yem tüketiminde ($P< 0.01$) olmak üzere iki önemli interaksiyon bulunmuştur. Pellet yem yiyen piliçler piliç başına 21 mm yemlik tahsisatı ile daha iyi bir performans gösterirken, dökme toz yiyen piliçler 38 mm yemlik tahsisatı ile daha iyi bir performans göstermişlerdir.

SUMMARY

A literature review was made concerning the possibility of interactions could have been occured between feed texture and feeder space allowances on the broiler performance.

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Two significant interactions were found between feed texture and feeder, space allowances on weight gain (P<0.05) during the period of 28 to 56 days of age and on food consumption (P<0.01) during performed better with 38 mm of feeder per bird while those which received pellets performed better with 21 mm of feeder space per bird.

INTRODUCTION

Common commercial practice of the poultry industry in the developed countries is to feed the layer by mash food and the broiler by pelleted food. Pelleted ration for broiler has been shown either to improve the rate of growth or the efficiency of food conversion or both. Several researchers have repeatedlv demonstrated this superiority of the pelleted food against mash form when fed to broilers (1, 2, 4, 7).

It was reported that birds consume pellet faster than mash. Jensen et al. (3) showed that there was little difference in the feeder each day. However, the time spent at the feeder on each time varied markedly. Birds on mash spent 14.3 % of their day on the feeder while those on pellet spent only. 4.7 % As mash fed birds longer at the feeders it is conceivable that feeder space may becoma a limiting factor when compare to pellet fed birds. In the Iiterature reviewed there were no report that the possibility of a feeder space by feed texture interaction considered.

Nakaue (6) has demonstrated that when mash fed birds are subjected to an intermittent lighting treatment both food consumption and bodv weight can be significantly depressed where food intake is limited by low feeder space allowance. Similarly, while Malone et al. (5) not being able to demonstrate a lighting by feeder space interaction for weight, were able to show a significant interaction for food conversion ratio at 27 days of age thus demonstrating that an interaction could exist.

MATERIALS AND METHODS

A) Experimental Facilities And Materials

a) Housing: A house containing four blocks of equal size separated from one another by solid light proff partitions was used. Two of the blocks were on one side of the house corridor while the other two on the opposite. Each block has six small pens of equal size (2.25 x 5.25 m) separated from one onother by wire mesh partitions. So, there were altogether 24 small pens of equal size in the house.

b) Equipment: Solid hardboard chick surround 60 cm high enclosing an area of approximately 2 m^2 were placed in the centre of each pen. Fresh white wood shavings were used as litter to a depth of approximately 10 cm. The pens were fumigated with a commercial paraformaldehyde preparation (Alphagen) one day before the arrival of the chicks.

Feed was supplied from tubular feeders and water was provided continuously by one circular hanging automatic drinker in each pen. For the first ten days water was supplied from two glass jar water founts in each pen to attract chicks to drink.

Liquid petrolium gas brooders were used for brooding the chicks. The brooders were 100 cm above the chick level at day-old.

c) Stock: Day-old 2952 male broiler chicks from a commercial strain (Ross-l) were used in the experiment. The boxes of chicks were weighed on arrival. Only small non-significant differences were noted in the weight of day-old chicks. The chicks were then allocated to one of the 24 pens at random, 123 chicksto each pen.

d) Brooding Management: The brooding temperature was adjusted by chick behaviour as the chicks grew by raising the height of the brooder and enlarging the area enclosed by the surround. The pen temperature initially was about 27 °C and this was reduced to approximately 20 °C at the end of the fourth week when the brooders were turned off.

B) Experimental Method

a) Experimental Design: Three feeder space allowances and two feed texture treatments were applied at random in each block for all four blocks.

b) Experimental Treatments: Two treatmantes applied were feed texture and feeder space differences.

i) Feed Texture Treatments: For the first 14 days all birds were fed a broiler starter ration in mash form. From 14 days to 28 days one half of the six pens in each block received broiler starter pellet, while the other half of the six pens in each block continued on the Starter mash. The three small pens in each block to receive pellets were determined at random before the start of the experiment so that six small pens in each side of the house corridor were fed pelleted food and the remaining 6 were fed mash food. From the 29 the day onwards the had previously received broiler Starter mash received broiler finisher mash and the birds that had previously received broiler starter pellet were fed broiler finisher pellet.

Rations were computer formulated to include o pellet binder. Mash Formulations were derived from the original formulae by eliminating the pellet binder. Computer formulations for pelleted Starter and finisher rations and the formulae of starter and finisher rnashes derived from these computers formulated pelleted rations are presented in table 1. Metabolisable energy value of the computer formulated starter pellets and finisher pellets were 12.61 MJ/kg and 13.04 MJ/kg respectively. Laboratory analyses of the finisher mash and finisher pellets used are shown in in table 2. For Iaboratory analyses, representative food samples were taken from each bag before feeding and these were bulked, mixed thoroughly and sub sampled for routine chemical analyses to determine the percentage dry matter, crude protein, true protein, ether extract, ash and crude fibre. The gross energy content of the samples were also determined by using an adiobatic bomb calorimeter.

ii) Feeder Space Treatments: Feed was provided to all pens by means of tubular feeders. For the first 28 days all the feeder space allowances were identical being by 2 circular tubular feeders allowing in total 2.1 cm of feeder space per bird. From the twenty ninth day three different feeder space treatments were applied. Each of these feeder space treatments were allocated ot random to two of the small pens in each of the four blocks in such a way that each feeder space allowance was allocated one mash fed pen and one pellet fed pen in each block. In this manner each of the three feeder space allowances was represented within each block by two pens and mash and pellet feed was each combined with one of the three feeder space allowances within each block. The three feeder space allowances provided were 2.1 cm/bird (2 tubular feeders); 3.1 cm/bird (3 tubular feeders) and 3.8 cm/bird (4 tubular feeders of smaller circumference).

c) Data Collections: The total body weight of birds in each pan was measured at 0, 14, 28, 42 and 56 days of age. The total net Food consumption of birds in each was measured at 14, 28, 42 and 56 days of age. Average body weight gain, food consumption and food conversion ratio (g feed conumed/g body weight gain) were calculated for the birds in each pen for each two week period.

RESULTS

The interactions between feeder space by feed texture treatment relating to body weight gain and food consumption are presented in table 3 and 4 respectively. The interaction between feed texture and feeder space allowance on weight gain (table 3) for the period of 28 to 56 days of age was significant (P<0.05). Birds responded to increased feeder space by greater body weight gains when fed on mash but when feeding pellets, the response pattern was reversed with increased feeder space resulting in reduced body weight gains. The only significant differences in weight gain increases noted for mash fed birds were between groups with 21 and mm of feeder space and significant reduction in body weight gain for pellet fed birds in the 38 mm feeder space group.

An examination of table 4 reveals that the interaction effect of feed texture by feeder space allowance on food consumption for the period of 42 to 56 days of age was highly significant (P<0.01). Birds fed on mash responded to a feeder space increase with increased food consumption only when they were allowed 38 mm per bird. Food consumptionwas highest with this feeder space allowance and lowest with 31 mm feeder space. Difference between the 38 mm feeder space allowance and either of the two other (21 mm, 31 mm) feeder space allowance were significant (P<0.01).

As in the case of body weight gain (table 3) the response pattern for food consumption when feeding pellets was revesed in comparison to that of mash. With pellets highest food consumption was measured for the group having 21 mm feeder space followed by 31 mm, while the lowest consumption was measured for the 38 mm feeder space group. The differences were only significant between the groups having 21 mm and 31 mm and 21 mm and 38 mm of feeder space.

DISCUSSION

The interactions between feed tekture and feeder space allowances on both body body weight gain (P<0.05) and foodconsumption (P<0.01), are displayed in tables 3 and 4.

Between 42 and 56 days of age food consumption of mash fed birds increased when they had 38 mm per bird of feeder space rather than 21 mm or 31 mm per bird. For pellet fed birds 21 mm of feeder space per bird allowed the greatest food consumption. This interaction (table 4) between feed texture with feeder space allowances on food consumption was highly significant (P<0.01). The interaction between feed texture with feeder space on food consumption is reflected in the second observed interaction of these two factors on body weight from 28 to 56 days of age (table 3). Mash fed birds grow better as feeder space allowance is increased from 21 mm per bird to 38 mm per bird while pellet fed birds grew better when the feeder space allowance was less than 38 rnrn per bird, an interaction which attained significance (P<0.05).

One possible explanation for these interactions arises from the observations of Jensen et al. (3), that birds eat rnash more slowly than pellets. In order to eat a given quantity of food in mash form birds would need to spend more time at the feeder and in so doing possibly prevent other birds from feeding. Additionally, birds at the feeder may be disturbed by other birds trying to gain access to the feed. In both situation social conditions rnay arise when feeder space is reduced which lead to a reduction of feed intake amongst mash fed birds (table 4) and to a reduction in the rate of sody weight gain (table 3). The nature of any change in the social conditions brought about by changes in feeder space allowances could be eluicdated by behavioural studies which did not form a part of this.

It is more difficult to suggest an explanation for the hegher consumption of pellets as feeder space allowance is decreased. It may be that an element of competition has again played role, inducing them to eat as much as possible before they were pushed aside by other birds competing for feeder space. The grater speed with which pellets can be eaten allows greater quantities of pellets to be consumed under such conditions than would be the case when mash is fed.

Had feeder space allowances been further decreased in the experiment, it can be speculated that an eventual decline in food consumption and growth rate would have occurred when pellets were fed. Again behaviorural studies of birds subjected to different feeder space allowances may provide evidence to support this or possibly indicate an alternative explanation.

CONCLUSION

The significant interactions which were found between feeder space allowances with feed texture on weight gain and food consumption suggest that if performance is not to be limited, greater feeder space allowances should be provided with mash feeds than with pellets.

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Table 1- Formulation of The Starter And Finisher Rations (%)

Rew Material	Mash		Pellet	
	Starter	Finisher	Starter	Finisher
Wheat meal	31.41	51.64	30.99	51.00
Maize meal	30.80	20.63	30.39	20.37
Soya (44 % protein)	24.82	13.77	24.49	13.60
Herring (72 % protein)	7.59	7.09	7.49	7.00
Meat/Bone (45 % prot/ 8 % oil)	2.52	4.05	2.49	4.00
Soya oil	1.51	2.03	1.49	2.00
Vit. min. suppl	0.50	0.51	0.49	0.50
Limestone flour	0.41	0.20	0.40	0.20
Methionine	0.04	0.08	0.04	0.08
Dicalcium phosphate	0.40	-	0.39	-
Pellet binder	-	-	1.24	1.25

Table 2- Laboratory Analyses of Finisher Ration (%)

Analyses	Finisher	
	Mash	Pellet
Crude protein	23.18	23.65
True protein	21.09	21.57
Fat	1.74	1.70
Crude fibre	2.45	2.69
Dry matter	87.60	86.65
Ash	4.92	4.84
Gross energy MJ/kg	19.20	19.40

Table 3- Interaction of Feed Texture With Feeder Space Allowance On Weight Gain From 28 to 56 Days of The Experiment

Feed texture	Feeder space (mm/bird)			
	21	31	38	Mean
Mash	1861.5	1873.3	1893.0	1875.0
Pellet	1909.5	1907.6	1871.3	1896.1
Mean	1885.5	1889.4	1882.1	1886.0

a, b: Means with unluke superscripts in the same row are significantly different ($P<0.05$).

Table 4- Interaction of Feed Texture With Feeder Space Allov'ance On Food Consumption From 42 To 56 Days of The Experiment

Feed texture	Feeder space (mm/bird)			
	21	31	38	Mean
Mash	2215.0	2210.8	2302.3	2242.7
Pellet	2406.0	2337.1	2299.3	2347.4
Mean	2310.5	2273.9	2300.8	2295.1

a,b: Means with unluki superscripts in the same row are significantly different ($P<0.05$).