Effect of Strain and Previous Experience on Pellet Preference

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Story in Brief

An experiment was conducted to examine the effect of strain and previous experience with feed form on choice of pelleted or mash feed in a free-choice situation. Forty male broilers from two commercial strains (20 from Strain A and 20 from Strain B) were reared to 18 d on a broiler starter diet in mash form. At 18 d of age, birds were fed a broiler grower diet in either mash or pellet form. When birds were 40 d of age, they were fasted overnight in preparation for a short (52 h) feed conversion ratio (FCR) test. While birds were in the feed conversion testing cages, they were continuously offered both pellets and mash free choice. Birds were observed three times (of 10 observations each) to measure behavior patterns related to Strain and feed form experience. When offered a choice of pellets or mash feed, birds preferred the feed they had previously been offered. Strain A initially chose a lower proportion of their previous feed, but those birds quickly caught up with Strain B, which continuously chose their previous diet. Behaviors were generally not affected by either strain or feed form experience, with the exception of an interaction for resting behavior. Strain A birds reared on pellets rested more than Strain A birds reared on mash, or Strain B birds fed either pellets or mash. Results of this study indicate that birds may be resistant to a change in feed form, and prefer to consume feed in a familiar form.

Key words: Broilers, Feed Form, Genetic Strains, Dietary Choice, Previous Experience, Behavior

Introduction

It is understood that pelleting feed for broilers improves feed conversion and body weight (BW) gain (Lanson and Smyth, 1955; Vondell and Ringrose, 1957; Proudfoot and Hulan, 1982; Nir et al., 1995; McKinney et al., 2001; Moritz et al., 2001). Yet in spite of the overwhelming evidence of pelleting benefits, pellet quality (defined as percentage of intact pellets) still remains a concern in broiler production. That pelleting of diets can affect growth and feed conversion has both positive and negative consequences. Pelleting can be used to enhance feed intake when birds are under conditions limiting feeding time or feeder space allowances per bird. This ability to consume additional feed can also have negative consequences in increasing relative growth rate and predisposing some birds to metabolic disorders such as ascites (Nir et al., 1995). If reducing feed intake is desirable, birds being fed pellets can be offered mash feed to reduce feed and thus growth rate and its potential negative consequences (Urdanete-Rincon and Leeson, 2002).

Improvements in feed conversion due to pelleting have been attributed to reduced feed wastage and reduced energy expended to consume similar amounts of feed. Feed wastage is difficult (but not impossible) to measure (Noble and Nestor, 1997), and has thus received little attention. Noble and Nestor (1997) indicated that a randombred control strain of turkeys from 1966 wasted proportionately less feed than two strains that had undergone additional selection for growth,

feed conversion, and meat yield, indicating that genetic progress for broiler traits may increase feed wastage. Current work in our laboratory is investigating the energy costs of feeding behavior of birds eating diets varying in pellet quality.

Occasionally under practical conditions, feed mills or pellet mills experience a breakdown, requiring either outsourcing of the feed or feeding a mash diet when a pelleted diet would be most desired. The objective of the current study was to determine if strain and previous experience with feed in different forms affects the birds preference for different feed forms.

Previous studies in this laboratory (McKinney et al., 2001) have indicated that birds will 'go off feed' when presented with a poor pellet quality diet. These birds had been reared on pellets of good quality, and thus previous experience of eating pelleted feed could not be eliminated as contributing to the results. Knowing how birds respond with dietary preference and knowing how previous experience affects dietary preference has implications in feed management of broilers. The objective of the study reported herein is to determine the effects of strain and previous experience on preference for feed of different forms.

Materials and Methods

Birds were obtained from a commercial broiler hatchery as part of another experiment. Birds were fed standard broiler rations, as described by Skinner-Noble et al. (2001a). The two strains used are known to differ in growth patterns and feed conversion. Strain A is known to grow at a faster rate early, then slow its growth at later ages. Strain B in contrast grows more slowly at younger ages, then accelerates its growth rate as it gets older. All birds (20 from each of Strains A and B) were fed a common starter diet in mash form from 0 to 18 d of age. At 18 d, half of the birds from each strain were randomly assigned to be fed the broiler grower diet in mash form, whereas the remaining birds were fed the same grower diet in pellet form. Birds remained on the grower diet in either pellet or mash form to 40 d of age. Birds were fasted overnight in preparation for the feed conversion test.

At 41 d of age, all birds were weighed and placed into individual bird feed conversion testing cages (previously described by McKinney et al., 2001). Each cage contained two feeders: one feeder contained broiler finisher in pellet form, and a second feeder contained the finisher diet in mash form. Feeders were weighed at the start of the feed conversion testing period and at 4, 24, 28, 48 h, and at the conclusion of the feed conversion test (at 52 h post feeding). Birds were weighed at end of the FCR test for calculation of gain and feed conversion.

Scan sample behavior observations were made at 25, 29, and 47 h after treatments were offered. Birds were observed 10 times at each observation period and all birds were classified as eating, drinking, standing, resting, walking, pecking, or preening (Skinner-Noble et al., 2001b).

Data were analysed as a completely randomized design by analysis of variance with strain, previous feed form, and the interaction between them as the sources of variation. Unless otherwise stated, statistical significance was accepted at $P \leq .05$. Cumulative feed intake was expressed as feed consumed as pellets, feed consumed as mash, and the percentage of the

previously fed diet consumed. Behavior data are presented as the mean of the three sets of 10 observations.

Results

Feed conversion test results are shown in Table 1. As expected from our experience with these strains, Strain A had greater starting weights than did Strain B. Strain and feed form history affected BW at the start of the feed conversion test, and these difference carried through to the end of the feed conversion test. This interaction was caused by mash feeding reducing BW of Strain B birds, whereas mash feeding did not reduce BW of Strain A birds.

Weight gain on test and feed conversion were different for the strains, with Strain B having greater gains on test, and thus improved FCR. Previous feed form did not affect overall feed intake, weight gain, or feed conversion.

Table 1. Feed conversion test results by strain and feed form history

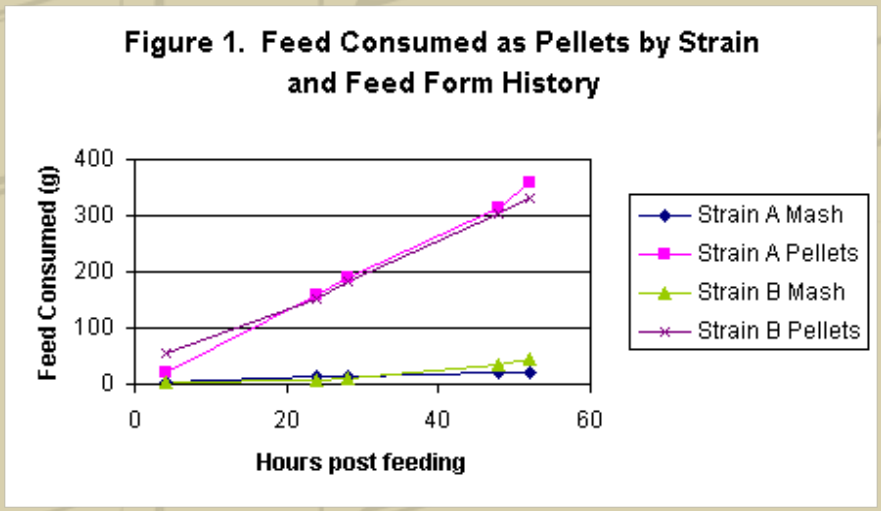
Strain	Previous Feed Form	Starting BW (g)	Ending BW (g)	Weight Gain (g)	Total Feed Intake (g)	Feed Conversion (g feed/ g gain)
A	Pellets	2015	2276	261	455	1.77
A	Mash	2007	2246	239	416	1.77
B	Pellets	1899	2220	321	446	1.41
B	Mash	1543	1849	306	440	1.46
Analysis of Variance						
Source	Strain (S)	**	**	**	ns	**
	Feed Form History (F)	*	*	ns	ns	Ns
	S x F	*	*	ns	ns	Ns

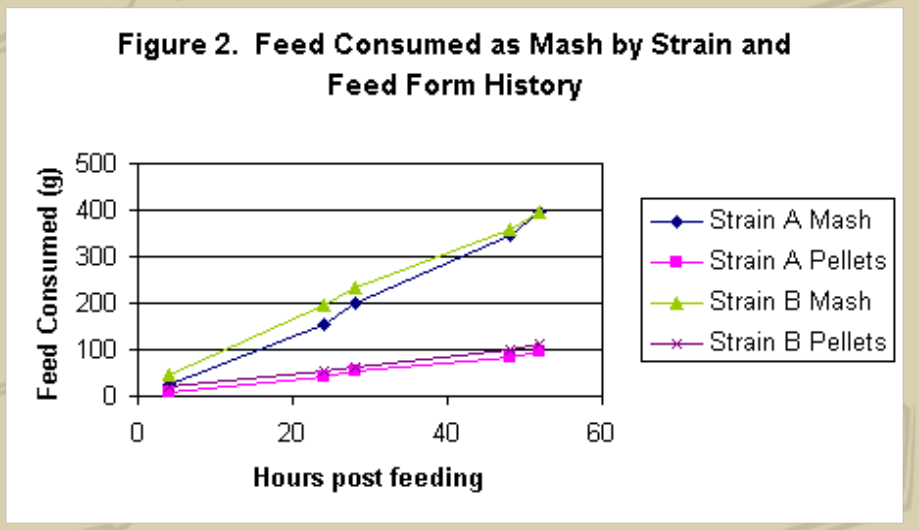
**= P≤.01

* =P≤.05

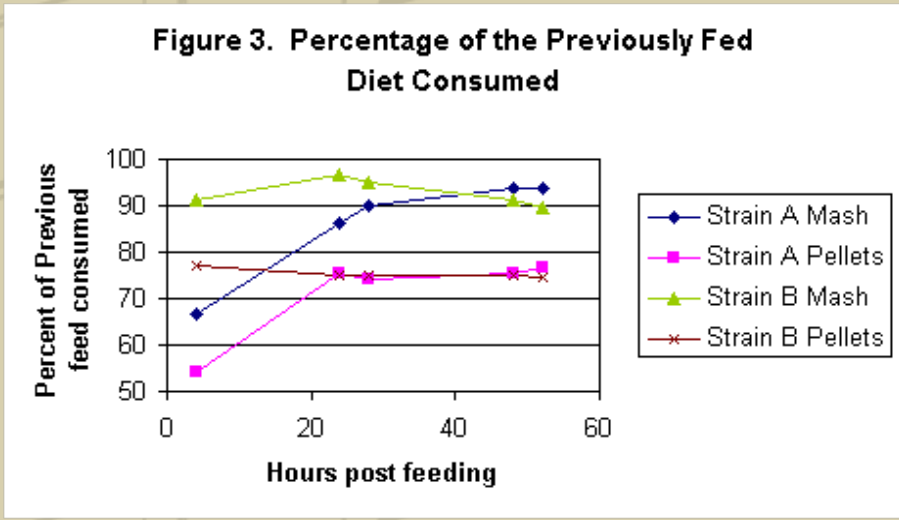
ns =Not Significant (P > 0.05)

When given a choice of pellets or mash, birds consumed the feed they had been previously fed (Figures 1 and 2). This was consistent with both strains whether fed pellets or mash.





When feed intake is viewed as the percentage of the previous feed consumed, strains differed in preference at 4 h post feeding, but not thereafter (Figure 3). This was caused by birds from Strain A choosing less of the diet they had previously been fed than did birds from Strain B.



Behaviors were generally not affected by either strain or previous feed form with one notable exception (Table 2). Strain and feed form history interacted to affect resting behavior. Birds from Strain A previously fed pellets rested more than did birds from that strain previously fed mash. Feed form history did not affect resting behavior in Strain B. It appears that Strain A birds may respond to eating pellets by spending more time resting at the expense of time spent eating and standing.

Table 2. Means of behavior traits (mean of 10 observations) by strain and feed form history

		Behavior						
Strain	Feed Form	Eating	Drinking	Standing	Resting	Walking	Pecking	Preening
A	Mash	.77	.50	1.87	6.30	.10	0	.47
A	Pellets	.40	.33	1.00	8.03	.03	0	.20
B	Mash	.63	.48	1.48	6.78	.07	0	.56
B	Pellets	.63	.47	1.40	7.00	.10	.03	.37
Analysis of Variance								
Source	Strain (S)	ns	ns	ns	ns	ns	ns	ns
	Feed Form (F)	ns	ns	.051	**	ns	ns	.051
	S x F	ns	ns	ns	*	ns	ns	ns

**= P≤.01

*= P≤.05

ns= Not Significant (P > .05)

It is interesting to note the birds previously fed mash exhibited a stronger (P<.05) preference for mash (~90%) than the birds previously fed pellets exhibited for pellets (~75%) past 24 h of feeding. Previous experience in our lab has shown that pellet quality of this feed from the same source is approximately 75% pellets, the same proportion of pellets birds consumed when given a choice.

Implications

The results of the current study indicate that broilers may resist management changes, requiring the need to slowly introduce management changes. The presence of a strain by feed form interaction for BW indicate that some strains require pelleting for maximum growth rate whereas others do not. Additionally, some strains of broiler chickens may exhibit behavior characteristics that make them more adaptable to environmental changes.

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Acknowledgements

The authors thank Peterson Farms of Decatur, AR for their support of this project.
