Use of a Single Diet Feeding Program for Female Broilers

D.O. Skinner-Noble, J.G. Berry, and R.G. Teeter

Story in Brief

An experiment was conducted to study the effects of feeding a single diet (the Grower diet) or a three-diet (Starter, Grower, and Finisher) feeding program on growth, performance, feed conversion, and carcass characteristics of female broilers. Feed intake, body weight, weight gain and feed conversion were recorded weekly by pen. Individual body weights were also recorded at 19 and 42 d of age. Feeding the grower diet throughout reduced body weights of birds by 7 d of age, with reductions in body weight still evident at 42 d of age. Reductions in feed intake lagged behind and paralleled differences in body weight. Feed conversion was generally similar between the two feeding programs. Though birds fed the single diet were smaller at 42 d of age, they contained less fat (both whole carcass and abdominal fat) than those fed three diets. Reductions in final body weight were offset by reductions in feed cost, resulting in similar income less feed costs. The results of this study indicate that a single diet feeding program may have merit in broiler production.

Key Words: Broilers, Feeding Program, Growth, Feed Conversion, Carcass Traits, Feed Costs

Introduction

Traditional dogma in the feeding of meat-type poultry holds that birds should be fed diets with decreasing protein and increasing energy as they approach market age and/or weight. Broilers are commonly fed three diets with increasing energy and decreasing protein content. Similarly, turkeys are also fed diets with increasing energy and decreasing protein that are changed approximately every 3 to 4 wk. If meat-type poultry are fed a single diet of ‘average’ composition relative to the multiple diet feeding program, then theoretically the protein level of the single diet would be lower than recommended as the birds are young, and higher than recommended levels as the bird gets older. Similarly, energy levels would be higher than recommended as the birds are young and lower than recommended as the birds get older. The effect of protein under-nutrition followed by protein over-nutrition, however, is generally lacking.

Ideally, growth restriction could be accomplished by use of fewer diets to reduce early growth and thus metabolic disorders. Feeding fewer diets would reduce the complications of changing from diet to diet and from one feed form to another (mash to crumbles to pellets). Previous studies in this laboratory (Skinner-Noble et al., 2000) have indicated that a single diet may prove useful in broiler feeding. Though the diet in the aforementioned report was a proprietary formula, it was generally intermediate to starter and grower diet in contents of most nutrients. With that in mind, an experiment was designed to use a single grower diet feeding program, compared to the classical ‘Starter, Grower, Finisher’ feeding program on performance of female broilers.

Materials and Methods

Diet composition, nutrient specifications, are presented in Table 1 and are based on diets used in the broiler industry. Feeds were mixed at the OSU Feed Mill in a manner that assured that diets differed only in the specified ingredients and nutrients.

Table 1. Composition of diets (as fed basis)

	Diet (days fed)		
Ingredient (%)	Starter (0-19)	Grower (19-35)	Finisher (35-42)
Corn	58.00	62.99	70.11
Soybean meal (48% Protein)	33.92	29.66	22.26
Menhaden fish meal	1.41	--	--
Fat	3.09	3.69	3.84
Ground limestone	1.58	1.85	1.80
Dicalcium phosphate	1.20	1.08	1.24
Salt	.38	.30	.23
DL-Methionine	.19	.19	.20
L-Lysine	--	.02	.09
Vitamin premix	.05	.05	.05
Mineral premix	.05	.05	.05
Choline chloride	.05	.04	.04
Avatek (Lasalocid)	.05	.05	.05
Copper sulfate	.03	.03	.03
Selenium premix	.01	.0015	.0015
Calculated analysis			
Crude protein (%)	22.67	20.20	17.33
Metabolizable energy (kcal/kg)	3077	3154	3229
Crude fat	5.59	6.17	6.49
Methionine	.57	.52	.49
Total sulfur amino acids	.90	.82	.75
Lysine	1.28	1.11	.96

Birds were obtained from a commercial hatchery following routine vaccinations and sexing. Upon arrival at Oklahoma State University's Poultry Research Center, the birds (800 heavy-type broiler females) were wingbanded and assigned into 20 pens. Birds and feed were weighed on a pen basis weekly, with birds individually weighed at 19 and 42 d of age. Each time the birds receiving the three-diet feeding program were switched from one diet to the next, feeders were emptied completely in all pens, regardless of diet treatment. This was done to reduce behavioral effects of presenting a novel feed. Water was provided by nipple drinkers and feed was in mash form from hatching to 19 d, and in pellet form thereafter.

At 42 d of age, four birds per pen were chosen to be subsequently slaughtered for carcass evaluation. Birds for slaughter were within one standard deviation of the pen mean body weight. Birds were fasted, then humanely slaughtered by electrocution followed by

exanguination. Once birds were slaughtered and evicerated, hot carcass weights were recorded. Carcasses were then chilled in ice water for 2 hr, at which time chilled carcass weights were recorded. Birds were weighed in water to determine specific gravity, and the abdominal fat pad was removed and weighed. Estimates of carcass protein and energy were made based on the equations of Wiernusz et al. (1999).

Feed costs were provided by the OSU Feed Mill and market prices of slaughtered chickens were obtained from a commonly accepted source (Urner Barry, 2001). Estimates of feed cost, return from slaughtered birds, and income over feed costs were calculated. All traits were analyzed within age or period measured by analysis of variance with diet as the source of variation.

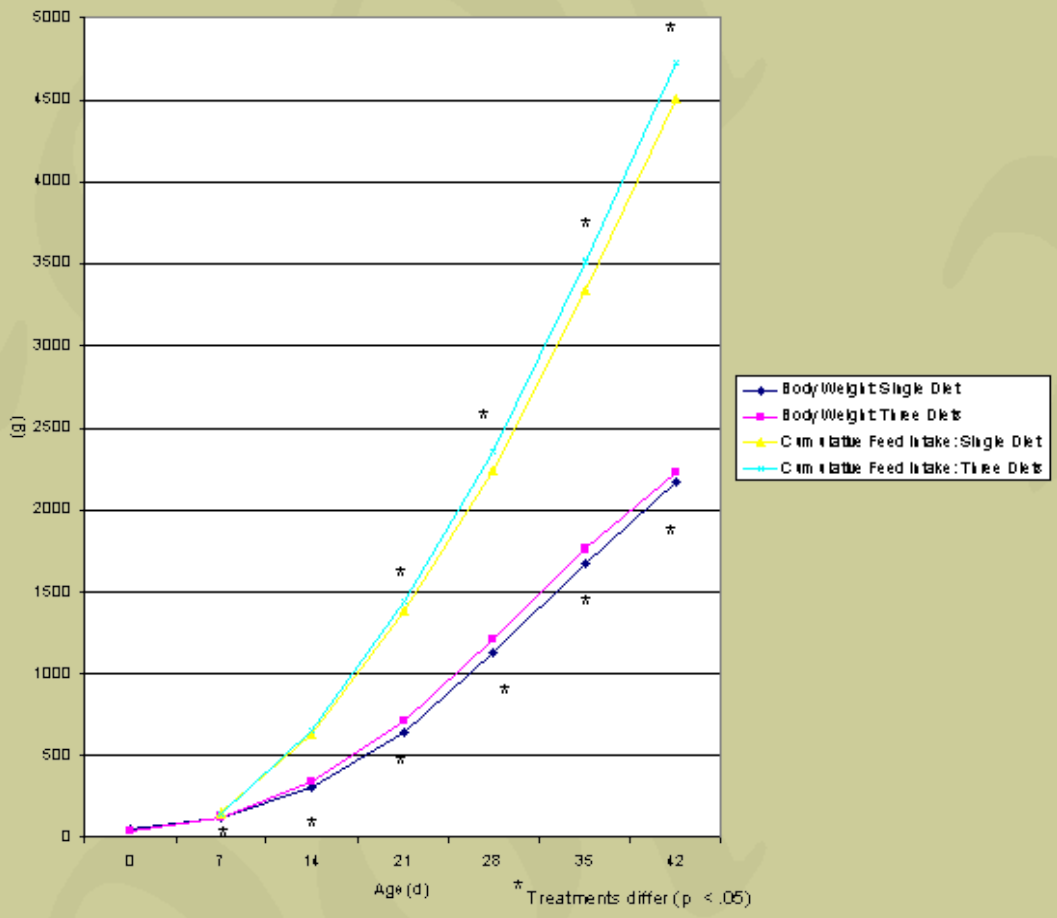
Results and Discussion

Body Weight. Feeding the grower diet throughout reduced body weight as early as 7 d post hatching, and continued throughout the experiment (Figure 1). This reduction, however, narrowed between 35 and 42 d of age. Previous reports with broilers used periods of growth restriction lasting less than 2 wk and starting at greater than 5 d of age (Plavnik and Hurwitz, 1985; Cartwright et al., 1986; Shlosberg et al., 1991). The length and severity of growth restriction in the present study was longer and more severe than in previous reports.

Skinner-Noble et al. (2000) reported that body weight of females fed a single diet was higher at 42 d than birds fed a three-diet feeding program. Differences at 42 d were caused by a reduction in body weight in birds fed the finisher diet. In the current report, birds fed the single diet throughout had increased weight gains from 35 to 42 d than those fed the three-diet program. It is possible that, given additional time, birds fed the single diet may have achieved similar weights as the other feeding program.

Feed Intake. Differences in feed intake between the two treatments lagged behind treatment differences in feed intake (Figure 1). This may not be surprising, given the reductions in body weight. Reductions in body weight would lead to reduced maintenance requirements. Skinner-Noble et al. (2000) reported that feed intakes were similar between single-diet and three-diet feeding programs. In the aforementioned report, birds had similar body weights, regardless of dietary treatment.

Figure 1. Body weight and cumulative feed intake by age and feeding program



Feed Conversion. Differences among treatments in feed conversion ratio (FCR) were most striking both early in the experiment (0 to 7 d) and late in the experiment (35 to 42 d). Birds fed the single diet had higher (poorer) FCR from 0 to 7 d, and lower (better) FCR from 35 to 42 d. Cumulative feed conversion did not differ between feeding programs (data not shown). Feed wastage occurred between 14 and 21 d of age, which resulted in poor feed conversion during this period. Previously, Skinner-Noble et al. (2000) reported that feed conversion was reduced when birds were switched to the finisher diet in a three-diet feeding program.

Carcass Traits. Means of selected carcass traits are shown in Table 2. While birds fed the single diet were lighter than those fed three diets, the birds fed the single diet had increased carcass protein and reduced carcass fat. If carcass fatness is a concern, this feeding program may prove useful in reducing unwanted carcass fat.

Table 2. Means of carcass traits

	Treatment		
Trait	Single diet		Three diets
Chilled carcass wt (g)	1529.68	**	1639.88

Abdominal fat (g)	38.23	**	51.09
Abdominal fat (%)	2.49	**	3.09
Carcass protein (%)	18.48	**	18.14
Carcass fat (%)	11.16	**	12.68
**Treatments differ (P<.05)			

Economic Analysis. Given the slaughter weight of the birds in this study, returns would be $0.49/lb (Urner Barry, 2001). Feed costs for Starter, Grower, and Finisher diets were $154.56, $146.26, and $140.80/ton, respectively. Given these values, substantial savings in feed costs can be realized in the single diet feeding program (Table 3). Reductions in feed costs, however, were offset by reductions in final weight, resulting in no difference between treatments in income less feed costs.

Table 3. Economic traits

	Treatment		
	Single diet		Three diets
Income ($US)	1.761	**	1.826
Feed costs ($US)	.729	**	.760
Income less feed costs ($US)	1.031	ns	1.065

**Treatments differed (P<.05)
ns=not significant

Implications

The results of this study indicate that a single-diet feeding program for broilers may have merit. The simplicity of feeding a single diet may appeal to producers lacking a sophisticated feed milling operation or adequate equipment to maintain multiple diets. Savings in feed costs may also make this feeding program desirable.

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