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Effect of Early Feeding Programs on Broiler Performance

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Abstract: This experiment was a 4x2 factorial arrangement of four feeding programs with or without water soluble multivitamin + electrolytes supplementation for the first 3 days of age. Four feeding programs includes: feeding a starter diet immediately after hatch until 28 d of age, feeding a prestarter diet immediately after hatch until 3 d of age, fasting for 24 hours after hatch, or fasting for 12 hours with access to water containing 5% sugar followed by 12 hours corn feeding after hatch. All chicks on the prestarter, fasting, and sugar corn feeding programs were fed the starter diet until 28 d of age after the end of the initial 3 d or 24 h treatment. This was followed by grower and finisher diets for the periods 29 to 42 d and 43 to 48 d, respectively. Feeding program had a significant ($p<0.05$) effect on final body weight. No significant ($p>0.05$) differences were observed in overall feed intake and feed conversion ratio. Supplement had no significant effects on body weight, feed intake, and feed conversion ratio. No interactions were observed between feeding program and supplement for body weight, feed intake, and feed conversion ratio. No significant differences were observed for abdominal fat, and organs weight (except for liver) between feeding programs. Twenty four hours fasting significantly ($p<0.05$) reduced T_3 concentration. multivitamin + electrolytes supplement significantly ($p<0.05$) increased liver weight and T_3 concentration.

Key words: Early feeding program, broiler performance, body weight, feed intake

Introduction

Early nutrition may appear to play a significant role in poultry production and profitability (Knight and Dibner, 1998). It is apparent that providing the optimum nutrition in the first 48 hours can have a substantial impact on final bird performance (Dibner *et al*., 1998). The high correlation between broiler body weight in the first 6 days with final body weight at 6-7 weeks gives strong evidence of the importance of a good start to good overall performance in commercial broilers (Nir, 1995). Delay in access to feed for 1-d-old chicks impairs posthatch growth. It is a standard practice that 1-d-old chicks are deprived of feed for about 48 h before they are placed on farms (Careghi *et al*., 2005).

Studies have indicated that chicks and poults receiving nutrients immediately after hatch show enhanced growth (Moran, 1990; Noy and Pinchasov, 1993; Noy and Sklan, 1997). water soluble multivitamin+electrolytes supplements have used by Iranian producers during the first 3 days of rearing period, because of their beneficial effects on broiler performance. In order to better understand the effects of various feeding programs and multivitamin+electrolytes supplements on the economic broiler performance parameters under farm conditions, this experiment was conducted.

Materials and Methods

This experiment was a 4x2 factorial arrangement of four feeding programs with (+) or without (-) multivitamin + electrolytes supplement. A total of 480 Ross broiler chicks were randomly assigned to one of eight treatments, with three littered floor pens (replicate) per treatment and 20 birds per pen. each pen of chicks had a similar initial weight (40 g).

Four feeding programs includes: feeding a starter diet immediately after hatch until 28 d of age (St), feeding a prestarter diet immediately after hatch until 3 d of age (Pr), fasting for 24 hours after hatch (F), or fasting for 12 hours with access to water containing 5% sugar followed by 12 hours corn feeding after hatch (SC). All chicks on the prestarter, fasting, and sugar corn feeding programs were fed the starter diet until 28 d of age after the end of the initial 3 d or 24 h treatment. This was followed by grower and finisher diets for the periods 29 to 42 d and 43 to 48 d, respectively. Composition of the experimental diets are shown in Table 1. throughout the experiment, chicks had free access to water. Housing and general management practices were similar for all treatment groups. Water soluble multivitamin + electrolytes supplement was added at the suggested concentration level of 50 g per 100 liter water during the first 3 d of rearing period. The composition of this supplement is shown in Table 2.

Feed intake, and body weight were measured, and weight gain, and feed conversion ratio for each pen were calculated at 3, 28, and 48 days of age. All chicks were group weighed. Exactly, at the end of the first day (24 h after the start of experiment), one bird from each pen was randomly selected and killed for blood sampling. A radioimmunoassay of plasma T_3 was performed. At the end of experiment (48 d of age), two birds (one male and one female) were selected at random per pen and killed.

Table 1: Composition and calculated nutrient content of the experimental diets

Ingredient	Pre starter	Starter	Grower	Finisher		Pre starter	Starter	Grower	Finisher
Corn	62.04	65.98	71.41	75.46	Calculated analysis				
Soybean Meal (44% CP)	25.60	26.08	22.43	20.65	ME, Kcal/kg	3050.00	2900.00	2930.00	2945.00
Fish Meal	6.00	5.00	3.00	0.00	CP,%	23.00	20.00	17.50	15.45
Vegetable Oil	3.00	0.00	0.00	0.00	Lys,%	1.35	1.05	0.87	0.77
Dicalcium Phosphate	0.66	0.62	0.96	1.35	Met,%	0.52	0.42	0.37	0.34
Oyster	1.18	1.34	1.24	1.42	Met+Cys,%	0.95	0.75	0.63	0.58
Salt	0.37	0.35	0.37	0.39	Thr,%	0.75	0.62	0.53	0.48
L Lysine	0.33	0.00	0.00	0.11	Trp,%	0.22	0.18	0.15	0.12
DL Methionine	0.32	0.13	0.09	0.12	Arg,%	1.40	1.10	0.92	0.82
Vitamin Premix[1]	0.25	0.25	0.25	0.25	Ca,%	1.00	0.95	0.89	0.86
Mineral Premix[2]	0.25	0.25	0.25	0.25	AP,%	0.45	0.42	0.39	0.36
Total	100.00	100.00	100.00	100.00	Na,%	0.19	0.18	0.18	0.17

[1]provided per kilogram of diet: vitamin A, 8000 IU; vitamin D_3, 2200 IU; vitamin E, 8 IU; vitamin B_{12} 0.02 mg; riboflavin, 5.5 mg; calcium pantothenic acid, 13 mg; niacin, 36 mg; choline, 500 mg; folic acid, 0.5 mg; vitamin B_1, 1 mg; pyridoxine, 2.2 mg; biotin, 0.05 mg, vitamin k, 2 mg. [2]provided per kilogram of diet: manganous oxide, 65 mg; iodine, 1 mg, ferrous carbonate, 55 mg; copper oxide, 6 mg; zinc oxide, 55 mg; sodium selenite, 0.3 mg.

Table 2: Composition of multivitamin+ electrolytes supplement (per gram)

Vitamin A, 15000 IU	Niacinamide, 30 mg	Vitamin B_1, 3 mg	Potassium chloride, 11 mg
Vitamin D_3, 3000 IU	Biotin, 0.2 mg	Vitamin B_2, 5.5 mg	Magnesium sulphate, 11 mg
Vitamin E, 15 mg	Calcium panthotenate, 15 mg	Vitamin B_6, 1.02 mg	Calcium chloride, 87 mg
Vitamin K_3, 2 mg	Sodium chloride, 111 mg	Vitamin B_{12}, 0.03 mg	Choline chloride, 12.7 mg
		Folic acid, 0.6 mg	

Table 3: Effect of feeding program and multivitamin + electrolytes supplement on growth performance of chicks

		BW (g)			FI (g /bird)			FCR		
Feeding program	Supplement	3 d	28 d	48 d	1-3 d	1-28 d	1-48 d	1-3 d	1-28 d	1-48 d
Pr	+	68^{a}	814^{ab}	2047^{a}	41^{a}	1540^{a}	4535^{a}	1.461^{b}	1.988^{ab}	2.258^{a}
Pr	-	70^{a}	840^{a}	2098^{a}	42^{a}	1592^{a}	4692^{a}	1.403^{b}	1.988^{ab}	2.281^{a}
St	+	66^{a}	783^{ab}	1981^{a}	41^{a}	1477^{a}	4368^{a}	1.573^{b}	1.987^{ab}	2.249^{a}
St	-	68^{a}	835^{ab}	2051^{a}	40^{a}	1492^{a}	4425^{a}	1.440^{b}	1.876^{b}	2.199^{a}
SC	+	58^{b}	774^{b}	1965^{a}	33^{b}	1509^{a}	4411^{a}	1.875^{a}	2.057^{a}	2.291^{a}
SC	-	60^{b}	784^{ab}	1980^{a}	38^{a}	1477^{a}	4320^{a}	1.873^{a}	1.983^{ab}	2.227^{a}
F	+	60^{b}	818^{ab}	2076^{a}	30^{b}	1513^{a}	4463^{a}	1.493^{b}	1.944^{ab}	2.192^{a}
F	-	59^{b}	799^{ab}	2001^{a}	30^{b}	1521^{a}	4443^{a}	1.584^{ab}	2.004^{ab}	2.268^{a}
SEM		1.30	18.99	42.82	1.28	58.95	119.0	0.09	0.05	0.04
Main effects										
Pr		69^{a}	827^{a}	2073^{a}	41^{a}	1566^{a}	4614^{a}	1.432^{b}	1.988^{a}	2.269^{a}
St		67^{a}	809^{ab}	2016^{ab}	41^{a}	1484^{a}	4396^{a}	1.507^{b}	1.931^{a}	2.224^{a}
SC		59^{b}	779^{b}	1972^{b}	36^{b}	1493^{a}	4366^{a}	1.874^{a}	2.020^{a}	2.259^{a}
F		60^{b}	808^{ab}	2039^{ab}	30^{c}	1517^{a}	4453^{a}	1.538^{b}	1.974^{a}	2.230^{a}
SEM		0.92	13.43	30.28	0.91	41.68	84.12	0.07	0.03	0.03
Supplement										
+		63^{a}	797^{a}	2017^{a}	36^{a}	1510^{a}	4444^{a}	1.600^{a}	1.994^{a}	2.247^{a}
-		64^{a}	815^{a}	2032^{a}	38^{a}	1521^{a}	4470^{a}	1.575^{a}	1.963^{a}	2.244^{a}
SEM		0.65	9.49	21.40	0.64	29.47	59.48	0.05	0.02	0.02

Means within columns with no common superscripts are significantly different ($p<0.05$)

Abdominal fat, full intestines, liver, Heart, and gizzard were removed and weighed separately for each bird. The organ weights were expressed as percentages of the 48 day live weight.

The data were analyzed using analysis of variance technique. The means were differentiated by Duncon's Multiple Range Test (Steel & Torrie, 1984).

Results and Discussion

Means of body weight (BW), feed intake (FI), and feed conversion ratio (FCR) are shown in Table 3. At the end of the treatment period (3 d of age), chicks of St or Pr feeding programs, had significantly ($p < 0.05$) higher body weight than chicks of SC or F feeding programs. Saki (2005) reported that body weight was decreased by those chickens which were not accessed to feed compared with that groups which was fed by starter diet immediately after hatching. This was confirmed by other researchers (Deaton, 1995). without additional nutritional supplies in the first 24 hours, the chicks are clearly in energy deficit and will invariably lose weight (Dibner *et al.*, 1998).

Table 4: Effect of feeding program and multivitamin + electrolytes supplement on abdominal fat, organs weight, and T_3 concentration

Feeding program	Supplement	%Abdominal fat	% Liver	% Heart	% intestines	% gizzerd	T_3 (µgr/dl)[1]
Pr	+	1.96[a]	2.65[ab]	0.55[a]	5.56[a]	1.74[a]	2.67[ab]
Pr	-	2.55[a]	2.61[abc]	0.56[a]	5.27[a]	1.56[a]	2.00[bcd]
St	+	2.03[a]	2.88[a]	0.58[a]	4.96[a]	1.76[a]	2.77[a]
St	-	2.40[a]	2.28[c]	0.49[a]	5.27[a]	1.69[a]	2.63[abc]
SC	+	1.70[a]	2.34[bc]	0.50[a]	5.13[a]	1.70[a]	3.13[a]
SC	-	1.85[a]	2.37[bc]	0.58[a]	5.30[a]	1.64[a]	2.87[a]
F	+	2.51[a]	2.60[abc]	0.55[a]	5.18[a]	1.53[a]	1.97[cd]
F	-	1.77[a]	2.27[c]	0.54[a]	5.48[a]	1.73[a]	1.67[d]
SEM		0.15	0.11	0.04	0.29	0.08	0.22
Main effects							
Feeding program							
Pr		2.26[a]	2.63[a]	0.56[a]	5.42[a]	1.65[a]	2.33[b]
St		2.21[a]	2.58[ab]	0.54[a]	5.12[a]	1.72[a]	2.70[ab]
SC		1.77[a]	2.36[b]	0.54[a]	5.21[a]	1.67[a]	3.00[a]
F		2.14[a]	2.44[ab]	0.55[a]	5.33[a]	1.63[a]	1.82[c]
SEM		0.11	0.08	0.03	0.20	0.06	0.15
Supplement							
+		2.05[a]	2.62[a]	0.55[a]	5.21a	1.68[a]	2.63[a]
-		2.14[a]	2.38[b]	0.54[a]	5.33a	1.65[a]	2.29[b]
SEM		0.08	0.06	0.02	0.14	0.04	0.11

Means within columns with no common superscripts are significantly different ($p<0.05$). 1. microgram per deciliter

At the end of experiment (48 d of age), significant differences existed in BW among feeding programs. Body weight for the SC feeding program birds was significantly ($p < 0.05$) lighter than those of Pr feeding program. There were no significant differences between Pr, St, and F feeding programs. For 24 h fasting chicks, reducing ($p < 0.05$) the body weight at 3 d of age did not affect final body weight at 48 d when compared with Pr or St feeding programs. This chicks seemed to make their compensatory growth (Wilson and Osburn, 1960).

No significant differences were observed in overall feed intake and FCR.

Supplement had no significant effects on body weight, feed intake, and FCR.

No interactions were observed between feeding program and supplement for body weight, feed intake, and FCR feeding programs and supplement had no significant effects on abdominal fat, and organs weight (except for liver) (Table 4). Addition of supplement significantly ($p<0.05$) increased liver weight.

T_3 concentration was significantly ($p<0.05$) lower in the fasting chickens than in the other feeding programs. It has been previously reported that a significant linear correlation exists between plasma T_3 concentration and feed intake (Klandorf and Harvey, 1985; Yahav *et al.*, 1995, 1998; Yahav and Hurwitz , 1996).

Addition of supplement significantly ($p<0.05$) increased T_3 concentration.

Overall, birds losses due to mortality and culling were at a low level, and were not affected by feeding program and supplement.

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