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EFFECT OF POST-HATCH DELAY IN FEEDING ON PERFORMANCE AND BLOOD BIOCHEMISTRY OF CHABRO CHICKEN

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ABSTRACT

In Kashmir, a large number of 1-day old chicks are procured from neighbouring states which puts birds to early life stress during transportation and affects their growth performance. The present study was aimed to evaluate the role of different durations of post-hatch delay in feeding in Chabro chicken. Four hundred 1-day old Chabro chicks were randomly divided into 5 groups with 4 replicates of 20 birds each and subjected to different durations of delay in post-hatch delay feeding for 6 weeks. Control chicks were offered feed at hatchery while in other groups feeding was started after delay of 12, 24, 48 and 72 h. As the post-hatch feeding was delayed at the start of experiment, it caused a significant ($P<0.05$) decrease in chick body weight with lower weight observed in groups subjected to 24, 48 and 72 h delay in feeding as compared to control. Thereafter, the body weights decreased steadily with increase in post-hatch delayed feeding with highest decrease in group subjected to 72 h feeding delay. The average weekly feed consumption showed a steady increasing trend with increase in post-hatch feeding delay. FCR of birds worsened with increase in post-hatch feeding delay. There was no significant change in various blood biochemical parameters, except for SGPT. Higher feed cost per kg live weight gain was observed in groups subjected to longer durations of delay in feeding. To circumvent negative effects of delayed feeding, early feeding strategies need may be adopted which include proper hatchery feeding and feeding during transportation of birds.

Key words: Blood biochemistry, Chabro chick, delayed feeding, performance

INTRODUCTION

Chabro is a low technology broiler with coloured plumage whcih was developed by Central Poultry Development Organization - Northern Region, Chandigarh (India). The bird attains a body weight of 1400-1500 g at 7-week age with feed conversion ratio (FCR) of 2.48 (Anonymous, 2013). The present day broiler is like a machine which grows manifold in a span of around 6 weeks. The growth magnitude of broilers indicates that every day is important to achieve the target (Chandrasekaran, 2005). In commercial practice, newly hatched chicks do not have access to feed and water for long periods. In commercial hatchery, eggs within a single tray do not hatch at the

same time but there is a hatching window ranging between 24 to 48 h. Once hatch is pulled, other procedures such as sex determination and sorting, vaccinations, beak trimming, comb dubbing and transportation further increase the fasting period experienced by the chicks (Batal and Parsons, 2002). Many birds even may have to wait up to 2 days in hatchery or in transit to farms before they are given access to food and water (Moran and Reinhart, 1980). This delay in initial access to feed and water has lasting negative effects on birds (Noy and Sklan, 2001; Madsen *et al.,* 2004). Delayed access to feed and water reduces initial weight at placement whereas early access to feed generally improves it (Bhuiyan *et al*., 2011). Yang *et al*. (2009) observed an inverse relationship between feed deprivation period and weight gain of chicks. Feeding hatchlings immediately after post-hatch reportedly increased body weight of both chick and turkey poults (Henderson *et al.,* 2008). The first 14 day's post-hatch represent approximately 25-33% growth in broilers, 12.5% pullet development period in layers and 10-14% life of a market turkey (Moore, 2010). Further, serum concentration of glucose upto 14 days and total protein and triglycerides until 56 days decreased with increased duration of delay in feed access (Gaglo-Disse *et al.,* 2010).

Out of 14 million broiler chicken raised in Kashmir valley annually (Anonymous 2012), a large chunk of 1-day old chicks are procured from neighbouring states and these chicks are transported across a longer distances over a period of several days. The long-distance transport not only puts birds to early life stress but also delays their feeding. This disturbs the future growth performance of broilers raised in valley and affects the profitability of poultry industry. Therefore, the present study was aimed to evaluate the role of different durations of post-hatch delay in feeding on the performance, blood biochemical parameters and economics of Chabro broiler chicken under temperate conditions of Kashmir.

MATERIALS AND METHODS

The experiment was carried out in 2014 on relatively slow growing meat type Chabro chicks procured from a local hatchery (Hariparbat Hatchery, Srinagar). Four hundred 1-day old Chabro chicks were randomly divided into 5 groups comprising of four replicates of 20 birds in each group. The chick boxes were transported from hatchery to the poultry farm where the chicks were brooded and reared up to 6 weeks of age in deep litter system using saw dust as litter material. The chicks were housed replicate-wise in separate pens providing a floor space of 0.092 m^2 per chick. Control chicks were offered feed at hatchery while in other groups feeding was started after a delay of 12, 24, 48 and 72 h. Feed (commercially available pre-starter, and starter mash) and water was offered *adlib*. Standard management and healthcare (vaccination) protocol were followed.

Chicks were weighed individually (when the hatch was pulled out) at the time of the initiation of feeding and at weekly interval in all treatment groups using a digital weighing balance. Weekly body weight gains were worked out. A known quantity of feed was placed in feed bins allotted to each replicate and offered *adlib* from the respective feed bins. At weekly interval, the feed left in bins was weighed to determine feed consumption during week. Body weight change (loss/gain) and FCR were calculated from the body weights and feed consumption as follows:

$$\text{FRC} = \frac{\text{Feed consumed}}{\text{Body weight gain}}$$

At 6 weeks of age, 2 mL blood was collected from randomly selected 3 birds from each replicate (12 birds/group). Various blood metabolites were estimated using diagnostic kits. Glucose was estimated by glucose oxidase-peroxidise/GOD-POD (Trinder's) method using a diagnostic kit (Transasia Biomedical Ltd., Mumbai, India). The total protein was estimated by Biuret method using a diagnostic kit (Medsource Ozone Biomedicals, Haryana, India). Cholesterol was estimated

by CHOD-PAP (modified Roeschlaus) method using a diagnostic kit (Transasia Biomedical). SGPT and SGOT were estimated by modified IFCC (International Federation of Clinical Chemistry & Laboratory Medicine) method (IFCC, 1986) using diagnostic kits (Piramal Healthcare Ltd., Mumbai, India). At the end of study, the economics was worked out on the basis of feed cost per kg live weight gain. The data was analyzed by analysis of variance using a statistical software SPSS 15.00. The differences between means were considered significant at $p<0.05$. The difference within the groups was estimated using Duncan's Multiple range test as per Snedecor and Cochan (1980)

RESULTS AND DISCUSSION

Body weight of birds

The body weight of Chabro chicks at hatch showed no significant difference ($P>0.05$) between various treatment groups (Table 1). Delay in post-hatch feeding in various groups resulted in decrease in body weight of chicks as compared to the control. Although the decrease in body weight of group subjected to 12 h delayed feeding did not differ significantly ($p>0.05$) from control, there was significant low body weight observed in other groups subjected to 24, 48 and 72 h delayed feeding. At 1st week age, the body weight decreased steadily with increase in post-hatch delayed feeding with highest decrease in group subjected to 72 h delay in feeding. Similar trend was observed throughout the rest of rearing period. Our results are in line with Gonzales *et al.* (2003) who observed a reduction in body weight of broiler chicks at day 7 when fasted for 30 h post-hatch or more. Noy and Sklan (1999) found decrease in body weight of chicks and poults held for 34 h or more at 7, 8, and 14 day as compared to chicks and poults allowed immediate access to feed, water or a combination of feed and water. Halvey *et al.* (2003), Tona *et al.* (2003) and Careghi *et al.* (2005) have reported decrease in chick weight at an approximate rate of 4 g 24 h^{-1} delay in feeding. Early feeding increases the growth performance of chicks in starter period (Yi *et al.*, 2005; Panda *et al.*, 2010).

In present study, the weight loss increased significantly with increase in post-hatch feeding delay (Table 2). Weight losses of chicks wherein feeding was withheld for 24 and 48 h post-hatch is equivalent to the lengthening the time taken to reach the market age by 1 and 2 days, respectively (Nir and Levanon, 1993). Initial loss of body weight has long term manifestations leading to lower body weight at later age. Wahlstrom (2013) has reported that achieving good initial 7-day live weight improves the performance parameters such as final body weight, feed conversion ratio and livability. This is in agreement with our findings where in delayed feeding resulted in lower 7th day body weights in groups subject to longer durations of delayed feeding and this difference perpetuated all the way up to 6th week body weight. The weight loss is as a result of mobilization of body reserves, mainly from subcutaneous fat and liver and potentially from muscles, to support metabolism and maturation of the thermoregulatory system (Nichelmann and Tzschentke, 2002).

Table 1: Effect of delayed feeding on body weight (g) of Chabro birds

Age group	Feeding soon after hatch	Delay in feeding			
		12 h	24 h	48 h	72 h
0 day	38.27 ±0.53	38.29 ±0.51	37.74 ±0.47	38.83 ±0.44	39.18 ±0.41
At initiation of feeding	38.27 ±0.53^{d}	37.31 ±0.24^{cd}	35.98 ±0.46^{bc}	34.43 ±0.35^{b}	31.39 ±0.81^{a}
1 week	87.55 ±0.87^{d}	80.13 ±3.40^{c}	76.84 ±3.19^{bc}	70.77 ±1.03^{b}	61.49 ±1.62^{a}
2 week	176.05 ±2.28^{b}	161.08 ±8.08^{b}	161.21 ±5.81^{b}	143.09 ±3.85^{a}	129.84 ±3.11^{a}
3 week	293.29 ±8.26^{c}	276.88 ±13.27^{bc}	267.71 ±6.78^{bc}	252.65 ±5.61^{ab}	233.12 ±4.45^{a}
4 week	394.89 ±7.78^{b}	377.53 ±20.15^{ab}	361.99 ±4.08^{a}	353.48 ±6.36^{a}	347.09 ±2.38^{a}
5 week	551.74 ±13.88^{c}	535.22 ±14.52^{bc}	525.44 ±3.14^{abc}	518.43 ±1.09^{ab}	505.12 ±1.33^{a}
6 week	672.98 ±14.19^{b}	660.65 ±5.99^{ab}	654.59 ±4.02^{ab}	645.51 ±7.24^{a}	640.15 ±4.74^{a}

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 80 observations.

Table 2: Effect of delayed feeding on weight loss (g) of Chabro birds

Age group	Feeding soon after hatch	Delay in feeding			
		12 h	24 h	48 h	72 h
From hatching to initiation of feeding	0.00[a]	0.98 ±.29[b]	1.76 ±0.19[b]	4.39 ±0.33[c]	7.78 ±0.43[d]

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 80 observations

Table 3: Effect of delayed feeding on weekly feed consumption (g) of Chabro birds

Age group	Feeding soon after hatch	Delay in feeding			
		12 h	24 h	48 h	72 h
0-1 wk	117.17 ±3.86c	84.32 ±5.01b	84.77 ±12.05b	61.36 ±4.94a	47.03 ±3.32a
1-2 wk	208.29 ±6.06a	224.67 ±12.59ab	219.86 ±9.77ab	247.57 ±13.53b	300.91 ±13.09c
2-3 wk	266.16 ±30.26	251.26 ±32.39	258.12 ±7.32	304.01 ±15.36	330.89 ±33.78
3-4 wk	330.59 ±21.13a	321.08 ±21.01a	304.55 ±8.29a	351.82 ±26.09ab	400.86 ±17.94b
4-5 wk	364.26 ±9.48a	381.59 ±12.00a	358.81 ±9.29a	401.92 ±17.62ab	451.92 ±27.38b
5-6 wk	478.52 ±11.87a	483.29 ±14.81a	462.32 ±11.65a	522.82 ±25.88ab	561.92 ±30.89b
0-6 wk	1764.99 ±78.69a	1746.22 ±95.51a	1688.42 ±56.12a	1889.49 ±102.34ab	2093.53 ±125.74b

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 80 observations

Effect on feed consumption

The average weekly feed consumption revealed a regular and steady increasing trend with increase in post-hatch feeding delay (Table 3). Significant increase was found in group subjected to 72 h delay as compared to control. Zubair and Leeson (1994) also observed significant increase in feed intake relative to body weight in restricted fed broiler chickens. Contrarily, other workers have reported that delayed access to feed and water decreased feed consumption in chicks and poults (Vargas *et al.*, 2009; Alhotan, 2011), but no such effect was observed in our study.

Effect on FCR

The FCR of birds worsened with increase in post-hatch feeding delay with significant values in group subjected to 72 h delay as compared to control (Table 4). Fontana *et al.* (1992) found that in broilers subjected to early feed restriction, FCR deteriorated. However, Mahmoudi *et al*. (2012) while studying the effect of delayed post hatch feeding on the performance of broilers reared in cages did not find any significant change in FCR among the groups subjected to different durations of delay in feeding ranging from 10 to 40 h and control. The worsening FCR found in present study could be attributed to decrease in body weight of birds as a result of post-hatch delay in feeding.

Effect on blood biochemistry

The blood glucose did not show any significant difference between post hatch delay in feeding treatment groups and control (Table 5). Same was true with cholesterol, total protein and SGPT.

Table 4: Effect of delayed feeding on feed conversion ratio of Chabro birds

Age group	Feeding soon after hatch	Delay in feeding			
		12 h	24 h	48 h	72 h
0-1 wk	2.38±0.09	2.08±0.28	2.27±0.49	1.95±0.25	2.17±0.29
1-2 wk	2.36±0.11[a]	2.83±0.31[ab]	2.63±0.20[a]	3.46±0.33[b]	4.42±0.29[c]
2-3 wk	2.31±0.34[ab]	2.22±0.38[a]	2.43±0.08[ab]	2.78±0.18[ab]	3.22±0.37[b]
3-4 wk	3.27±0.25	3.29±0.46	3.24±0.09	3.49 ±0.28	3.51±0.09
4-5 wk	2.34±0.15[a]	2.43±0.07[a]	2.19±0.053[a]	2.44±0.06[a]	2.86±0.15[b]
5-6 wk	3.99±0.25	3.89±0.18	3.59±0.15	4.17±0.39	4.19±0.35
0-6 wk	2.79±0.17[a]	2.81±0.18[a]	2.74±0.11[a]	3.12±0.21[ab]	3.49±0.24[b]

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 80 observations

Table 5: Effect of delayed feeding on blood biochemical parameters of Chabro birds

Age group	Delay in feeding				
Feeding soon after hatch		12 h	24 h	48 h	72 h
Glucose (mg dL^{-1})	208.69±12.29	216.12 ±3.16	224.38±3.10	219.84±1.13	222.94±3.42
Cholesterol (mg d L^{-1})	189.95±7.31	200.89 ±3.91	205.64±7.21	207.71±4.36	200.33±3.58
Total Protein (g d L^{-1})	4.38±0.13	4.21±0.23	4.63±0.22	4.40±0.19	4.26±0.17
SGPT (IU L^{-1})	8.65±1.49	8.97±0.93	11.76±1.53	10.59±1.05	9.74±0.75
SGOT (IU L^{-1}	187.62 ±16.47^{b}	202.86 ±25.92^{b}	152.93±2.82^{a}	157.26±1.98^{a}	165.16±8.05^{ab}

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 12 observations

However, SGOT levels were significantly lower in birds subjected to 24 and 48 h post-hatch feeding delay as compared to 12 and 72 h delayed groups and control. The values ranged from 208.69 to 224.38 mg dL^{-1} for glucose, 189.95 to 207.71 mg dL^{-1} for cholesterol, 4.21 to 4.38 g dL^{-1} for total protein, 8.65 to 11.76 IU L^{-1} for SGPT and 152.93 to 202.86 IU L^{-1} for SGOT. Rajman *et al.* (2006) did not observe any changes in glucose concentration due feed restriction in chickens but observed decrease in the levels of plasma protein and cholesterol. Richards *et al.* (2010) reported that plasma glucose was significantly low in delayed fed group at 24 h post hatch but recovered thereafter while Gaglo-Disse *et al.* (2010) reported serum concentration of glucose up to 14 days and of total protein and triglycerides until 56 days decreased with the increasing duration of delay in feed access.

Effect on economics

The economics of delayed feeding worked out on the basis of feed cost kg^{-1} live weight gain indicated that higher feed cost in groups subjected to longer durations of delay in feeding (> 24 h) [Table 6[. This could be a direct consequence of decreased weight gain, higher feed consumption and adverse feed conversion ratio in groups subjected to longer durations of post-hatch feeding delay. So, the post-hatch delay in feeding resulted in higher feed cost kg-1 weight gain and thereby reduced net returns. On the basis of results of present study, early feeding could be suggested as one of the managemental interventions to economize broiler farming. Idahor *et al.* (2013) studied the effect of restricted feeding regimes on Hubbard, Kuchbor, Arboracre and Pawl broiler strains subjected to adlib feeding and 2, 4 and 6 h of restricted feeding regimen and reported that cost of feed consumed was more in 2 and 4 h groups than other groups.

Table 6: Effect of delayed feeding on economics of Chabro birds

Parameter	Feeding soon after hatch	Delay in feeding			
		12 h	24 h	48 h	72 h
FCR	2.79±0.17^{a}	2.81±0.18^{a}	2.74 ±0.11^{a}	3.12 ±0.21^{ab}	3.49 ±0.24^{b}
Feed cost kg^{-1} weight gain (Rs)	56.15±2.52	55.61±3.05	53.75 ±1.77	60.91 ±3.33	66.91 ±4.04
Difference in feed cost	-	-0.54	-2.40	+4.76	+10.76

Means within the same row with different superscripts are significantly different ($p<0.05$); Each value is the mean of 80 observations

Conclusion: The feeding delay by 48 h or more results in lower body weight, higher feed consumption, adverse FCR and economic returns in Chabro birds. Early feeding strategies need to be developed which may include hatchery feeding or feeding during transportation of birds. If these practices would be employed, it will boost poultry production in Kashmir valley.

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