Biomedical & Pharmacology Journal Vol. **8**(2), 945-955 (2015)

Effect of Post Hatch Delayed Access to Feed on Performance, GIT Physical and Histological Development and Yolk Absorption in Young Broiler Chicks

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DOI: http://dx.doi.org/10.13005/bpj/846

(Received: September 10, 2015; accepted: November 30, 2015)

ABSTRACT

The effect of post hatch starvation on growth rate, feed intake, feed conversion ratio, yolk absorption, and small intestine morphological index and gastrointestinal tract (GIT) organs relative weight were evaluated in young broiler chicks. Two hundred and twenty five newly hatched male "Ross-308" broiler chicks were placed in three treatments with five replications of 15b each. The experiment was arranged in a complete random design (CRD) at 6, 12 and 18 hours delay access to feed immediately after hatching as treatments. Body weight and weight gain increased significantly in birds that had access to feed with 6h delayed compared with those at 12 and 18h delayed access to feed. The total gastro intestinal tract and small intestine relative weight and small intestine length numerically decreased with increased delayed access to feed. The highest small intestine relative weight and length were observed in birds that started to feed at 6h after hatching and the lowest weights were observed in birds that started to feed at 18h after hatching. Also, the highest villus height, villus width and apparent villus surface area were observed in birds that started to feed at 6h after hatching. The results of this study revealed that delayed access to feed has adverse effects on broiler performance. Therefore, be recommended that transportation plan have to be provided to chicks to reduce starvation time after hatching.

Key words: Post-hatch starvation, performance, digestive system, broiler chick .

INTRODUCTION

In commercial broiler farm, it has been shown that the neonatal chicks remain approximately 24- 36h without feed and water after removal from the incubator until placement in the farm (Bhuiyan *et al*. 2011; Willemsen *et al*. 2010), this gap between hatching time and neonatal chick's access to feed due to hatchery handling and transport processing (Noy and Sklan 1999a). This delay access to feed after hatching results in a lowering of development and function of the gastrointestinal tract (GIT) (Potturi *et al*. 2005; Yang *et al*. 2009), thereby undesirable bird performance (Gonzales *et al*. 2003) such as reducing final body weight (Noy *et al*. 2001), decreasing immune response (Dibner *et al*. 1998), retarding growth and increasing mortality (Gonzales *et al*. 2003; Willemsen *et al*. 2010). Because of delays in placement chicks are often subjected to delayed access to feed which may retard the development of the GIT, limiting nutrient utilization and performance of the broiler chicken (Uni *et al*. 2003). Early access to feed after hatching stimulates rapid growth of the GIT and its absorptive capacity, improves chick's immune system and faster utilization of yolk suck (Bhuiyan *et al*. 2011) and improves gut integrity (ýNoy and Sklan 1999a; ýMoran *et al*. 1990). Therefore, it is extremely important for the chicks to consume feed as close to hatch as possible. Although, hatchery feeding (ýKidd *et al*. 2007; ýWillemsen *et al*. 2010) and in ova injection (ýUni and Ferket 2004) suggested to reduce the detrimental effects of such delay access to feed but those are practically difficult to achieve (ýLilburn 1998). Early access neonatal chick to feed as reduced transport time to the poultry farm with purchase chicks from local hatchery is most important applied clue to overcome the detrimental effects of such starvation. Hence, this study was designed to evaluate the effects of different delayed times access to feed on the performance, yolk absorption and physical development of the digestive system in young broiler chicks.

MATERIAL AND METHODS

Birds, Housing and Care

A total of 225 neonatal commercial “Ross 308” male broiler chicks were obtained from a local hatchery and were transported to the study area within 6h after hatched. The chicks were divided into three groups; each group was further divided into five pens of 15 chicks each. The chicks were raised on conventional deep litter system, with windows less house, equipped by inlet for ventilation. Each pen was 1.5 squares meter and covered with wood shavings. The house temperature and humidity were initially maintained at 35-37ºC and 60-70% respectively and after 3 days gradually decreased (temperature 0.5ºC every day and humidity decreased 50-60%). From 1 to 42 d of age, the lighting program was constant (23 Light: 1 Dark) with 25-35 lx light intensity. The chicks in each pen were allowed to have free access to feed from a handing feeder and fresh water from a handing drinker throughout the experiment. The whole house work includes house cleaning, adding new food and fresh water did daily.

Experimental Design and Diets

The experiment was arranged in to a completely randomized design (CRD) experiment of three groups include done starved birds for 6, 12 and 18 hours after post hatching. Each group was further divided into five replicates per treatments with 15 birds per each. Diets were formulated according to the recommended nutrients by Ross 3.8 manual for broiler chickens and were offered in mash form. The composition of the diet is presented in Table 1. The water was offered ad-libitum to the birds from 1 to 42 d of age.

Performance Measurements

Live body weight and feed weighed in and weighed back per pen were measured in a period of 0-12 days of age. Weight gain, feed intake and feed conversion were calculated. Daily chick mortality were recorded for the calculation of feed intake and feed conversion during the experimental period.

Slaughter, Sampling and Histological Measurements

At 0, 2, 4, 8 and 12 d of age, one birds/ pen, close to the average pen weight was selected, weighed and slaughtered. The digestive tract, from the pro-ventriculus to the end of the intestine, was excised. The crop, pro-ventriculus and gizzard were emptied and weighed. The small intestine was divided into three segments: duodenum (from gizzard to pancreo-biliary ducts), jejunum (from pancreo-biliary ducts to Meckel’s diverticulum), and ileum (from Meckel’s diverticulum to the ileo-caecal junction). Then, the total segments of small intestine and large intestine were emptied and weighed. After clearing the intestinal contents, a portion (about 0.5 cm in length) of the small intestine segments was taken from the midpoint of each segment, flushed with 0.9% saline to remove the contents and then were fixed in 10% neutral buffered formalin solution for histological study.

Intestinal samples were transferred from formaldehyde, after dehydration by passing tissue through a series of alcohol solutions, were cleared in xylene and were embedded in paraffin. Intestinal samples were sectioned at 5 µm thickness using an auto microton[1]. These samples were placed on glass slides, and were prepared and processed for staining with Hematoxylin and Eosin (H& E) and Vangieson. All chemical were purchased from sigma chemical company.

Micrographs were taken with an Olympus microscopic[2], BX41 (Olympus, Tokyo, Japan). Morphometric measurements were performed on 9 villi chosen from each sample. Morphometric indices included were villus height (VH) from the tip of the villus to the crypt, crypt depth (CD) from the base of the villi to the submucosa, villus width (VW; average of VW at one-third and two-third of

the villus) and muscular thickness (MT) from the submucosa to the external layer of the intestine (ýGeyra *et al.* 2001). Apparent villus surface area (AVSA) was calculated by the formula (1):
Formula 1:

$$AVSA = 2\pi \frac{VW}{2} VH$$

Where AVSA is apparent villus surface area, VW is villus width and VH is villus height (Solis *et al.* 2007ý26).

Statistical Analysis

The data were tested for effects of starvation for 6, 12 and 18 hours. Analysis of variance was performed using a complete randomized experimental design. All percentage data were transformed to arc-sin by the formula (2) before statistical analysis. All data were analyzed by ANOVA using the GLM procedure of the SAS 9.1 software (SAS 2003). Means were compared for significant differences using Duncan Multiple Range test (P<0.05).
Formula 2:

$$X = Degrees\ (arcSin\sqrt{\frac{x}{100}})$$

Where X is transformed date and x is percentage

RESULTS AND DISCUSSION

Performance

The mean of initial body weight of newly hatched chicks was 37.56 ± 0.65g and chick's pen weight were similar before they were allocated to the treatment. The average body weight (BW) at the end of 10d of age, daily body weight gain (DBWG) and daily feed intake (DFI) and feed conversion ratio (FCR) during 1-10d of age of broiler chickens are shown in Table 2. The BW and DBWG of birds fed at 6h post hatch were significantly (P<0.05) superior to those on 12 and18h fasting. The observed lower DBWG in the 12&18h fasted chicks during the first 10d of life is consistent with reports by (ýSaki 2005) in which delayed access to feed decreased broiler post-hatch performance. Lower DBWG exhibited with increasing fasted period (12&18h) could be attributed to lower feed intake and poor development of digestive tract. Early access to feed and water may improve the feed/ gain ratio and affect feed intake of broilers during the first two weeks while a short period of feed restriction (12 h) at the time of placement could impact the growth performance and feed intake of broilers during the starter phase (ýRashed 2011). Geyra *et al*. (2001) reported that when feed consumption starts soon after hatch, the nutrients provided by feed are complementary to the yolk nutrients and this will trigger rapid growth rate in birds. Initiation of feed consumption as close to hatch as possible is essential to support early muscle development, which may ultimately affect meat yield. That feeding of broiler in the first days of life is one of the priority factors that could affect BW, DBWG, feed efficiency, uniformity and economic benefit.

Residual yolk and gastrointestinal tract relative weight

The average relative weight as a percentage of live body weight (%LBW) of different sections of the gastrointestinal tract (GIT) and small intestine length of chicks that were measured at 1, 2, 4, 8 and 10d of ages are shown in Table 3 and 4 respectively. Although, the difference of the residual yolk relative weight between the three experimental groups was not significant (P > 0.05), during 48h of post hatch, residual yolk relative weight of birds in the all groups decreased, while the decrease rate in birds that feed with 6h delayed was more rapid than fasted birds for 18h. This result is consistent with the previous study (ýNoy and Sklan 2001). Early feeding after hatch, compared to delayed feeding, appears to stimulate yolk utilization (Noy and Sklan 1998a; ýSpeake *et al.* 1998). Moran (1989) and Pinchasov and Noy (1993) reported depriving chicks of feed for 18 h post-hatch led to reduced uptake of residual yolk and greater yolk weights than was observed with chicks given immediate access to feed and water (ýMoran 1989; ýPinchasov and Noy 1993). Murakami *et al.* (1992) reported yolk weight decreases 48 to 41% per day for fed and feed-deprived broiler chicks, respectively. Upon examination of the rate of residual yolk utilization, hatchlings subjected to delayed access to food or water showed that the use of the yolk is retarded in comparison to 'Early-fed' birds, this may be due to increased intestinal mechanical (antiperistaltic) activity (ýNoy *et al.* 1996).

Tale1: Composition of the experimental diet

Ingredients	
Corn %	59.40
Soybean meal %	34.50
Soybean oil %	1.20
Limestone %	1.30
Di Ca- phosphate %	1.80
Sodium chloride %	0.50
Vit- min premix* %	0.50
Hcl- lysine %	0.40
DL-Methionine %	0.40
Theronine %	0.10
Calculated nutrients	
ME, (KCal/kg)	2900
CP, %	21.00
Ca, %	1.01
Av. P, %	0.48
Na, %	0.19
Lys, %	1.31
Met, %	0.69
Met + Cys, %	1.03
Theronine	0.90

*Supplied per kilogram of diet: vitamin A, 11000 IU; vitamin D3, 1800 IU; vitamin E, 36 mg; vitamin K3, 5 mg; vitamin B12, 1.6 mg; thiamine, 1.53 mg; riboflavin, 7.5 mg; niacin, 30 mg; pyridoxine, 1.53 mg; biotin, 0.03 mg; folic acid, 1 mg; panthotenic acid, 12.24 mg; choline chloride, 1100 mg; etoxycoin, 0.125 mg; Zn-sulfate, 84 mg; Mn-sulfate, 160 mg; Cu-sulfate, 20 mg; Se, 0.2 mg; I, 1.6 mg; Fe, 250 mg.

In the immediate post-hatch period, yolk was used for maintenance and for intestinal growth (ýNoy and Sklan 1999a). This requirement possibly led birds to use their body reserves to supply the nutritional requirement for survival, which resulted in body weight reduction. Yolk is utilized for preferential early growth of the small intestine, which occurs both in the presence and in the absence of feed although in the absence of feed both absolute and relative growth is lower (ýNoy and Sklan 1999b). The importance of the residual yolk was emphasized in the study of Swennen *et al*. (2009) as the residual yolk appeared to be of high importance when chicks were fed diets with different macronutrient content. Chicks fed the low protein diet showed the highest utilization of the yolk during the first two days.

The GIT organs relative weight were significantly ($p<0.05$) different between birds fed with 6h delayed compared to birds fed with 12 and 18h delayed after hatching. The GIT organs relative weight and small intestine length numerically decreased with increased delayed access to feed time. Significantly better development of GIT and higher duodenum, jejunum and ileum relative weights indicated a slight tendency of better GIT development in chicks that fed 6h delayed post-hatch opposite to birds fed with 12 and 18h delayed. The negative effect of fasting on performance traits was related to inadequate development of the GIT, particularly of the duodenum and jejunum, at a very early stage of postnatal life (**ý**Kuhn *et al*. 1996). Initiation of feed consumption as close to hatch as

Table 2: Effect of delayed access to feed of post-hatch on performance index; body weight at 12d, daily body weight gain, daily feed intake and feed conversion ratio in the during 1-12d of age of broiler chickens

Fasted hours	Body weight (g)	Daily body weight gain (g/ b/ d)	Daily feed intake (g/ b/ d)	Feed conversion ratio(g/ g)
6	271.64^{a}	21.28a	19.05	0.9
12	240.62^{b}	18.47b	19.24	1.05
18	249.86^{b}	19.29b	18.26	0.95
SEM	8.94	0.81	0.55	0.04
P-Value	*	*	ns	ns

a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

Table 3: Effect of delayed access to feed of post-hatch on relative weights of different sections of the gastrointestinal tract of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Age (d)	Fasted hours	Yolk	GIT	Gizzard	Small intestine	duodenum	jejunum	ileum	Large intestine
				(% Live Body Weight)					
1	6	5.69	17.62^{a}	8.88^{a}	5.21	0.51	1.31^{a}	3.33	0.39
	12	5.54	16.45^{ab}	8.56^{a}	4.93	0.59	1.08^{b}	3.20	0.48
	18	5.13	14.92^{b}	7.06^{b}	4.49	0.45	0.83^{c}	2.89	0.61
	SEM	0.60	0.58	0.20	0.31	0.19	0.19	0.23	0.27
	P-Value	ns	*	**	ns	ns	**	ns	ns
2	6	2.61	15.70	6.23	7.30	0.82^{a}	2.05^{a}	4.36	0.41
	12	1.85	15.08	5.56	7.01	0.82^{a}	1.94^{ab}	4.25	0.40
	18	3.54	14.95	5.43	7.11	0.58^{b}	1.60^{b}	4.24	0.41
	SEM	1.09	0.29	0.41	0.36	0.20	0.25	0.49	0.11
	P-Value	ns	ns	ns	ns	*	ns	ns	ns
4	6	-	17.95	4.95	10.22	1.03	3.15	6.05	0.36
	12	-	17.51	5.08	9.73	0.93	2.70	6.10	0.37
	18	-	17.16	4.95	10.14	0.91	2.61	6.63	0.38
	SEM	-	0.06	0.09	0.11	0.26	0.17	0.15	0.19
	P-Value	-	ns	ns	ns	ns	ns	ns	ns
8	6	-	14.43	3.80	8.34	0.86^{a}	2.51^{a}	5.19	0.37
	12	-	14.97	4.02	8.19	0.65^{b}	2.09^{b}	5.23	0.37
	18	-	14.41	4.09	7.86	0.62^{b}	1.98^{b}	5.25	0.30
	SEM	-	0.36	0.16	0.34	0.17	0.24	0.30	0.11
	P-Value	-	ns	ns	ns	*	*	ns	ns
12	6	-	12.81^{a}	3.46	7.62^{a}	1.08	2.13	4.41	0.24
	12	-	11.26^{b}	3.61	6.13^{ab}	0.50	1.69	3.94	0.26
	18	-	11.67^{b}	3.29	6.84^{b}	0.71	1.84	4.28	0.27
	SEM	-	0.30	0.16	0.44	0.53	0.3	0.34	0.08
	P-Value-	*	ns	*	ns	ns	ns	ns	

a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

Table 4: Effect of delayed access to feed of post-hatch on small intestine length of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Fasted hours	Age (d)				
	1	2	4	8	12
6	45.25	55.28	80.86	90.86^{a}	107.43
12	44.16	53.46	77.84	81.52^{b}	102.76
18	43.14	47.90	75.93	88.64^{a}	108.94
SEM	1.22	2.51	3.03	1.50	3.36
P-Valuens	ns	ns	**	ns	

a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

possible is essential to support early GIT development. Uni *et al*. (1998) reported that withholding feed from chicks for 36 h post-hatch resulted initially in retarded growth of all segments of the small intestine. Murakami *et al*. (1992) found that delaying access to feed and water slowed the growth of the small intestine and pro-ventriculus in broiler chicks. Noy and Sklan (1997) concluded that one effect of delayed placement on both chicks and poults was that the organs of the GIT (crop, small intestine, and large intestine) grew less by 48 h post-hatch than did organs of chicks placed immediately on feed and water.

Histological Measurements

The average villus height (VH), villus width (VW), crypt depth (CD), muscular thickness (MT) and apparent villus surface area (AVSA) of small intestine segments (duodenum, jejunum and ileum) of birds measured at 1, 2, 4, 8 and 12d of age are shown in tables 5, 6&7, curve 1& 2 and figure 1&2. The VH, VW and AVSA of duodenum and jejunum

Table 5: Effect of delayed access to feed of post-hatch on small intestinal (duodenum) morphological parameters of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Age(d)	Fasted hours	VH*	VW	CD	MT	VS	VH/CD
			(μm)			(μm^2)	
1	6	197^a	60^a	42	43	37595^a	4.76^a
	12	189^a	50^b	40	42	29495^b	4.77^a
	18	140^b	64^a	40	42	28662^b	3.49^b
	SEM	7.47	3.01	3.20	2.47	1930	0.30
	P-Value	**	*	ns	ns	*	*
2	6	202^a	81^a	46	37	51537^a	4.52
	12	195^a	72^a	52	43	43893^a	3.87
	18	183^b	58^b	54	41	33352^b	3.40
	SEM	9.97	4.84	4.28	3.77	2588	0.36
	P-Value	*	*	ns	ns	*	ns
4	6	252^a	83^a	69	48	65733^a	3.65
	12	221^b	72^{ab}	67	36	50748^b	3.32
	18	217^b	65^b	80	36	44746^b	2.70
	SEM	13.61	4.63	4.50	4.00	3832	0.21
	P-Value	*	*	ns	ns	*	*
8	6	442^a	87	118	78^a	121245^a	3.77
	12	385^b	77	101	59^b	93833^b	3.84
	18	382^b	68	118	80^a	82950^b	3.23
	SEM	15.95	6.10	5.31	5.55	8427	0.20
	P-Value	*	ns	ns	*	*	ns
12	6	480	85	112	99	130015	4.34
	12	467	74	111	93	109834	4.24
	18	425	66	117	97	88994	3.75
	SEM	19.79	8.03	8.25	6.08	13353	0.34
	P-Value	ns	ns	ns	ns	ns	ns

VH: Villus height (μm); VW: Villus width (μm); CD: Crypt depth (μm); MT: Muscular thickness (μm); VS: Villus surface area (μm^2).a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

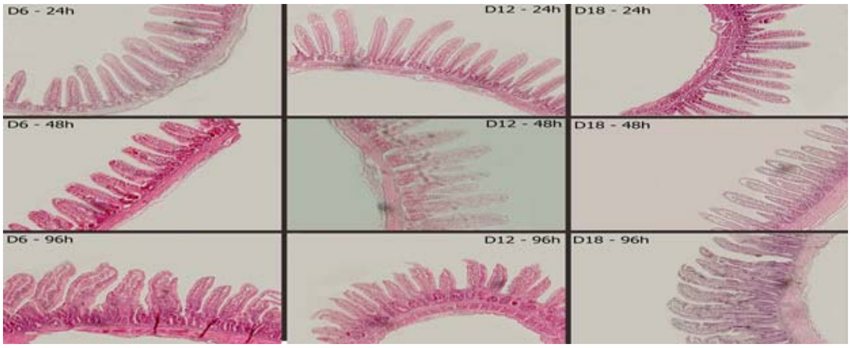


Fig. 1: Effect of delayed access to feed of post-hatch (: 6h, : 12h and : 18h) on duodenum villus height (µm) of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Table 6: Effect of delayed access to feed of post-hatch on small intestinal (jejunum) morphological parameters of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Age(d)	Treatments (fasted hours)	VH*	VW	CD	MT	VS	VH/CD
			(µm)			(μm^2)	
1	6	141	38	37	54^{a}	17414	3.82
	12	127	45	40	52^{a}	18399	3.22
	18	126	41	37	37^{b}	16723	3.36
	SEM	6.23	5.70	2.52	3.47	2986	0.23
	P-Value	ns	ns	ns	**	ns	ns
2	6	165^{a}	65	54	49^{a}	27313	3.06
	12	145^{b}	49	52	47^{a}	22628	2.84
	18	143^{b}	52	50	44^{b}	23745	2.89
	SEM	5.23	5.60	3.18	2.63	2907	0.20
	P-Value*	ns	ns	**	ns	ns	
4	6	189^{a}	89^{a}	59	72	59226^{a}	3.20
	12	184^{ab}	84^{a}	55	77	48764^{b}	3.43
	18	177^{b}	59^{b}	63	61	33246^{c}	2.88
	SEM	3.30	6.04	4.82	7.33	3219	0.25
	P-Value*	**	ns	ns	**	ns	
8	6	292	86	93	65	78979	3.18
	12	299	86	81	71	79777	3.68
	18	297	83	91	82	79769	3.30
	SEM	22.97	7.65	4.98	6.51	9518	0.29
	P-Valuens	ns	ns	ns	ns	ns	
12	6	308	88	91	72	85638	3.39
	12	304	86	93	73	82116	3.32
	18	302	84	91	80	80191	3.39
	SEM	14.35	4.94	4.73	5.94	5817	0.27
	P-Valuens	ns	ns	ns	ns	ns	

VH: Villus height (µm); VW: Villus width (µm); CD: Crypt depth (µm); MT: Muscular thickness (µm); VS: Villus surface area (μm^2).a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

significantly decreased with increased fasted time over 12h of chicks measured at 2, 4 and 8d of age. The highest VH, VW and AVSA observed in birds started to feed at 6h post-hatch and lowest VH, VW and AVSA observed in birds that started to feed with 18h delayed.

Significantly higher VH, VW and AVSA of duodenum and jejunum and insignificantly higher VH, VW and AVSA of ileum in the birds that started to fed at 6h after hatch compared to birds that fed 12 and 18h after hatch indicated a tendency of better GIT development in chicks (tables 5, 6 and 7 and curve 1). In line with this finding, previous studies have shown that feeding broiler checks immediately post-hatch accelerates the morphological development of small intestine (Noy and Sklan 1998b), while delay access to first feed for 24 to 48h post-hatch has decreased villi length (ýYamauchi *et al*. 1996). Uni *et al*. (1998) indicated that villus volume was depressed in the duodenum and jejunum in chick by 36h fasting post-hatch. In

Table 7: Effect of delayed access to feed of post-hatch on small intestinal (ileum) morphological parameters of broiler chickens measured at 1, 2, 4, 8 and 12d of age

Age(d)	Treatments (fasted hours)	VH*	VW	CD	MT	VS	VH/CD
			(µm)			(µm²)	
1	6	112	59	37	57	21011	3.04
	12	113	54	40	64	19662	2.88
	18	112	45	34	48	16108	4.07
	SEM	4.36	6.78	3.81	5.66	2729	0.74
	P-Value	ns	ns	ns	ns	ns	ns
2	6	156	49	48	53	23893	3.35
	12	145	47	52	61	21467	2.82
	18	155	48	51	62	23430	3.12
	SEM	7.36	4.14	3.44	4.34	1446	0.32
	P-Value	ns	ns	ns	ns	ns	ns
4	6	204	78	61b	72	50740	3.36a
	12	205	67	75a	72	44400	2.72b
	18	190	71	77a	76	42383	2.48b
	SEM	11.86	5.62	2.27	10.02	4874	0.20
	P-Value	ns	ns	**	ns	ns	*
8	6	230	76	92	76	55669	2.58
	12	224	92	89	75	65150	2.52
	18	222	87	91	81	61553	2.44
	SEM	8.14	5.64	7.12	3.58	5334	0.15
	P-Value	ns	ns	ns	ns	ns	ns
12	6	246	102	102ab	110	79215	2.41ab
	12	247	94	109a	109	72938	2.26b
	18	249	97	94b	103	76352	2.66a
	SEM	10.01	8.77	4.53	6.96	7378	0.10
	P-Value	ns	ns	*	ns	ns	*

"VH: Villus height (µm); VW: Villus width (µm); CD: Crypt depth (µm); MT: Muscular thickness (µm); VS: Villus surface area (µm2).

a, b Means with no common superscripts in each column are significantly different ($P < 0.05$)

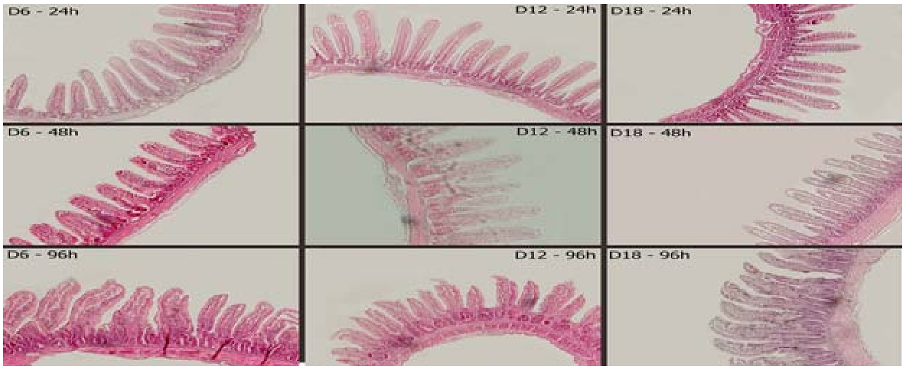
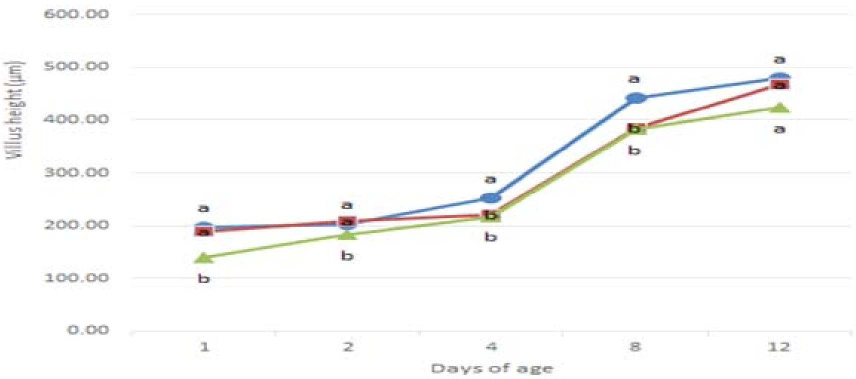
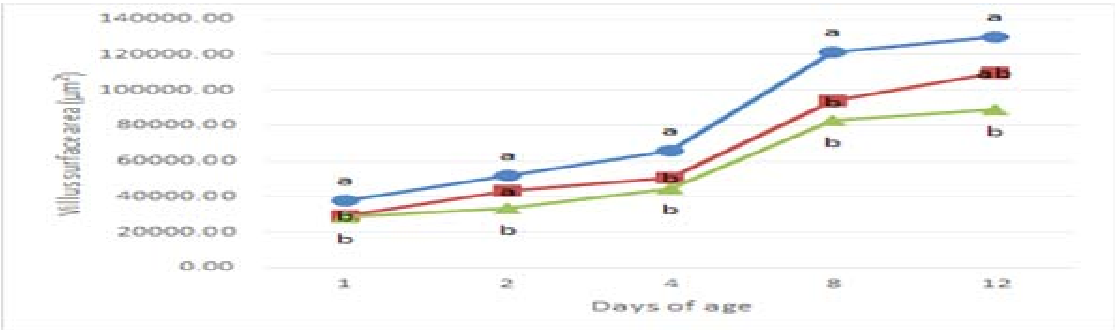


Fig. 2: Effect of delayed access to feed of post-hatch (: 6h, : 12h and : 18h) on duodenum villus surface area (µm2) of broiler chickens measured at 1, 2, 4, 8 and 12d of age





the rat following 4d fasting, atrophy and hyperplasia were reported in the duodenum and jejunum, but not in the ileum (Holt *et al*. 1986). Although the digestive capacity begins to develop a few days before hatch, most of the development occurs in the post-hatch period when the neonatal chick begins consuming feed (ýFerket and Uni 2006). Birds that have been given access to food immediately after hatch have been observed to exhibit more rapid development of the intestine during the immediate post hatch period and associated organs (ýYegani and Korver 2008).The surface area of the villi in the duodenum was initially depressed in the absence of feed but reached values close to those of fed chicks after 4 days, whereas the villus surface area in the jejunum was lowered throughout the first week post hatch.

CONCLUSION

In conclusion, because of delays in placement chicks are often subjected to delayed access to feed and water, which may retard the development of the GIT, limiting nutrient utilization and performance of the broiler chicken. Early access to feed and water after hatch has shown to be an important factor for subsequent performance. Therefore, delayed access to feed adversely affects chicks' performance. In this experiment we found that holding feed time for 6h v until 18h is compensated by increasing the broiler performance. It is recommended that transportation plan be provided to chicks to reduce starvation.

ACKNOWLEDGMENT

We greatly appreciate financial support of this research from the Ferdowsi University of Mashhad, Iran.

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