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Effect of Feed Volume on some Morphological Characteristics of the Chick Gastrointestinal Tract

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It is evident that feed volume exerted an infeluence upon chick performance and some morphological characteristics of the gastrointestinal tract. The larger volume being unfavourable.

Certain amount of bulk is considered important for the normal functioning of the digestive tract, particularly in the elimination of feed residues since it has a laxative and stimulating effect on the peristaltic movement (Bolton, 1961). In a previous article we found that a compact diet with a volume of 176/c.c gave higher growth value than a bulky diet with a volume of 266/c.c.

Very little is known about the effect of feed volume on the morphological characteristics of the chick gastrointestinal tract, though a search was made to a search was made to clear this effect.

Experimental

This study was conducted for 14 weeks period using 495 unsexed one-day old chicks. All chicks were wing banded, weighed and divided into three groups of equal numbeé. Every group was distributed randomly over three replicates of 55 chicken each. Chicks were reared on wire floors in electrically heated battery brooders up to the age of seven weeks. They were then transfered to floor pens up to 14 weeks age. The first group (A) were fed the compact ration and the second group (B) were fed the bulky ration while the third group (C) were fed both the compact and bulky ration alternatively, at weekly intervals starting with compact ration. Rations used are shown in Table 1, both of them are equal in digestible protein (18 %) and starch value (63 g/100 kg feed). The estimated volume of the two rations as measured by measuring cylinder were 167 and 266 cc/100 g feed for the compact and bulky rations, respectively. Cod liver oil was added at a level of 2 % to both rations to cover vitamins A and D requirements. Food and water were given *ad libitum*.

At 14 weeks of age, live body weight of 5 males and 5 females from each treatment were recorded. The birds were then slaughtered eviscerated and carcass weights were obtained as live weights minus blood,feather, heads, necks, shanks and internal organs. Dressing percentage was calculated as eviscerated carcass weight relative to live body weight. The digestive organs of the dressed birds were morphologically studied. The digestive organs were weighed before their contents were removed. The liver, pancreas and the separate parts of the digestive tract were weighed separately. Weights of full digestive tract, liver and pancreas are relative to live weight. Weights of empty digestive tract and its separate parts are relative to live body weights minus the digestive tract contents in each. The length of digestive tract and cecum were measured using a cloth tape-measure.

TABLE 1. **Composition of experimental rations.**

Ingerdients	Compact %	Bulky %
Corn	10	22
Wheat	40	—
Horse bean	17	9
Cottonseed meal	19	—
Peanut meal	5	20
Wheat bran	—	30
Rice polish	—	10
Fish meal	66	6
Bone meal.	2	2
Ground limestone	0.5	0.5
Salt	0.5	0.5
Total	100	100
Digestible protein.	18.09	18.09
Starch value	63.33	63.01
Crude fiber	4.31	5.74
Volume cc/100 g. feed.	176.00	266.00
Density g/cc	0.57	0.38

Estimated from Ghoneim's tables 1965, 1960 and Ministry of Agriculture tables, 1961.

Results and Discussion

The results obtained in this study are shown in Table 2 and 3. It appears that eviscerated weights of the group (A) fed compact ration was significantly superior to group (B) which was fed a bulky diet and group (C) which was fed both compact and bulky diets alternatively, in both males and females. Dressing percentage in group (A) was higher than the other two groups. The average relative weight values of empty gastrointestinal tract showed significant differences among treatments in males while in females there was no significant differences among treatments. On contrary of that, the average values of the gastrointestinal tract and ceca lenghts were only significant in females.

The relative weight of separate parts of the gastrointestinal tract and accessory glands (liver and pancreas) were higher in group (B) than both group (A) and group (B) in both males and females irrespective of the proventriculus in males and ilem in females. The differences in esophagus and crop, duodenum and ceca were significant in both males and females.

It is well known that the secretion of gastric juices is very closed to the quantity of feed consumed (Maynard and Loosli 1962). It is suggested that the contraction of the digestive tract, particularly the crop are highly related to the quantity of feed consumed. These contractions may be concerned with the transport of feed in the gastrointestinal canal, as well as, connected with the absorption and secretion (Duckes 1955).

TABLE 2. Eviscerated carcass weight and dressing percentage of male female groups at 14 - week age.

Sex	Compact feed	Bulky feed	Bulky and compact feed
Eviscerated weight g . .	497.0[a]	394.4[a]	453.4[a]
Dressing %	54.1[a]	52.5[a]	51.8[a]
Live body weight	918.0	751.0	875.0
Eviscerated weight g . .	475.4[a]	372.4	375.0[b]
Dressing %	57.2[a]	54.5[a]	49.6[a]
Live body weight	831.0	678.4	756.0

a, b means in every or any given row sharing the same superscript do not significantly (P 0.05) differ from each other ; otherwise they differ.

TABLE 3. Weight and percentage for digestive organs for males and females of different gronps at 14 weeks age.

Organs	Groups					
	A		B		C	
	Male	Female	Male	Female	Male	Female
Digestive tract full .	209.5[a] 22.9[b] %	196.0[a]g 23.5[a]	223.1[a] 29.7[a]	190.0[a] 29.9[a]	257.0[a] 29.3[a]	194.0[a] 25.7[a]
Digestive tract empty	141.7[a] 16.7[a] % 171.4[a]cm	136.1[a]g 17.6[a] 181.0[a]	129.8[a] 19.8[b] 170.4[a]	119.3[a] 19.7[a] 158.0[b]	145.5[a] 17.1[a] 187.0[a]	131.5[a] 17.4[a] 174.8[a]
Esophagus and crop	9.6[a]g 1.1[b]%	9.3[a] 1.1[b]	9.4[a] 1.4[a]	9.3[a] 1.5[a]	12.7[a] 1.6[a]	11.4[a] 1.6[a]
Proventriculus . . .	6.2[a]g 0.72[a]%	5.7[a] 0.70[b]	5.9[a] 0.69[a]	5.6[a] 0.91[a]	6.2[a] 0.81[a]	5.9[a] 0.85[a]
Gizzard	31.3[a]g 3.6[a] %	31.3[a] 4.8[a]	28.2[a] 4.2[a]	24.8[b] 4.0[a]	31.2[a] 4.0[a]	27.4[ab] 3.9[a]
Duedenum	12.6[a]g 1.4[b]%	12.6[a] 1.5[b]	14.2[a] 2.1[a]	12.1[a] 1.9[a]	16.5[a] 2.1[a]	14.6[ab] 2.08[a]
Ileum	34.7[a]g 4.0[a]%	35.6[a] 4.5[a]	29.8[a] 4.5[a]	24.2[b] 3.9[a]	33.6[a] 4.3[a]	30.4[a] 4.3[a]
Colon.	4.0[a]g 0.82[a]%	4.1[ab] 0.89[a]	3.6[a] 0.98[a]	3.5[a] 0.0[a]	4.0[a] 0.99[a]	4.5 [b] 1.06[a]
Ceca	7.0[a] 0.47[b]% 16.3[a]cm	7.0[a] 0.52[b] 16.8[b]	6.5[a] 0.54[a] 15.9[a]	6.1[b] 0.57[a] 15.0[a]	7.9[b] 0.53[a] 15.9[a]	7.2 [a] 0.64[a] 14.6 [a]
Liver	31.5[a]g 3.4 %	26.2 3.1	27.4[a] 3.56[a]	22.9[a] 3.34[a]	33.3[a] 3.8[a]	25.2[a] 3.38[a]
Pancreas	4.9[a]g 0.53[a]%	4.7[a] 0.56[a]	4.8[a] 0.63[a]	4.8[a] 0.70[a]	6.0[a] 0.68[a]	5.3[a] 0.70[a]

An extra stimulating effect will happen to the digestive tract to contract either to secrete more juices, or to transport ingesta when an extra feed was consumed.

Consequently the contractions of the gastrointestinal canal of chicks fed bulky diets were more than those fed compact diet as a result of the more feed consumed in the former group. However, this could be responsible for the increase in relative weight of digestive tract of the group fed bulky diets. Cleaves and Satyavan, (1971) reported that feed volume did not exert a consistent effect on the weight of gizzard and small intestine or large intestine.

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تأثير حجم الكتلة الغـذائية على بعض الصفات المرثولوجية للجهاز الهضمى فى الدجاج

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ثبت من البحث أن حجم الكتلة الغذائية له تأثير كبير على حجم الجهـاز الهضمى ، كذلك أدى الى تغيرات كثيرة فى وزن الجهاز الهضمى وسرعة نمو الدجاج وكفاءة التمويل الغذائى . وكلما صغر حجم الغذاء أدى ذلك الى سرعةالنمو وتحسين كفاءة التمويل الغذائى عن العلف اذا كبر حجمه وزادت نسبة الألياف بها .