

## Development of Digestive System in Pigeons

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**F**IVE AGE groups and three males in each age were available. The ages were 1,7,15,30 days and adults of almost one year. Squabs used were left for their parents for the brooding stage until one month of age. Afterwards, the birds were fed a ration composed of equal parts of wheats and maize. The digestive system were removed and the absolute and relative physiological volume, length and weight of different segments were determined. The absolute volume, length and weight of different segments of digestive system of pigeons increased with age. In the brooding stage the relative volume of gizzard decreased and that of crop increased. In this period the squabs consumed semi-digested food. Over the brooding relative stage, the squabs became independent in its nutrition from parents, the volume of gizzard increased and that of crop decreased. Except crop, the relative weight of all segments of the digestive system decreased with age. Numerous folds formed in the wall of crop caused the observed increase in its relative weight.

No picture can be observed for the development of digestive system of pigeons due to lack of literature.

### Material and Methods

Parents of pigeons used were collected from the local workers at random. Its strains were unknown. Five age groups and three males in each age were available. The ages were 1,7, 15,30 days and adults of almost one year. Squabs used were left for their parents for the brooding stage until one month of age. Afterwards, the birds were fed a ration composed of equal parts of wheat and maize. At the selected ages, the parts of digestive system were obtained after slaughtering. The absolute and relative physiological volume, length and weight of different segments were determined. Analysis of variance was carried out according to Snedecor (1959).

### Results and Discussion

#### 1. Physiological volume

##### 1. Crop

The actual and relative volume of crop increased with age reaching at 30 days of age. During this period the squabs consume lot of semi-digested feed due to the coinciding highest growth rate. Adult pigeons however, have smaller crop size Table 1. The decrease of volume in adult pigeons is

TABLE 1. Absolute and relative physiological volume and calculated volume (I.S.E) of crop gizzard, duodenum and jejunum and ileum of pigeons at different ages.

Segments	Age (days)				Adult
	1	7	15	30	
Mean actual volume (cm <sup>3</sup> ) of:					
Crop	2.83±0.44	16.50±1.91	32.50±2.33	38.33±3.77	24.33±2.59
Gizzard	0.50±0.32	2.00±0.33	2.33±0.33	2.17±0.67	5.00±1.16
Duodenum	0.27±0.02	1.63±0.33	3.33±0.33	2.93±0.33	2.00±0.33
Jejunum and ileum	0.40±0.10	2.50±0.76	4.67±1.45	5.00±1.04	3.67±0.88
Mean calculated volume (cm <sup>3</sup> ) of:					
Crop	18.86	31.58	49.02	80.29	119.40
Gizzard	22.93	37.63	49.02	58.55	80.92
Duodenum	0.18	2.05	4.81	5.65	6.60
Jejunum and ileum	0.57	2.89	16.04	22.59	29.15
Relative volume of:					
Crop	70.75±2.67	71.96±1.67	74.15±2.11	79.30±4.94	69.51±3.89
Gizzard	12.50±1.08	8.72±1.50	5.32±0.74	4.44±0.52	14.29±1.31
Duodenum	6.75±1.96	7.11±1.40	7.60±0.89	5.99±0.84	9.71±1.06
Jejunum and ileum	10.00±1.41	10.72±1.21	12.84±1.62	10.22±1.48	10.49±1.59

TABLE 2. Absolute and relative length of the different digestive tract parts of pigeons at different ages.

Segments	Mean length (cm)					Relative length				
	Age (Days)					Age (Days)				
	1	7	15	30	Adult	1	7	15	30	Adult
Esophagus ± S.E	5.90 ±0.21	11.17 ±1.17	13.17 0.17	14.27 0.27	16.00 ±0.58	12.24 ±1.39	11.06 ±0.95	10.03 ±0.52	11.59 ±0.93	16.49 ±2.61
Proventriculus ± S.E	1.10 ±0.60	2.07 ±0.07	2.23 ±0.46	2.67 ±0.17	2.67 ±0.19	2.27 ±0.24	2.05 ±0.04	1.71 ±0.21	2.19 ±0.32	2.73 ±0.85
Duodenum ± S.E	6.90 ±0.38	13.90 ±0.76	17.33 0.88	18.00 ±1.00	14.47 ±1.01	14.44 ±2.06	13.76 ±0.83	13.16 ±0.51	14.50 ±0.47	14.57 ±0.99
Jejunum & ileum ± S.E	32.73 ±3.91	67.67 ±1.67	93.67 ±6.84	84.33 ±5.71	1.67 ±75.55	66.30 ±1.53	67.27 ±1.39	70.80 ±1.50	71.21 ±0.97	72.68 ±2.33
Rectum ± S.E	0.87 ±0.07	1.97 ±0.09	2.83 ±0.17	3.23 ±0.80	2.57 ±0.26	1.83 ±0.34	1.95 ±0.12	2.14 ±0.02	2.62 ±0.60	2.61 ±0.83
Caeca ± S.E	0.33 ±0.03	0.43 ±0.13	0.53 ±0.03	0.63 ±0.15	0.66 ±0.00	1.71 ±0.23	1.05 ±0.31	0.97 ±0.06	1.17 ±0.18	1.41 ±0.10

$$\text{Relative caeca length} = \frac{\text{The length of two caeca}}{\text{The length of small intestine}} \times 100$$

TABLE 3. Absolute and relative weight of the different digestive system parts of pigeons at different ages.

	Mean weight(g) Age (Days)				Rel. wt. to body wt. Age (Days)				Rel. wt. to empty dig. tr. wt. Age (Days)						
	1	7	15	30	Adult	1	7	15	30	Adult	1	7	15	30	Adult
Esophagus ± S.E	0.27 ±0.07	0.53 ±0.07	0.80 ±0.10	1.00 ±0.12	1.20 ±0.20	1.17 ±0.18	0.43 ±0.07	0.33 ±0.02	0.31 ±0.02	0.27 ±0.04	5.82 ±1.02	3.27 ±0.48	2.70 ±0.39	2.73 ±0.13	2.53 ±0.29
Crop ± S.E	0.33 ±0.07	1.53 ±0.07	2.90 ±0.31	3.33 ±0.44	7.27 ±0.27	1.44 ±0.23	1.24 ±0.05	1.04 ±0.07	1.04 ±0.07	1.65 ±0.01	8.33 ±1.96	9.44 ±0.68	9.78 ±0.53	9.09 ±1.32	15.33 ±1.08
Proventriculus ± S.E	0.37 ±0.09	0.67 ±0.07	1.30 ±0.07	1.60 ±0.12	1.93 ±0.13	1.61 ±0.49	0.55 ±0.06	0.50 ±0.11	0.50 ±0.03	0.44 ±0.03	9.34 ±1.23	4.14 ±0.74	4.38 ±0.32	4.37 ±0.42	17.04 ±0.55
Gizzard ± S.E	1.07 ±0.27	4.47 ±0.67	7.53 ±0.59	10.10 ±1.19	13.60 ±2.78	4.65 ±0.73	3.63 ±0.76	3.16 ±0.09	3.16 ±0.46	3.08 ±0.71	27.02 ±2.06	25.59 ±2.06	25.59 ±0.69	27.56 ±2.88	28.69 ±3.41
Duodenum ± S.E	0.20 ±0.00	0.80 ±0.12	1.52 ±0.12	2.03 ±0.24	2.87 ±0.07	0.87 ±0.08	0.65 ±0.15	0.63 ±0.26	0.63 ±0.09	0.65 ±0.01	5.05 ±0.96	4.94 ±0.94	5.13 ±0.32	5.54 ±1.19	6.06 ±0.69
Jejunum & ileum ± S.E	0.40 ±0.12	1.87 ±0.13	3.60 ±0.70	4.77 ±0.47	5.74 ±0.27	1.74 ±0.51	1.52 ±0.23	1.51 ±0.11	1.49 ±0.17	1.30 ±0.06	10.01 ±1.22	11.54 ±1.92	12.14 ±1.28	13.02 ±1.28	12.09 ±1.36
Rectum ± S.E	0.20 ±0.00	0.27 ±0.07	0.44 ±0.00	0.62 ±0.10	0.87 ±0.07	0.87 ±0.08	0.22 ±0.03	0.19 ±0.02	0.19 ±0.02	0.20 ±0.02	5.05 ±0.93	1.67 ±0.57	1.48 ±0.10	1.69 ±0.28	1.84 ±0.59
Liver ± S.E	0.00 ±0.12	5.33 ±1.07	10.30 ±1.22	11.53 ±1.47	12.00 ±0.72	4.35 ±0.45	4.33 ±0.56	3.33 ±0.10	3.60 ±0.69	2.72 ±0.15					
Pancreas ± S.E	0.12 ±0.00	0.73 ±0.07	1.27 ±0.18	1.67 ±0.24	1.93 ±0.24	0.52 ±0.04	0.51 ±0.10	0.53 ±0.06	0.52 ±0.12	0.44 ±0.06					



due to the thick and heavy walls of the crop especially during the period of brooding. Accordingly, lumen size decreases. The calculated volume however, does not decrease at the adult ages. This is due to that when this part is stretched, it gives longer measure as it has lot of folds. The crop part showed significant variation in its physiological volume between ages.

### 2. Gizzard

The physiological volume of gizzard increased with age (Table 1). The rate of development of the body is higher than the rate of the gizzard. Accordingly, the relative volume of the gizzard decreased with age. Adults have relatively higher gizzards as body weight is almost constant and also the gizzard increased in size to be able to ground the hard food (Table 1). The difference was significant between ages.

### 3. Small intestine

Duodenum, jejunum, and ileum are an early maturing segments. These parts have almost constant relative and absolute value from the beginning of life until the adult ages (Table 1). The difference between ages in physiological volume of duodenum was highly significant, while in jejunum and ileum was significant.

## II. The length

The absolute length of esophagus, proventriculus and rectum increased with age, while that of small intestine increased only until 30 days of age then decreased (Table 2). Relative length of esophagus, proventriculus and duodenum decreased with age until 30 days and then increased. Whole, jejunum and ileum and rectum increased with age. This may indicate that the squabs demand the jejunum and ileum and rectum in early period than esophagus, proventriculus and duodenum. This indicates that, jejunum and ileum and rectum were maturing earlier than the other parts. The caeca as a rudimentary part in pigeons have no role or trend of changed (Table 2). The differences between ages in length of proventriculus, duodenum, jejunum and ileum and rectum were significant, while in esophagus it was highly significant.

## III. The tissue weight

The absolute weight of all segments and parts of digestive system increased with age (Table 3). Relative weights to body weight of all segments and parts of digestive system decreased was higher than the growth rate of digestive system. However these relative weights were almost the same from 7 days of age until adult pigeons except the crop. Relative weights to total weight of empty digestive tract of all decreased with age while in crop it increased (Table 3). Analysis of variance showed that it was significant between ages in esophagus, gizzard, rectum and pancreas, while it was highly significant between ages in proventriculus small intestine and liver (Table 4).

In general, the different estimations of the digestive system indicate that, that is an early maturing organ and this occurs from the beginning of life. The only exception is the crop as it has two distinct stages. The first during the brooding stage when semi-digested feed is consumed and its size is large while its weight and relative values are small. The contrary occurs in the adults when hard food is used causing the crop to be small while its weight and relative values are high due to thick walls having numerous folds.

#### References

Sendecor, G. W. (1959) "Statistical Methods." Iowa State College Press, Ames, Iowa .  
5th edition, 2nd reprinting

### تطوير الجهاز الهضمي في الحمام

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في هذه التجربة جمعت الإباء من المشتغلين المحليين ثم ربين لذلك نجد أن سلالة هذا الحمام غير معروفة \*

استخدم في هذه التجربة خمسة مجاميع من العمر وداخل كل مجموعة أخذت ثلاثة ذكور من الحمام وهذه المجاميع هي عند عمر ١ - ٧ - ١٥ - ٢١ يوم - حمام بالغ عمره تقريبا سنة \*

الزغالييل كانت تعتمد على الإباء في تغذيتها أثناء فترة الحضانة حتى عمر ٣٠ يوم ولكن الإباء كانت تغذيتها على عليقة مكونة من نسبة متساوية من كلاً من الذرة والقمح \* العينات - المقاييس - التحليل الإحصائي التي استخدمت في هذه التجربة مشابهة التجربة السابقة وكانت أهم النتائج المتحصل عليها هي :

١ - الحجم - الطول - الوزن المطبق للأجزاء المختلفة للجهاز الهضمي يزيد من العمر \*

٢ - في فترة الحضانة ( من عمر الفقس حتى عمر ٣٠ يوم ) نجد أن الحجم النسبي للقنوصة ينقص بينما تزيد بالحوصلة حيث في هذه الفترة تتناول الزغالييل غذاء نصف مهضوم أما بعد فترة الحضانة فنجد أن الزغالييل استقلت عن الإباء في تغذيتها لذلك نجد أن الحجم النسبي للقنوصة يزيد ولكن الحوصلة ينقص \*

٣ - باستثناء الحوصلة نجد أن الوزن النسبي لكل أجزاء الجهاز الهضمي تنقص مع تقدم العمر ٠٠ أما الحوصلة فإن الوزن النسبي لها يزيد مع تقدم العمر وقد يكون ذلك راجع لتكوين عدد التنيات في جدار الحوصلة \*