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Original Contribution

AGE MORPHOMETRY OF SOME INTERNAL ORGANS IN COMMON PHEASANT (*PHASIANUS COLCHICUS COLCHICUS*)

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ABSTRACT
AIM: To determine some morphometrical parameters of colchis pheasant internal organs.
MATERIALS: We studied 30 colchis pheasants, divided in three groups (each group was consisted of 5 males and 5 females) at 15, 17 and 19 weeks of age.
METHODS: Following euthanasia and evisceration, the digestive tract was separated in segments, corresponded to its different parts (esophagus, crop, proventriculus, gizzard, small intestine, caeca and rectum). The weight of digestive structures, heart, liver, spleen and testicles was determined by electronic scale and the length of the tubular digestive organs was measured with ruler and graph paper. The results were collected and recorded. The obtained data was processed via variable statistical methods.
RESULTS: The body weight of the female birds was significantly lower than that of the male ones. In males the gizzard's percent decreased significantly through the whole investigative period. The proventriculus and heart proportions were almost the same with age advancing. Females were with heavier livers and spleens than males, but the spleen difference was without statistical significance. The length of the crop, esophagus and intestines had lower values in males, compared to females
CONCLUSION: The older male and female pheasants had significantly shorter tubular digestive organs. The youngest male individuals had heavier liver, compare to the females. These alterations of the morphometrical parameters in the pheasant internal organs are provoked by sex dimorphism influence.

Key words: morphometry, internal organs, pheasant

INTRODUCTION

The pheasants are birds widely spread all over the world. They are part of the suborder Galloanserae, order Galliformes, family Phasianidae. These birds are found in Europe, Asia, North America, some areas of South America, the southern parts of Australia and New Zealand (1).

The birds' digestive system has different variations, which are mainly observed in the structures and segments, as well in the length and weight. These features are connected with the amount and type of food, season conditions, species characteristics, age, sex, housing type, ambient temperatures, etc (2, 3).

There is data available, concerning the structure and the weights and lengths of the digestive tract and its segments. A lot of authors investigate the major pheasant internal organs, such as heart, liver, gizzard, spleen, lung, testicles and intraorbital glands and find the correlative effect among the pheasant housing, conditions and sex on the organs' weight (4, 5, 6).

In the wild nature the bird have adaptive mechanisms for rational use of feed resources,

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because of the irregular finding of food. Due to the conditions of life and seasons' cycle variations in the weight and length of their different digestive system aren't often observed. In individuals bred voliery, there are many adaptive alterations, concerning the morphometrical parameters of the digestive organs, because of the regular access to food (7).

The morphometrical parameters of game pheasant are investigated by (7). They find that pheasants, bred voliery have smaller gizzards, proventricules, hearts and testis, but bigger liver and spleen. The lenght of the digestive system and its segments is greater in the birds, bred with feed mixture for commercial purposes.

According to some authors (8) the red-legged partridges fed for commercial purposes have lighter gizzards and shorter intestines, than the birds bred in the summer season and fed with fibre-rich diet.

The length of the bird intestines and their segments differs in birds fed on fruit and insects then in carnivorous individuals as the first have shorter intestines (9).

Statistical studies are performed by (10, 11) in broiler chicks and pheasants. The results show an age related specification, concerning the digestive structures' length. The relative length of the small intestine and caeca demonstrate regression and decrease with age. The percent weight of the pheasant glandular stomach reduces toward the slaughter body weight.

The scarce data about morphometrical features of common pheasant (Phasianus Coclchicus Coclchicus) internal organs was a motivation to perform the present study. The obtained data could be useful as a base for standard values of the optimal parameters in these organs.

MATERIALS AND METHODS

Object

We studied 30 colchis pheasants, housing in battery cages, divided in three groups (each group was consisted of 5 males and 5 females) at 15, 17 and 19 weeks of age. Stocking density of the studied birds was one bird per 1 m^2 approximately. The feeding was with finisher, containing 18.06% of protein and 2750 kcal ME/ kg. Five male and five female birds at 15, 17 and 19 weeks of age with body weight similar to this of the flock were selected. The birds were weighed on automatic weightier. The experimental animals were euthanized and then eviscerated. The digestive tract was separated in segments, which corresponded to its different parts (esophagus, crop, proventriculus, gizzard, small intestine, caeca and rectum). The weight of digestive structures, heart, liver, spleen and testicles was determined by electronic scale with accuracy of 0.1 g and was calculated as percentage of body weight. The length of the tubular digestive organs was measured with ruler and graph paper with accuracy of 1 mm. The experiments were done in strict compliance with the Institutional Committee of Animal Health Care in the Trakia University, Stara Zagora. The statistical analyses of the obtained data (arithmetic means and standard errors (SE) and Student's t-test between age groups and sexes) were processed with statistical software StatView™ v. 4.53 for Windows (Abacus Concepts, Inc).

RESULTS

It was found by the present study that the pheasants at 15, 17 and 19 weeks of age had a relatively high weight. The body weight of the female birds' three aged groups was significantly lower than that of the male ones, provoked by the one of sexual dimorphism's manifestation. In males the gizzard's percentage decreased significantly through the whole investigative period, and in females- only between 15th and 17th week. At 19th week of age the males had significantly lower gizzard than females. With the age, the proventriculus and heart proportions were almost the same. There were significant differences in the heart percentage of female birds at 15 and 19 weeks of age. The liver's proportion decreased with statistically significant levels in females with increasing age. Statistically significant difference in the organ percentage between both sexes was observed at 15th and 17th week. At 19th week, although there wasn't significant intersexual difference, females were with heavier livers. The spleen's proportion decreased reliably only between males at 15 and 17 weeks of age. As with the livers, the spleens had higher proportion in females, than in males, but the difference was without statistical significance. The testis percentage increased statistically with age **(Table 1)**.

Table 1. *Proportional weight in total body weight (%) of some internal organs in males and females pheasants of different age*

Feature		Age (weeks) and sex					
		15		17		19	
		males	females	males	females	males	females
Gizzard, %	x	1.9[a]	2.0[b]	1.7[a]	1.8[b]	1.5[a]	1.7*
	SE	0.07	0.08	0.08	0.06	0.08	0.07
Proventriculus, %	x	0.5	0.5	0.4	0.4	0.4	0.4
	SE	0.02	0.01	0.02	0.02	0.02	0.01
Liver, %	x	2.0	2.2*	2.0	2.2 [b]*	1.9	2.0[b]
	SE	0.09	0.04	0.06	0.05	0.06	0.07
Heart, %	x	0.5	0.6[b]	0.5	0.5	0.5	0.4[b]
	SE	0.02	0.01	0.01	0.02	0.02	0.02
Spleen, %	x	0.1[a]	0.1	0.08[a]	0.09	0.07	0.08
	SE	0.01	0.01	0.02	0.02	0.01	0.01
Testicles, %	x	0.01	-	0.02[a]	-	0.04[a]	-
	SE	0.002		0.004		0.005	

a, b – mean values of features in rows with distinct letters, singly for males and females, differ significantly ($P \leq 0.05$).

* - mean values for different sexes of pheasants of the same age differ significantly.

The length of the crop, esophagus and intestines was with lower values in males, compared to females in the three aged groups. The older birds had lower relative length of the esophagus, crop small intestines, caeca and rectums and lower total intestinal length than the younger individuals **(Table 2)**.

Table 2*. Body weight and relative length of segments of the digestive tract in pheasants of both sexes at different age*

Feature		Age (weeks) and sex					
		15		17		19	
		males	females	males	females	males	females
Body weight, g	x	1185.4	938.6*	1253.7	956*	1310	988*
	SE	8.8	9.6	10.1	11.1	14.2	12.8
Esophagus and crop	x	1.80	1.85	1.77	1.79	1.68	1.70
	SE	0.25	0.17	0.09	0.15	0.29	0.24
Small intestine	x	11.24	12.01*	10.65	11.86*	9.75	11.23*
	SE	0.70	0.74	0.52	0.64	0.69	0.70
Caeca	x	4.21	4.76*	3.10	3.53	2.80	3.09*
	SE	0.11	0.19	0.15	0.12	0.18	0.14
Rectum	x	0.90	0.97*	0.81	0.75*	0.68	0.70
	SE	0.06	0.09	0.07	0.09	0.08	0.07
Total intestine	x	18.6	19.1*	14.3	15.9*	13.8	14.1
	SE	0.74	0.84	0.91	0.77	0.71	0.86

* - mean values for different sexes of pheasants of the same age differ significantly.

DISCUSSION AND CONCLUSION

The results of our study confirmed the attitude of many authors, that the age and sex have a significant role on digestive organs' development. There were alterations observed in length as well as in width of the studied organs.

As many authors (4, 5 and 6) have studied internal organs such as intraorbital glands, heart, proventriculus, gizzard, liver, spleen and testicles except pheasant digestive system, important role and the influence of sex and age on their development was proved.

The studied birds were bred in voliery, and there were many adaptive changes observed, concerning digestive organs' morphometrical parameters, because of regular feeding, that was found by some authors (7).

Our data confirmed the statistical results of (7) that the dimorphism manifestation has a key role for body weight's difference in both sexes. The age and body weight of the studied birds, used by these authors was close to the age of the pheasants, investigated in our study.

The length and weight of the gizzards, proventriculus, hearts and testis in the studied pheasants in voliery were with decreased values with age progression, which corresponded with the data of (7, 8).

Contrary to (9) there was no differentiation, concerning the manner of bird feeding. The fact, that the birds are herbivorous wasn't proved. Only the age and sex impact was observed in details.

As (10, 11) a statistical study was performed. The results confirmed the findings of these authors, that pheasant colchis females have significantly lower weight, compared to males. The gizzard and liver proportion showed the same decreasing patterns, compared to testicles with age advance. The comparative length of the intestines, caeca and rectums and the total length of the intestinal mass demonstrated similar decreasing values, as found by (10, 11).

The older male and female pheasants had significantly shorter small intestines, caeca and rectums. The intestinal mass was shorter with age advancing in both sexes. The oldest males had significantly lower gizzards, than females at the same age. The youngest male individuals had heavier liver, than females. All these results proved the key importance of dimorphism manifestation and age on pheasant internal organs proportions.

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