



The dynamics of Live Weight of Pheasant Chicks (*Phasianus colchicus colchicus*) Breeding Artificially

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THE RESEARCH was implemented in 2018 at the Institute of Zoology of ANAS. The experimental part of study was carried out in Institute's vivarium, but the analysis of results was performed in Protozoology laboratory and at the Department for Biology and its teaching methods of Azerbaijan State University. The studies were conducted on pheasants (*Phasianus colchicus colchicus*) incubated in the vivarium of the Institute. The birds were weighed individually, separately, one by one on an electronic scale (Adventurer Pro) with an accuracy of 0.1 mg, in the first two months of postembryogenesis (1, 3, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 34, 38, 42, 50 and 60 days) before feeding in the morning.

It was determined that recorded jumps of the pheasants of all ages manifests itself in the form of peaks in the dynamics of relative weight gain and relative growth rate during the development and growth of both male and female individuals. The highest peak in the dynamics for relative weight gain (RWG) and relative growth rate (RGR) of pheasant chicks is observed in 10-day birds (64.24% and 94.65%, respectively), although there is decrement in both indicators of male and female pheasants, it was noted that these indicators rise in some days. In the index of RWG and RGR of 12-60 day pheasants, the first high increase is observed in 16-day birds (♂ 32.26% and 38.46%; ♀ 31.14% and 36.89%), the second highest increase in 22-day birds (♂ 35.07% and 42.52%; ♀ 36.21% and 44.12%), the third highest increase in 42-day birds (♂ 63.10% and 62.19%; ♀ 51.17% and 68.76%). The decrements in the index of both RWG and RGRs is compensated in the days when the next peaks observed. The differences among all weight indicators of male and female pheasants, as well as RWG and RGR are significant and the index of male pheasants is higher than female pheasants.

Keywords: Pheasants (*Phasianus colchicus colchicus*), body weight, postembryonic development, ontogenesis, growth rate.

Introduction

Pheasants are found all over the world [1]. In Azerbaijan, pheasant (*Phasianus colchicus*) is represented with 2 subspecies - Caucasian pheasant (*Phasianus colchicus colchicus* L. sinonim *Phasianus colchicus lorenzi*) and Talish pheasant (*Phasianus colchicus talischensis* Loreuz) [2]. Caucasian pheasant is spread in the foothills and plains of Greater Caucasus and Lesser Caucasus, Talish pheasant is spread in the plain and mountainous areas of physical-

geographical region of Lankaran. Caucasian pheasant (*Phasianus colchicus colchicus* Linnaeus, 1758) is included in the 2nd Ed of the Red Book of Azerbaijan Republic [3].

Adequate research have been devoted to the study of biological features of pheasants [4-11] and the research conducted in this direction are currently underway.

Like other hunting birds, pheasants are not excluded from the negative effects of both

natural and anthropogenic factors. Pheasants are "inhabitants" of grassland - steppe zone, so rain in summer, snow in winter and strong winds, as well as purposeful hunting, long rains during the nesting period and natural enemies affect to decrease in their numbers.

Worldwide, artificial breeding of these birds for various purposes was began in the early 19th century [12]. Recently, pheasants (*Ph. colchicus colchicus*) in the world were released into the nature like hunting birds and decorative birds for the purposes of commercial and ecotourism. Pheasants are bred not only as hunting and decorative birds, but also for the purpose of usage of dietary meat and egg products as food [13, 14]. Pheasant meat is rich in protein and micronutrients, the saturated fatty acids in its content is very low [12, 15, 16]. As these birds are mainly used for hunting purposes, so increasing their number is always relevant [17].

The aim in research is to study comparatively the dynamics of live weight depending on the growth and development of pheasants (*Ph. colchicus colchicus*) breeding artificially and aviary conditions.

Materials and Methods

The research was implemented in 2018 at the Institute of Zoology of ANAS. The experimental part of the study was carried out in Institute's vivarium, but the analysis of the results was performed in Protozoology laboratory and at the Department for Biology and its teaching methods of Azerbaijan State Pedagogical University.

Birds

The object of study was pheasants (*Phasianus colchicus colchicus*) chicks incubated in Institute's vivarium of Zoology of ANAS.

Ration

The chickens were grown-up to 60 days of age. All chickens were kept under identical conditions, fed with compound feed that did not contain antibiotics during the experiment.

Dynamic parameters

Live weight dynamics of pheasant chicks was observed up to 60 days. In early days, it was impossible to determine the gender of chicks, so they were weighed up to 10 days without considering their gender. 10 days later, sexual dimorphism was observed in the chicks due to their live weight, so they were divided into two

groups, taking into account their gender. Before feeding the birds in the morning, they were weighed separately and by accuracy of 0.1 mg in (1, 3, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 34, 38, 42, 50 and 60 days) of postembryogenesis at electronic scales (Adventurer Pro).

The absolute weight gain of pheasants was estimated by using formula $A = W_t - W_0$, daily

average weight gain by formula $D = \frac{W_t - W_0}{t}$, relative

growth by formula $K = \frac{W_t}{W_0}$, rate of relative growth

by formula $K = \frac{W_t - W_0}{W_0} \cdot 100\%$, relative increase by

formula $P = \frac{W_t - W_0}{0,5(W_t + W_0)} \cdot 100\%$ proposed by Borodi

and Mayont [18].

Statistical analysis

Statistical analysis of data - average arithmetic price (M), standard deviations (SD) were calculated by using Statistical (StatSoft Inc. 2012) Program and the results by Microsoft Excel 2016 software.

Results

The changes in live weight of pheasants for 60 days are presented in the Table 1 and Figs. 1-3. It is clear that the early days, when pheasants hatch from their eggs, the weights of chicks differ from each other. Thus, maximum indicator of weight of daily chicks is 10.30g and minimum indicator is 7.02g. In the next days, the increase was observed between maximum and minimum indicators of chicks. The maximum and minimum indicators of 3 daily chicks are 17.2-7.92g and 6,8g, the indicators for 10 day chicks are 17.42-7.99g, 18.43-7.70g and 28.01-16.9g (Table 1) respectively. The average weight indicator of daily chicks is 8,78±0,94 g, live weight of 10-day chicks is 20,19±3,73 g by increasing 11.48 g compared to the indicators of daily chicks.

Within 10 days, RWG of chicks increases from 7.65% to 64.24%, and RGR from 7.96% to 94.65% (Fig. 1). During the specified time period, an increase was observed in absolute and daily weight of chicks, as well as their relative growth. On the 10th day, there were notable differences in live weight of chicks and considering that this indicator being the main sign of sexual dimorphism

for pheasants, the chicks were divided into two groups, male and female. Customarily, the weight of male pheasants is higher than female pheasants. The results of experiments show that the weight of 12-day male pheasants is 51.30 ± 1.19 g, but the weight of female pheasants 46.59 ± 2.05 g. If the difference between the weights of male and female pheasants is 4.71 g, as increasing the age of birds, this difference also increases, so the weight of 20-day chicks is 14.38 g. It is noted a severe increase in all indicators of 22-day chicks compared to the indicators of 20-day chicks. Compared to today's indicators, live weight of 22-day male pheasants was 38.01g, live weight of female pheasants was 36.20 g (Table 1). The RWG increased to 35.07% in males pheasants at this age, 36.15% in female pheasants (Figures 2 and 3), then absolute weight gain increased to 41.01 g and 36.21 g, daily weight gain - 20.51 g and 18.10 g, relative growth rate - 42.52% and 44.12%. The RGR of female pheasants increased to 43.11%. Apparently, the RGR of female pheasants is 1.6% higher than male pheasants.

The indicators of RWG, absolute weight gain, daily average weight gain, relative growth, RGR for both 22-day males and females pheasants fall abruptly, the indicators recorded in 26-day chicks rise again, it decreases in 28, 30, 34 and 38 day chicks and increases abruptly in 42-day chicks. It should be noted that the value of all indicators was lower in female pheasants than male pheasants (Table 1, Fig. 2 & 3).

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The differences between the weight of males and females pheasants (Table, Fig. 3) are more clearly visible in 60-day pheasants. The comparison of weight indicators of male and female pheasants at this age shows that live weight of male pheasants is 59.14 g higher than live weight of female pheasants. There

are also differences in their daily weight gain. The average daily weight of male pheasants was 8.97 g and the average daily weight of female pheasants was 9.35 g. In male pheasants, relative weight gain is 18.03% and relative growth rate is 19.81%, the figures for female pheasants are 21.44% and 24.01% respectively. It shows that relative weight gain and relative growth rate of 2-month female pheasants are higher than male pheasants.

Discussion

In the process of growth and development, the body obtains not only natural and typical characteristics, but also constitutional features, so it is important to study postembryonal ontogenesis of body. The relation between growth and development processes characterizes the relationship between quantitative and qualitative changes taking place in body during ontogenesis process. Studying the weight is one of the key indicators in order to evaluate their development and growth in the study of ontogenesis of birds. Live weight determines the typical morphological features, the nature and extent of physiological processes in body [19].

Some researchers show that the differences in body weight occur at the age of 3 weeks due to the gender of pheasants. Other authors report that sexual dimorphism has been observed in pheasants for 30 days [20]. According to the results of our research, sexual dimorphism was observed after 10 days of age due to the weight of pheasant chicks. This is also consistent with the results of Felska-Błaszczyk and Pohorecki research [21].

Mroz [22] shows that pheasants reach mature body weight in their 20-24 weeks. Intensive development is recorded in their 1-4 week, beginning from the 8th week, growth significantly decreases. According to the data of Strakov and others [23] rapid growth is recorded in their 5-10 weeks. Ipek and Dikmen [24] show that pheasants have the highest weight gain in their 4-8 weeks. Weight increasing and growth rate of pheasants depend on many factors - reproduction period, storage conditions, nutrition, air temperature and climatic conditions. In these studies, live weight dynamics of pheasants was monitored within 8 weeks. The data provided in the Table 1 and Fig. 2 and 3 show that male and female pheasants differ due to live weight indicators. Live weight of male pheasants is higher than female pheasants.

TABLE 1. Weight dynamics of pheasant chicks (*Phasianus colchicus colchicus*)

age/ day	♂♀		♂		♀		♂♀		♀				
	P	A	D	K	P	A	D	K	P	A	D	K	K%
1-10 days													
1	-	-	-	-	-	-	-	-	-	-	-	-	-
3	7.65	0.70	0.35	1.08	7.96	-	-	-	-	-	-	-	-
6	5.84	0.57	0.19	1.06	6.02	-	-	-	-	-	-	-	-
8	3.13	0.32	0.16	1.03	3.18	-	-	-	-	-	-	-	-
10	64.24	9.82	4.91	1.95	94.65	-	-	-	-	-	-	-	-
12-60 days													
♂, n=6													
12	-	-	-	-	-	-	-	-	-	-	-	-	-
14	51.30±1.19	46.59±2.05	5.04	1.20	19.65	10.08	5.04	1.20	19.65	10.49	5.16	1.11	11.07
16	61.39±8.30	51.75±4.32	11.81	1.38	38.46	23.61	11.81	1.38	38.46	31.14	19.09	1.37	36.89
18	58.00±2.18	70.84±6.53	0.89	1.02	2.10	1.78	0.89	1.02	2.10	8.07	5.95	1.08	8.41
20	86.76±4.20	76.79±3.65	4.83	1.11	11.14	9.67	4.83	1.11	11.14	6.64	5.28	1.07	6.87
22	96.45±1.85	82.07±6.77	20.51	1.43	42.52	41.01	20.51	1.43	42.52	36.15	36.21	1.44	44.12
24	134.46±9.50	118.27±6.35	1.93	1.03	2.81	8.87	1.93	1.03	2.81	6.89	8.43	1.07	7.13
26	141.33±6.76	126.71±6.85	13.02	1.18	18.42	26.03	13.02	1.18	18.42	18.44	25.74	1.20	20.32
28	167.36±3.81	152.45±9.60	7.81	1.09	9.33	8.92	7.81	1.09	9.33	9.00	14.37	1.09	9.43
30	182.98±2.72	166.82±11.51	1.70	1.02	1.86	3.40	1.70	1.02	1.86	2.46	4.16	1.02	2.49
34	186.38±6.14	170.98±9.27	2.01	1.04	4.30	8.02	2.01	1.04	4.30	4.51	7.89	1.05	4.62
38	194.40±4.27	178.87±6.61	4.30	1.11	11.06	21.50	4.30	1.11	11.06	14.48	27.91	1.16	15.60
42	215.9±3.75	206.78±4.20	49.76	1.92	92.19	199.05	49.76	1.92	92.19	51.17	142.19	1.69	68.76
50	414.94±6.17	348.97±7.22	4.70	1.09	9.06	37.60	4.70	1.09	9.06	10.99	40.58	1.12	11.63
60	452.55±3.79	389.56±7.88	8.97	1.20	19.81	89.67	8.97	1.20	19.81	21.44	93.53	1.24	24.01
♀, n=8													
12	-	-	-	-	-	-	-	-	-	-	-	-	-
14	51.30±1.19	46.59±2.05	5.04	1.20	19.65	10.08	5.04	1.20	19.65	10.49	5.16	1.11	11.07
16	61.39±8.30	51.75±4.32	11.81	1.38	38.46	23.61	11.81	1.38	38.46	31.14	19.09	1.37	36.89
18	58.00±2.18	70.84±6.53	0.89	1.02	2.10	1.78	0.89	1.02	2.10	8.07	5.95	1.08	8.41
20	86.76±4.20	76.79±3.65	4.83	1.11	11.14	9.67	4.83	1.11	11.14	6.64	5.28	1.07	6.87
22	96.45±1.85	82.07±6.77	20.51	1.43	42.52	41.01	20.51	1.43	42.52	36.15	36.21	1.44	44.12
24	134.46±9.50	118.27±6.35	1.93	1.03	2.81	8.87	1.93	1.03	2.81	6.89	8.43	1.07	7.13
26	141.33±6.76	126.71±6.85	13.02	1.18	18.42	26.03	13.02	1.18	18.42	18.44	25.74	1.20	20.32
28	167.36±3.81	152.45±9.60	7.81	1.09	9.33	8.92	7.81	1.09	9.33	9.00	14.37	1.09	9.43
30	182.98±2.72	166.82±11.51	1.70	1.02	1.86	3.40	1.70	1.02	1.86	2.46	4.16	1.02	2.49
34	186.38±6.14	170.98±9.27	2.01	1.04	4.30	8.02	2.01	1.04	4.30	4.51	7.89	1.05	4.62
38	194.40±4.27	178.87±6.61	4.30	1.11	11.06	21.50	4.30	1.11	11.06	14.48	27.91	1.16	15.60
42	215.9±3.75	206.78±4.20	49.76	1.92	92.19	199.05	49.76	1.92	92.19	51.17	142.19	1.69	68.76
50	414.94±6.17	348.97±7.22	4.70	1.09	9.06	37.60	4.70	1.09	9.06	10.99	40.58	1.12	11.63
60	452.55±3.79	389.56±7.88	8.97	1.20	19.81	89.67	8.97	1.20	19.81	21.44	93.53	1.24	24.01

P- relative increase; A- absolute weight gain; D- daily average weight gain; K- relative growth rate (RGR), K%- relative growth rate (RGR).



Fig. 1. The dynamics of relative weight gain and relative growth rate of 1–10-day of mixed sex pheasants (♂♀)

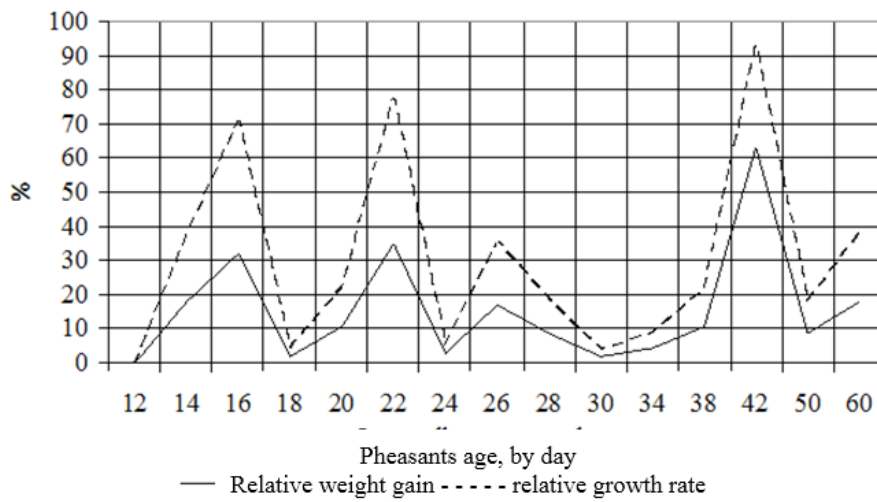


Fig. 2. The dynamics of relative weight gain and relative growth rate of 12-60-day male (♂) pheasants.

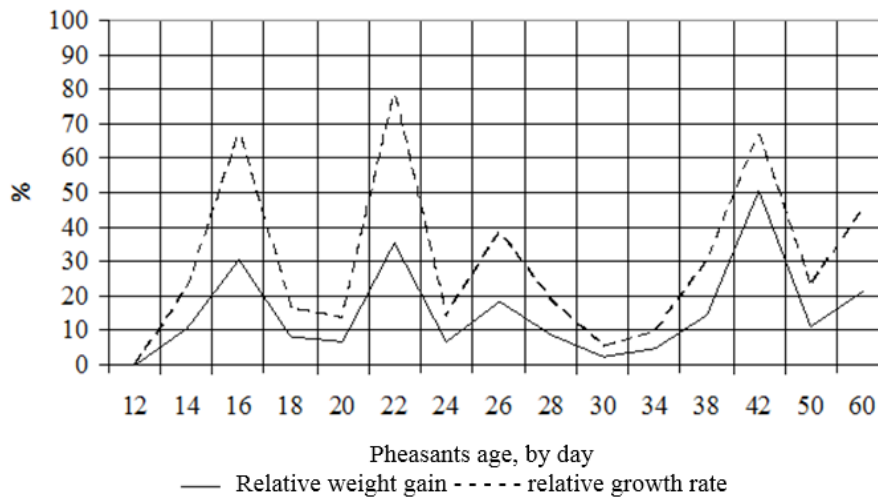


Fig. 3. The dynamics of relative weight gain and relative growth rate of 12-60-day female (♀) pheasants.

It was determined that the bounds occur in weight dynamics at different times during the development and growth of both males and female pheasants. In Figures, the bounds noted in the dynamics for the indicators of relative weight gain and relative growth manifest itself in the form of peaks. The highest peak in the dynamics for RWG and RGR of pheasant chicks is observed in 10-day birds, although there is decrement in both indicators of male and female pheasants, it seems clear from the graphs that these indicators rise in some days. Thus, in the index of RWG and RGR of 12-60 day pheasants, the first high increase is observed in 16-day birds, the second highest increase in 22-day birds, the third highest increase in 42-day birds. The reductions in the index of both RWG and RGR is compensated in the days when the next peaks observed. The differences among all weight indicators of male and female pheasants, as well as RWG and RGR are significant and the index of male pheasants is higher than female pheasants.

Conclusion

According to the results of study, it was determined that sexual dimorphism is observed after the 10th day due to weight among pheasant chicks. The highest live weight is noted among male pheasants.

In the index of relative weight gain and relative growth rate of 12-60 day pheasants, the first high increase is observed in 16-day birds, the second highest increase in 22-day birds, the third highest increase in 42-day birds. The decrements in the index of both relative weight gain and relative growth rates is compensated in the days when the next peaks observed.

Acknowledgment

A lot of thanks for ANAS Institute of Zoology for support, advices and guidance as well as giving me extraordinary experiences throughout the work.

Funding statements

The author declared that she have funded by.

Conflict of Interests

The authors declare that they have no conflict of interests.

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