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Changes of Some Morphological Properties of the Body in Japanese Quail *Coturnix coturnix japonica* in Its Postnatal Growth

Zmiany niektórych cech morfologicznych ciała przepiórki japońskiej *Coturnix coturnix japonica* w rozwoju postnatalnym

Изменения некоторых морфологических черт тела японской перепелки *Coturnix coturnix japonica* в постнатальном развитии

Japanese quail *Coturnix coturnix japonica* (Temm. et Schleg., 1849) is a domesticated form of the wild quail. Some of its biological properties like rapid individual growth, a high laying capacity, low breeding requirements and small size make the Japanese quail one of the pilot laboratory animals used in experiments with poultry.

The literature on Japanese quail concerns mostly practical and breeding aspects (3, 5, 6, 8, 11, 12). The subject of study were also growth rate and changes of internal organs in postnatal growth (1, 2, 7, 10, 16). Fewer studies concern the growth of morphological parameters (14, 17, 21) and the existing ones often ignore changes in those parameters throughout the whole life cycle.

In view of the growing importance of the Japanese quail as a laboratory animal, more thorough-going studies on the properties of its postnatal development are required. Ample and comparable material is needed for the purpose as well as standardized breeding conditions that reduce the influence of the environment to the minimum.

The aim of the present study is the investigation of the growth rate of the basic morphological parameters in the Japanese quail such as gross body mass, carcass weight, body length, wing length and tarsus length in its postnatal development.

MATERIALS AND METHODS

The analysis of the postnatal development was conducted on 576 specimens of Japanese quail (288 ♀♀ and 288 ♂♂) obtained from the breeding facility of the Institute of Biological Foundations of Animal Production, Agricultural Academy, Lublin in 1971–1972. Owing to the breeding conditions,

the material was largely homogeneous. The feed was a standard DKA-Starter poultry mix given *ad lib.* Drinking water was enriched with a mixture of vitamins and microelements with antibiotic (Polfamix A) at a dose 10 times as small as that recommended for chickens.

The investigation covered birds from one day to 23 months old, which comprised the whole life cycle of the species in breeding conditions. Because of the high growth rate in the first weeks of life the birds were killed every 2, 7, 15 and 30 days. 27 age groups were formed with 10 males and 10 females in each group. The birds were weighed and measured immediately after killing. The following body measurements were taken:

1. Gross body mass was determined by weighing the birds immediately after they were put to sleep without exsanguination.
2. Carcass weight was determined by weighing the birds exact to 0.01 g after the internal organs with accompanying fatty tissue were removed.
3. Body length was measured from the beak-end to the end of the pygostyle. The bird was put on its back, a pin was inserted between the rectrices, the bird was stretched out and measured from the pin to the beak end. The measurement was made with a slide-caliper exact to 1 mm.
4. Tarsus length was measured from the bone limen on the base of the proximal tibiotarsus to the tarsus base: with a slide-caliper exact to 0.1 mm.
5. Folded wing length was measured with a slide-caliper exact to 0.1 mm from the carpus to the end of the longest primary.

Materials were analyzed with the generally accepted methods (18), males and females separately. For each age group, the arithmetic mean ($\bar{x}$), standard deviation (SD) and variation coefficient (V) were calculated. The significance of differences between the means was analyzed with the t-Student test. The r-Pearson correlation coefficient was calculated between age in days and parameter values. When significant correlations were found, regression equation was computed: $y = bt + c \pm e$ where y — the expected value of a property at the time t, b — line direction coefficient and information by how many units y changes in 1 day, c — constant value (y for $t = 0$), e — standard estimation error $y \cdot t = \frac{1}{n-2}\left(ns^2y - \frac{(nsty)^2}{ns^2t}\right)$. When there was no significant correlation between the means in a particular time interval, the weighted mean and standard deviation were accepted for the whole interval. The significance of differences was studied on the levels $p_{0.05}$ and $p_{0.01}$, the latter being considered high.

RESULTS

Gross body mass of the quail on the day of hatch is 6.4 g on the average. During the first 4 weeks its growth rate is very high, the daily weight increase being on the average 3.2 g (Table 1). During that period there are no clear differences between the body mass of males and females (Fig. 1). Around the 28th day of age the growth rate of males decreases with only a negligible 0.063 g weight increase a day lasting throughout the rest of the bird's life. The heaviest males in the 510–570 days age group reached the weight of over 140 g (Table 3). After a period of very intense growth females continue to have a high rate of body weight increase until they are about 60 days old. At this point they reach their maximum weight, 148.4 g on the average. Then their body weight decreases by 7.5% to reach a stable level of 137 g. The observed negligible growth is statistically insignificant.

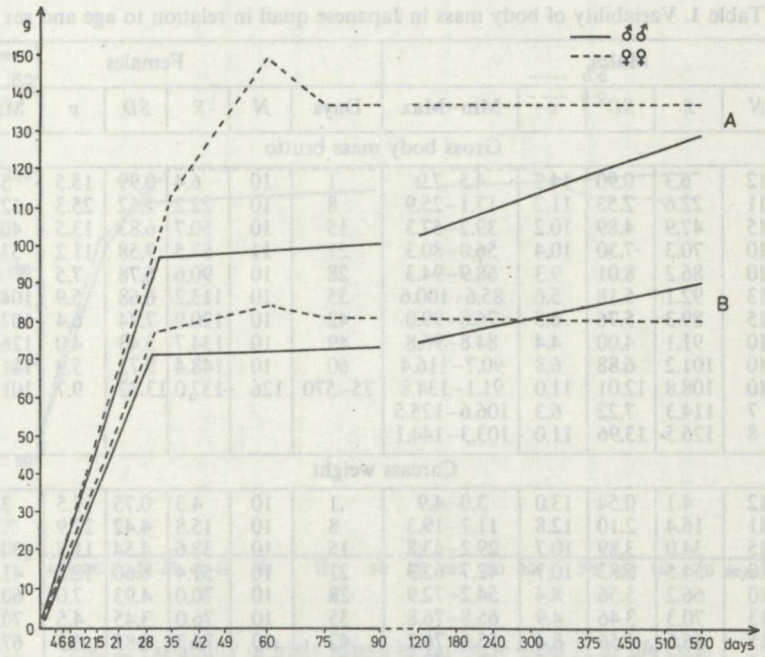

Fig. 1. Variability of gross body mass (A) and carcass weight (B) of Japanese quail in its life cycle

Variation coefficient for gross body mass in quail until they are aged 21 days is considerable and amounts 8.4–27% for males and 11.2–25.3% for females. It is by far lower for older birds, being 3.8–11% for males and 4–11.5% for females. Sexually mature females are significantly heavier than males ($p > 0.01$). This difference decreases with age and never disappears entirely.

Carcass weight in particular age groups is similar to gross body mass, only proportionally smaller (Fig. 1). The increase of carcass weight in males and females is also very fast until they are 28–30 days old, amounting 2.5 g a day on the average (Table 1). After the 4th week the growth rate in males is distinctly lower and a negligible increase of 0.034 g a day lasts for the rest of the male's life. In females an intense carcass weight increase of 0.23 g a day can be reported until they are 60 days old. In females aged 75 days carcass weight is 8% lower on the average and in the remaining age groups it stays on the more or less unchanging level of 80.4 g. Individual changes in carcass weight on the basis of variation coefficient V are similar to those for gross body mass.

The body length of the quail after hatching is 68–70 mm. The growth rate until the 15th day is very high, being 6 mm a day (Table 2), then it drops slightly being still very intense for males until they are 26 days old and for females until they are aged about 35 days. After this period of intense growth, females stop increasing their length (Fig. 2) and in the age interval of 300–570 days their

Table 1. Variability of body mass in Japanese quail in relation to age and sex

Males						Females					
Days	*N*	$\bar{x}$	*SD*	*v*	Min–Max	Days	*N*	$\bar{x}$	*SD*	*v*	Min–Max
Gross body mass brutto											
1	12	6.3	0.90	14.2	4.5–7.9	1	10	6.4	0.99	15.5	5.0–7.9
8	11	22.6	2.53	11.2	17.1–25.9	8	10	22.2	5.62	25.3	12.9–33.0
15	15	47.9	4.89	10.2	39.2–57.3	15	10	50.7	6.83	13.5	40.9–61.0
21	10	70.3	7.30	10.4	56.0–80.3	21	11	67.5	7.58	11.2	53.7–78.5
28	10	86.2	8.01	9.3	68.9–94.3	28	10	90.6	6.78	7.5	77.8–101.5
35	13	92.1	5.18	5.6	85.6–100.6	35	10	113.2	6.68	5.9	104.1–127.2
42	15	89.3	5.76	6.5	76.8–99.0	42	10	120.9	7.74	6.4	107.3–130.4
49	10	91.1	4.00	4.4	84.8–96.8	49	10	134.7	5.43	4.0	126.1–144.8
60	10	101.2	6.88	6.8	90.7–116.4	60	10	148.4	8.73	5.9	131.2–157.1
120	10	108.8	12.01	11.0	91.1–134.8	75–570	126	137.0	13.32	9.7	101.5–166.4
300	7	114.3	7.22	6.3	106.6–125.5						
570	8	126.5	13.96	11.0	103.3–144.1						
Carcass weight											
1	12	4.1	0.54	13.0	3.0–4.9	1	10	4.3	0.75	17.5	3.0–5.3
8	11	16.4	2.10	12.8	11.7–19.3	8	10	15.8	4.42	27.9	7.7–24.2
15	15	34.0	3.89	10.7	29.2–43.8	15	10	38.6	4.54	11.7	30.3–45.3
21	10	54.5	5.83	10.7	42.7–62.3	21	10	51.4	6.60	12.8	41.1–61.6
28	10	66.2	5.56	8.4	54.2–72.9	28	10	70.0	4.93	7.0	60.4–78.5
35	13	70.3	3.46	4.9	65.8–76.8	35	10	76.0	3.45	4.5	70.5–80.5
42	15	66.6	5.56	8.4	55.8–76.2	42	10	76.3	4.85	6.3	67.8–84.1
49	10	67.8	2.61	3.8	62.1–72.3	49	10	84.2	6.20	7.4	77.6–98.0
60	10	74.0	3.88	5.2	67.8–82.9	60	10	88.8	5.86	6.6	77.8–96.2
120	10	78.1	9.28	11.9	64.9–98.3	75–570	126	80.4	8.11	10.1	51.1–97.4
300	7	83.0	4.66	5.6	77.3–91.4						
570	8	88.1	6.45	7.3	77.6–95.1						

body length is even 12 mm smaller. After the 28th day females grow very slowly ca. 0.03 mm a day for the rest of their lives.

Individual changes in body length are similar for both sexes. In the first 2 weeks of age these values amount 4.0–9.4% being on the average twice as high as those in mature birds. Greater variation occurs in females aged 450–570 days.

The increase of tarsus length is similar for both sexes. For the first 14 days the growth rate is very high being ca. 1 mm a day, until the 35th day it decreases significantly amounting only 0.3 mm. The longest tarsi for the quail were reported in the 35-days group, the average for males being 32.3 mm and 32.6 mm for females. In the 35–570 days interval the average lengths have somewhat smaller values of 32.1 mm for males and 31.9 mm for females (Table 4). Variation coefficient for this property in this interval is small, being 1.5–3.9%.

In the first days of the quail life, wing length is measured only for the *carpo-metacarpus* and *phalanges* I and II, later to include the fast-growing flight-feathers. For the youngest birds the length of wing is a little over 15 mm. Growth rate for males and females is similar (Fig. 3), amounting on the average 4.3 mm a day (Table 4) in the first 2 weeks of life. After about 32 days of age the wings do not grow any longer until the first moult.

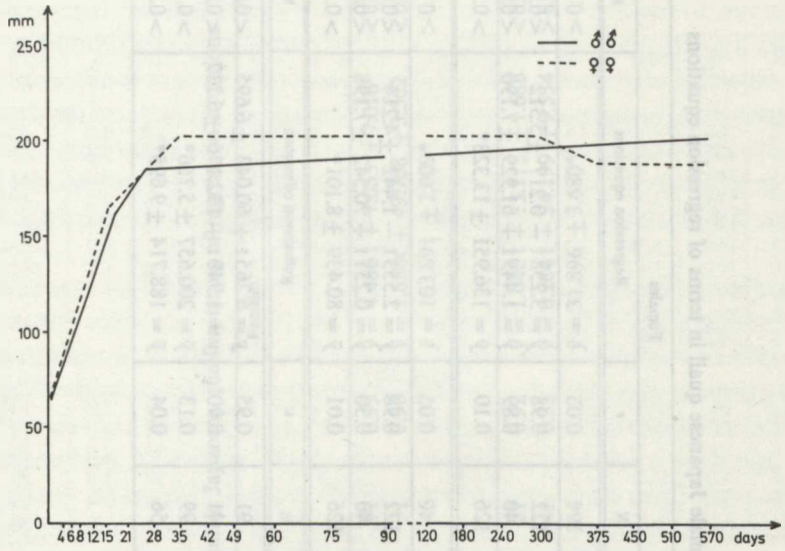

Fig. 2. Variability of body length in Japanese quail in its life cycle

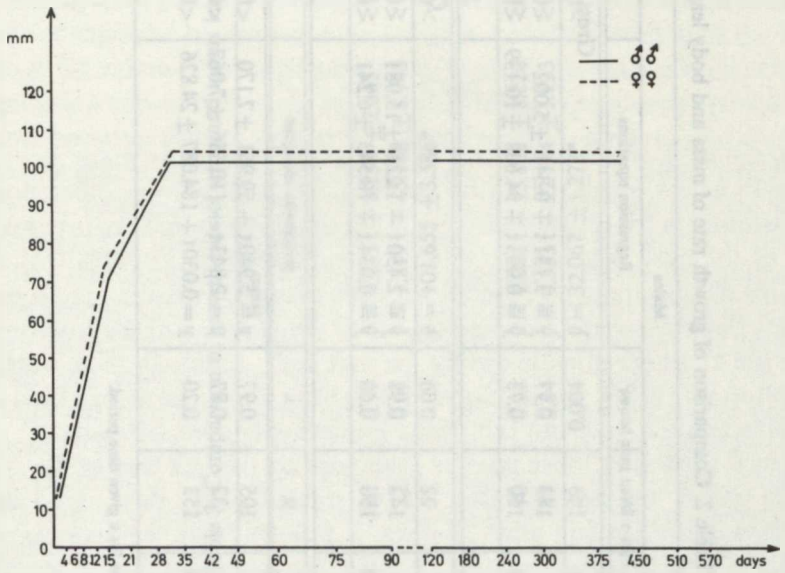

Fig. 3. Variability of wing length in Japanese quail in its life cycle

Table 2. Comparison of growth rate of mass and body length in male and female Japanese quail in terms of regression equations

Males					Females				
Days	N	r	Regression equations	p	Days	N	r	Regression equations	p
Gross body mass brutto									
1–28	143	0.97	$y = 3.131\,t + 0.341 \pm 5.002$	<0.001	1–28	122	0.98	$y = 3.258\,t - 0.217 \pm 5.312$	<0.001
35–570	150	0.73	$y = 0.063\,t + 94.608 \pm 10.139$	<0.001	35–60	40	0.89	$y = 1.449\,t + 61.929 \pm 7.190$	<0.001
					75–570	126	0.10	$\bar{y} = 136.951 \pm 13.323$*	>0.2
Carcass weight									
1–28	143	0.98	$y = 2.450\,t - 1.221 \pm 15.081$	<0.001	1–28	122	0.98	$y = 2.553\,t - 1.442 \pm 4.214$	<0.001
35–570	150	0.68	$y = 0.034\,t + 70.543 \pm 6.241$	<0.001	35–60	40	0.30	$y = 0.231\,t + 70.542 \pm 7.198$	<0.05
					75–570	126	0.01	$\bar{y} = 80.439 \pm 8.101$*	>0.8
Body length									
1–15	105	0.97	$y = 5.940\,t + 59.961 \pm 7.170$	<0.001	1–15	91	0.95	$y = 6.265\,t + 60.043 \pm 6.695$	<0.001
18–28	32	0.87	$y = 2.843\,t + 110.556 \pm 7.067$	<0.001	18–35	41	0.90	$y = 1.940\,t + 132.176 \pm 6.237$	<0.001
35–570	153	0.20	$y = 0.030\,t + 184.087 \pm 24.826$	<0.01	42–300	99	0.13	$\bar{y} = 200.657 \pm 5.766$*	>0.1
					375–570	56	0.04	$\bar{y} = 188.714 \pm 9.695$*	>0.8

* Mean for a given time period.

Table 3. Comparison of growth rate of wing and tarsus length in male and female Japanese quail in terms of regression equations

Males					Females				
Days	N	r	Regression equations	p	Days	N	r	Regression equations	p
Wing length									
1–15	104	0.99	$y = 4.235\,t + 8.758 \pm 2.365$	<0.001	1–15	91	0.95	$y = 4.466\,t + 7.053 \pm 7.016$	<0.001
18–28	32	0.67	$y = 1.819\,t + 45.168 \pm 8.745$	<0.001	18–28	31	0.90	$y = 1.680t + 49.708 \pm 3.562$	<0.001
35–90	55	0.09	$\bar{y} = 101.655 \pm 3.586$*	>0.5	35–75	46	0.07	$\bar{y} = 103.891 \pm 2.009$*	>0.6
Tarsus length									
1–12	90	0.93	$y = 1.001\,t + 13.122 \pm 2.220$	<0.001	1–12	81	0.92	$y = 1.040\,t + 13.115 \pm 1.686$	<0.001
15–28	47	0.84	$y = 0.353\,t + 22.124 \pm 1.133$	<0.001	15–28	41	0.33	$y = 0.204\,t + 24.199 \pm 9.534$	>0.01
35–570	149	0.004	$\bar{y} = 32.067 \pm 1.272$*	>0.9	35–570	164	0.02	$\bar{y} = 31.896 \pm 3.680$*	>0.7

* Mean for a given time period.

Table 4. Variability of body dimensions in Japanese quail in relation to age and sex

Males						Females					
Days	*N*	$\bar{x}$	*SD*	*v*	Min–Max	Days	*N*	$\bar{x}$	*SD*	*v*	Min–Max
Body length											
1	12	68.3	3.17	4.6	63–71	1	10	69.6	2.80	4.0	65–74
8	11	106.7	6.02	5.6	95–115	8	10	107.0	8.08	7.6	90–116
15	15	148.8	6.78	4.6	140–162	15	10	155.7	6.43	4.1	146–165
18	10	173.8	7.27	4.2	160–184	21	11	171.4	6.79	4.0	160–184
28	10	189.1	5.97	3.2	178–199	28	10	192.6	4.55	2.4	188–200
35	13	194.1	5.36	2.8	182–201	35–300	99	200.7	5.77	2.9	183–212
60	10	192.0	3.97	2.1	186–201	375–570	56	188.7	9.69	5.1	160–202
150	10	192.2	8.64	4.5	189–200						
240	10	191.7	8.60	4.5	173–202						
570	8	192.6	8.82	4.6	178–202						
Tarsus length											
1	12	14.7	0.97	6.6	13–16	1	10	14.5	0.85	5.9	13–16
8	11	21.4	0.67	3.2	20–22	8	10	21.8	1.81	8.3	19–25
15	15	27.1	1.22	4.5	25–29	15	10	28.8	1.32	4.6	26–31
21	10	30.4	0.70	2.3	30–32	21	11	30.3	0.90	3.0	29–32
28	10	31.6	0.52	1.6	31–32	28	10	31.3	1.06	3.4	29–32
35–570	149	32.1	1.27	4.0	30–34	35–570	164	31.9	3.68	11.6	28–34
Wing length											
1	12	15.7	2.46	15.7	13–23	1	10	15.2	1.55	10.2	12–17
8	11	43.6	4.15	9.5	35–49	8	10	44.4	4.09	9.2	34–49
15	15	71.6	3.16	4.4	65–78	15	10	72.3	3.64	5.1	69–91
21	10	85.1	5.02	5.9	75–90	21	11	85.4	3.23	3.8	81–91
28	10	95.6	2.95	3.1	91–100	28	10	96.7	4.22	4.4	91–103
35–90	55	101.7	3.59	3.5	97–106	35–75	46	103.9	2.01	1.9	99–109

DISCUSSION

The quail as a typical precocial bird is characterized by many properties adaptable to a very quick postnatal development. Considerable differences can already be found in the composition of the egg: in nestlings yolk mass constitutes 18–20% of the fresh egg weight, while in precocial birds 33–40% (15). Quail chickens are hatched entirely covered with down and have feather contour very early, being thereby largely independent of the temperature of the environment. They can see and hear already during the first days. Although their wings and acromial muscles are not yet well-formed they have highly developed hind-limbs and are able to walk and find their food immediately after hatching.

The quick growth of those birds is evidenced by the fact that in the studied quail body weight was doubled after 5 days, trebled after 7 days and a tenfold increase took place already after 20 days. It follows from the analysis of the growth rate of Japanese quail in its life cycle that the largest increase in gross body mass and carcass weight takes place until the 4th week of age. Quail females increase their body mass until they are 60 days old, after that period gross

body weight and carcass weight remain more or less constant for the rest of their lives. In sexually mature males these parameters show a systematic but negligible increase. In both sexes the fastest increase in body length, wing length and tarsus length takes place in the first two weeks of their life. After 14 days the growth rate for length parameters decreases more than twice but intense growth continues to take place until the birds are 4–5 weeks old. In males a negligible growth of body length can be observed for the rest of their lives. After the 5th week of age female body length and the wing and tarsus lengths in both sexes do not increase any longer.

Comparative figures for the studied material and data from other breeds taken in the same period (17) were shown in Table 5. A comparison of body masses of the quails aged 1–35 days shows that body weights are similar in all groups. The birds used in the present study have a smaller body mass in particular age intervals than those in the Cracow breed but larger than those from Brwinów and Jastrzębiec. Individual body mass variability decreases with age in each breed group under investigatin. Differences in body mass of 35-days-old males and females are highest in the birds from the Lublin breed. Comparatively low weights of quail chickens after hatching in the studied material can be ignored as numerous findings demonstrate that they are not a reliable criterion for the chickens weight 1 g (1/6) less after the first defecation. Moreover, prematurely hatched chickens lose a lot of water (11). For that reason the mass of one-week-old birds is taken as the initial weight.

The analysis of gross body mass, carcass weight and body length in the whole life cycle of Japanese quail demonstrated that from the hatch until the 28–35th day of age the values of those parameters are very much alike in both sexes. Clear differentiation appears when the birds enter the pre-reproductive period and the difference becomes distinct and stable when they reach puberty. Domańska (5) reports that quail males aged 49 days reach the weight of 85–100 g; females are by far heavier, weighing 100–150 g. Other authors (3) give the average weight of mature females as 130 g, this weight never exceeding 120 g in males. In the present study the greatest differences in gross body mass were observed in quails aged 60 days, the average value being 47.2 g, which is more than 31% of female weight (♂♂ 101.2 g – ♀♀ 148.4 g). The diagram of gross body mass variability for the life cycles of males and females from the 4th week onwards coincides with the age variability curve of the relative weight of reproductive organs for both sexes, calculated by Korybska (10) from the same material. A very quick growth of the ovary takes place in birds aged 28–42 days and the oviduct is fully developed by the 60th day. The weight of the ovary and oviduct increases for the rest of life of the quail and can reach 1/10 of the net weight of mature female. The weight of internal organs, particularly of the ovary and oviduct, is closely connected with sexual puberty and the beginning of egg-laying. The above data demonstrate that sexual dimorphism of gross body mass in both sexes results from the propor-

Table 5. Comparison of body weight in the first five weeks of age of the four breed groups of Japanese quail (after Radomska et al., 17)

		Days													
		1		3		7		14		21		28		35	
Groups*	N	$\bar{x}$	v	$\bar{x}$	v	$\bar{x}$	v	$\bar{x}$	v	$\bar{x}$	v	$\bar{x}$	v	$\bar{x}$	v
Males															
I	3	8.50	6	12.00	8	21.33	12	46.66	15	73.50	9	98.00	7	113.00	6
II	45	7.61	9	10.27	12	19.08	12	39.98	12	62.21	10	82.68	10	97.66	10
III	21	7.14	11	10.00	12	17.69	14	37.50	12	61.07	9	81.04	8	97.14	6
IV	10	6.34	14	9.27	27	19.46**	11	44.80**	10	70.28	10	86.15	9	92.08	6
Females															
I	3	7.33	14	10.66	11	18.33	13	43.50	5	69.16	6	96.00	8	109.00	10
II	37	7.67	11	10.35	13	19.79	12	42.42	11	63.36	9	87.46	10	104.00	8
III	35	7.11	11	10.21	15	18.44	16	38.32	13	62.05	10	83.57	9	101.54	7
IV	10	6.40	15	10.67	14	18.92**	25	47.45**	13	67.52	11	90.58	7	113.23	6

* I — Breed of the Department of Genetics and Methods of Animal Improvement, High Agricultural School, Kraków. II — Breed of the Institute of Genetics and Animal Breeding, Polish Academy of Sciences, Jastrzębiec. III — Breed of Yugoslavian origin from the former General Department of Animal Breeding, Brwinów. IV — Breed of the Institute of Biological Foundations of Animal Production, Agricultural Academy, Lublin.

** Estimated value (calculated from regression equation).

tionally larger weight of female internal organs. Male quails reach sexual puberty at the age of 35–40 days (16). An increase in testicles weight before sexual puberty does not affect the male body weight so much as does the growth of the weight of female gonads.

The material analyzed shows that sexually mature females also have greater carcass weight. In males and females aged 20–300 days the difference in carcass weight is statistically significant. Sexual dimorphism in quails is thus not caused by the weight of gonads and some other internal organs exclusively but carcass weight is also essential. Differences in body weight in females and males are not significantly affected by the amount of fatty tissue, which can be as much as 10% of the gross body weight of older birds, because that amount is more or less equal in both sexes (11).

In the studied material it was interesting to find a decrease in gross body mass by 12.8 g and in carcass weight by 7.3 g, only in females aged over 60 days. It should be noted that this is a period of full laying capacity, characterized by a tremendous reproductive effort of the female. Body weight losses seem therefore to be connected with that process and are not even compensated for by the weight of eggs alone, which is 8–9% of the quail's body mass. Studies on other vertebrates permitted to find that the reproductive energy effort is different in both sexes, being far greater in females than in males (9).

Sexual dimorphism in the Japanese quail can be seen not only in body mass but also in body and wing lenghts. Sexually mature females are on the average 10 mm longer than males and have the wing longer by 2–3 mm. These length differences decrease with age. While males preserve their dimensions, in females after the laying period there is a significant decrease in body length. This drop between 300–375 days of age can be attributed to extensive physiological changes that occur in females in connection with their loss of reproductive function. The body length of the quail is seldom reported by other authors as this is a dimension subject to considerable error because it combines the measurement of bony and horny parts. The bird's beak grows for all its life and is successively abraded. Its abrasion rate largely depends on the kind of food. Moreover, the beak tends to have the greatest fluctuations in dimension in the same species and is not correlated with body measurements like tarsus length, wing length and tail length (4, 20).

The growth of tarsus length in the quail ends ca. the 27th day of age. In the materials from Kraków, Brwinów and Jastrzębiec a small growth of tibiotarsus still occurred in the interval 28–35 days (17), without being investigated in the later age intervals. In the studied material the completion of growth and ossification of the tibiotarsus in the quail occurs in the fifth week of age. The measurement of tarsus is a very important measurement in the estimation of the bird size since its length is significantly correlated with many other metric measurements (19). This measurement permits to draw conclusions about

ossification rate and the moment of completion of the ossification of the bird's skeleton (4).

A comparison of body measurements of the Japanese quail and European quail, *Coturnix coturnix* (L.), in Poland (13) shows that the distinctly evident sexual dimorphism in body weights in the studied material does not occur after the reproductive period in the European subspecies. In the autumn when the birds prepare to fly south females *C. coturnix* are on the average 18 grams lighter than the females Japanese quail, the males having similar body weights. Body length and folded wing length are similar in both subspecies. Scanty data about the European quail that we have at our disposal do not permit to compare the two subspecies in their full individual development.

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STRESZCZENIE

Badania zmienności ciężaru ciała brutto, ciężaru tuszki, długości ciała, długości skoku oraz skrzydła w rozwoju postnatalnym przeprowadzono na 576 osobnikach (288 ♂♂ i 288 ♀♀) przepiórki japońskiej *Coturnix coturnix japonica*. Tempo wzrostu prześledzono w całym cyklu życiowym przepiórki, tj. od 1 do 570 dnia życia.

U obu płci najszybszy wzrost długości ciała, długości skrzydła i skoku ma miejsce w pierwszych 2 tygodniach życia. Po tym okresie tempo wzrostu parametrów długościowych ponad 2-krotnie maleje, ale wzrost odbywa się jeszcze do 4–5 tygodnia. Od 5 tygodnia skrzydła i skok nie rosną na długość. Wzrost tych parametrów przebiega podobnie u obu płci (ryc. 2 i 3). Największy przyrost masy ciała brutto i masy tuszki występuje od 4 tygodnia życia (ryc. 1, tab. 1). Samice przepiórek zwiększają swoją masę ciała do 60 dnia życia, a po tym okresie masa ciała brutto i masa tuszki do końca życia pozostaje na stałym poziomie. U samców po osiągnięciu dojrzałości płciowej masa ciała i długość ciała wykazują niewielki wzrost, utrzymujący się aż do śmierci osobnika. Dojrzałe płciowo samice są dłuższe i cięższe od samców. Wszystkie analizowane pomiary ciał w okresie pierwszych 2 tygodni wzrostu charakteryzuje co najmniej 2-krotnie większa zmienność indywidualna niż w okresie dojrzałości płciowej.

РЕЗЮМЕ

Исследование изменений веса тела брутто, веса тушки, длины тела, длины прыжка и крыла в развитии постнатальном проводилось на 576 особах (288 ♂♂ и 288 ♀♀) японской перепёлки *Coturnix coturnix japonica*. Темп роста прослеживался в течение всего жизненного цикла перепёлки, т.е. с 1 по 570 день жизни.

У обоего пола самый быстрый рост длины тела, длины крыла и прыжка наблюдается в течение первых двух недель жизни. Начиная с 5 недели крылья и прыжок не растут в длину. Рост этих параметров происходит одинаково у обоего пола (рис. 2 и 3). Самый большой прирост массы тела брутто и массы тушки начинается с 4 недели жизни (рис. 1, табл. 1). Самки перепелок увеличивают свою массу тела до 60 дня жизни, после этого периода масса тела брутто и масса тушки остается до конца жизни на неизменном уровне. У самцев после достижения половой зрелости масса тела и длина тела показывают небольшой рост, удерживающийся до смерти особы. Зрелые самки длиннее и тяжелее самцев. Все анализированные измерения тела характеризуются в период первых двух недель роста удвоенной индивидуальной изменчивостью по сравнению с периодом половой зрелости.