MORPHO-PRODUCTIVE PERFORMANCE OF COTURNIX COTURNIX JAPONICA POPULATIONS REARED IN BIHOR COUNTY, ROMANIA

Denis Paul BACTER[1], Ionut Darian GAL[1], Monica Angelica DODU[1]

[1] University of Oradea, Faculty of Environmental Protection, 26 Gen. Magheru St., 410048 Oradea, Romania
e-mail: monica_dodu@yahoo.com

RESEARCH ARTICLE

Abstract

The Japanese quail (Coturnix coturnix japonica) is a species of growing interest in small-scale and commercial poultry farming in Romania, particularly in Bihor County, where its rearing has developed progressively since the 1990s as part of family-based agriculture and small commercial farms. The present study aimed to characterize the morpho-productive performance of Japanese quail populations maintained in three private farms in Bihor County, with a focus on body weight dynamics during juvenile and adult stages in both sexes. A total of 990 individuals were examined, comprising 240 males and 750 females. Body weight was recorded at weekly intervals from day-of-hatch to 34 weeks of age, and the results were statistically processed and compared with reference values from the scientific literature. The findings revealed a linear growth trajectory in both sexes, with females consistently outperforming males in body weight gain during the juvenile period, achieving approximately 30% greater body mass at 6–8 weeks of age. At maturity, males reached a mean final body weight of 128.8 g, while females attained 148.6 g at the end of the laying period. Population uniformity was high in early stages and declined progressively in adult birds. The study confirms that the quail populations in Bihor County express growth potential close to the upper limit typical for the breed, providing a valuable baseline for future genetic selection and herd improvement programmes.

Keywords*: Coturnix coturnix japonica; Japanese quail; body weight dynamics; morpho-productive performance; growth trajectory; Bihor County*

#Corresponding author: Monica Angelica DODU

INTRODUCTION

The Japanese quail (Coturnix coturnix japonica) is a small gallinaceous bird originating from East Asia, where it was first domesticated in China and subsequently bred intensively in Japan as early as the 12th century. Initially valued as a songbird, the species has progressively acquired considerable economic importance as a producer of both eggs and meat. Its relatively short generation interval, early sexual maturity, high egg-laying capacity, efficient feed conversion and modest space requirements have made it an attractive species for poultry farming systems ranging from small household flocks to semi-intensive commercial operations (Vacaru-Opris, 2000; Usturoi, 2008).

In Romanian rural communities, and particularly in Bihor County, the rearing of Japanese quail has historically been integrated into small-scale, diversified agricultural systems. Throughout the Crisurilor Plain and the Oradea metropolitan area, quail were traditionally kept as a complementary activity alongside other forms of livestock and crop production. This pattern changed gradually during the 2000s and 2010s, when specialized micro-farms began to emerge to supply the growing demand for quail eggs and lean quail meat in Oradea and the broader western Romanian market. More recently, the integration of modern incubators and genetically improved lines has begun to professionalise quail rearing in the region (Dodu, 2010).

The morpho-productive characterisation of quail populations is essential both for assessing the genetic potential of existing breeding stock and for designing effective selection and improvement programmes. Body weight at successive developmental stages is one of the most informative and readily measurable performance traits, as it reflects the combined influence of genotype,

nutrition, management and environmental conditions. Published reference ranges for Coturnix coturnix japonica indicate that females typically achieve greater body mass than males by approximately the sixth week of life, a phenomenon attributed primarily to the hormonal stimulation associated with the onset of reproductive activity (Sauveur, 1988; Usturoi, 1999; Vacaru-Opris, 2002).

Despite the practical relevance of quail farming in the region, systematic data on the productive performance of Bihor County populations remain scarce. The present study was therefore designed to provide a detailed characterisation of body weight dynamics in Japanese quail maintained under local farm conditions, covering the full developmental trajectory from hatch to 34 weeks of age. The specific objectives were: (i) to describe the pattern of body weight gain in juvenile and adult males and females; (ii) to assess population uniformity at each developmental stage; and (iii) to compare the observed values with established reference data from the international scientific literature.

MATERIAL AND METHOD

The study was conducted in three private quail farms located in Bihor County, Romania, all engaged in small-scale commercial production of quail eggs and meat. The farms were selected on the basis of their use of the Japanese quail breed (Coturnix coturnix japonica), their operational continuity over the study period, and their willingness to provide access to production records and animals. A total of 990 individuals were included in the study, comprising 240 males and 750 females. The distribution of birds across the three farms is presented in Table 1.

Table 1. Distribution of study animals across the three quail farms in Bihor County

Farm	Females (n)	Males (n)	Total (n)
Farm 1	230	80	310
Farm 2	220	70	290
Farm 3	300	90	390
Total	750	240	990

Body weight was recorded individually at weekly intervals from the day of hatching (day 0) through to 34 weeks of age, using calibrated digital analytical and technical balances. All weighing was performed in the early morning, before the first feeding, to minimise the confounding effect of feed and water intake on body mass measurements.

Additional equipment used in data collection included photographic apparatus for morphological documentation and a personal computer with spreadsheet software for data entry and statistical processing. The results were analysed using descriptive statistics (arithmetic mean, standard deviation, and coefficient of variation) and were subsequently compared with reference values from authoritative sources in the scientific literature (Sauveur, 1988; Usturoi, 1999; Vacaru-Opris, 2002).

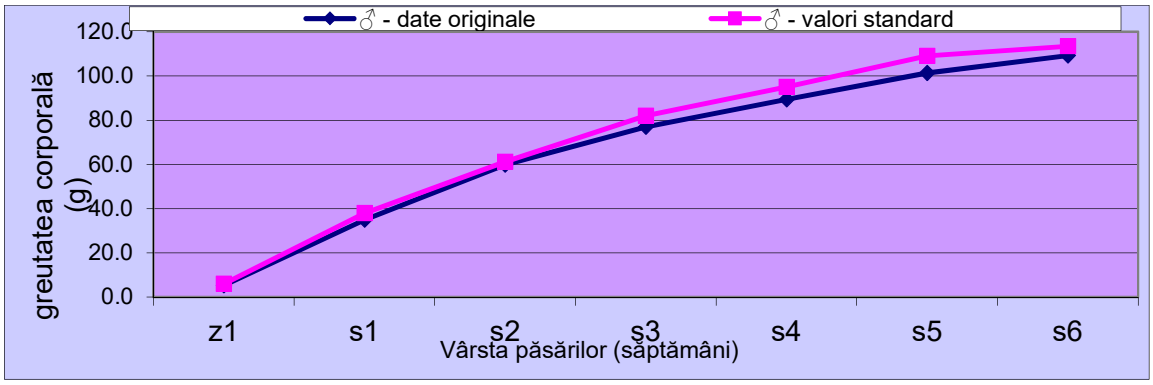
The coefficient of variation (CV) was used as an indicator of population uniformity: values below 10% were interpreted as indicative of a highly homogeneous population, values between 10% and 20% as moderate heterogeneity, and values exceeding 20% as poor uniformity. Statistical analysis was performed using Microsoft Excel (version 2019, Microsoft Corporation, Redmond, WA, USA).

RESULTS AND DISCUSSIONS

Body weight dynamics in juvenile males. The mean body weight of male quail at day of hatch was 5.2 g per bird, with individual values ranging from 4.8 ± 0.4 g to 5.7 ± 0.9 g. Population uniformity at this stage was very high, as reflected by a coefficient of variation between 3.2% and 8.4%. These values are consistent with published reference data for the breed (Sauveur, 1988) and confirm the genetic and incubation quality of the study flocks.

A linear pattern of body weight gain was observed throughout the juvenile period. At three weeks of age, males achieved a mean body weight of 77.0 g; however, population uniformity began to decrease from this point onwards, indicating the emergence of individual variation in growth rate. Subsequent mean body weights were: 89.3 g at four weeks, 101.3 g at five weeks, and 109.2 g at six weeks. This progressive increase follows the sigmoid growth curve typical of the species and is in agreement with previous reports from Romanian and international literature (Usturoi, 1999; Vacaru-Opris, 2002).

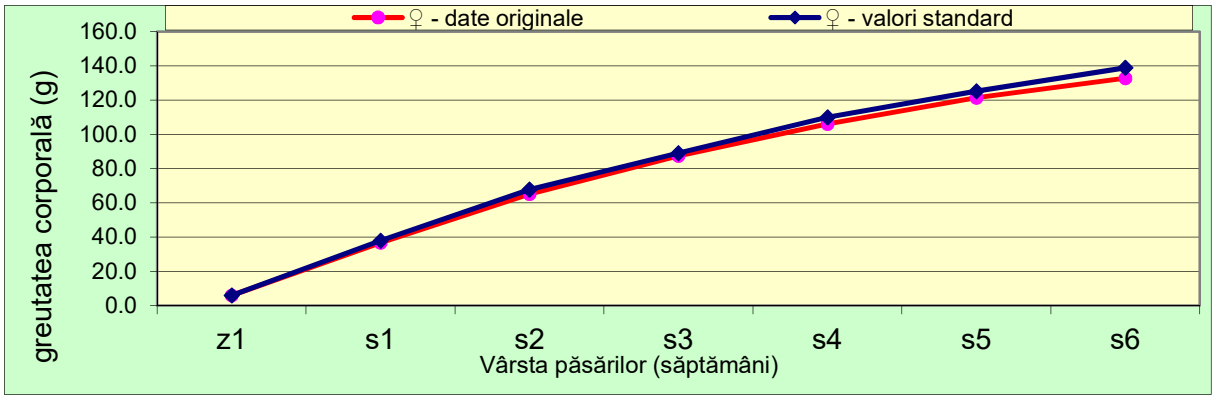
Fig. 1. Body weight dynamics of juvenile males from Coturnix coturnix japonica



Body weight dynamics in juvenile females. The growth trajectory of female quail during the juvenile period was broadly similar to that of males, but characterised by a distinctly higher rate of weight gain, a well-documented sex-specific pattern in this species. The mean body weight at hatch was 5.9 g per bird, slightly higher than in males, with excellent population uniformity (CV = 3.2–3.8%). This sex difference in early body weight, though modest at hatch, became progressively more pronounced during the following weeks.

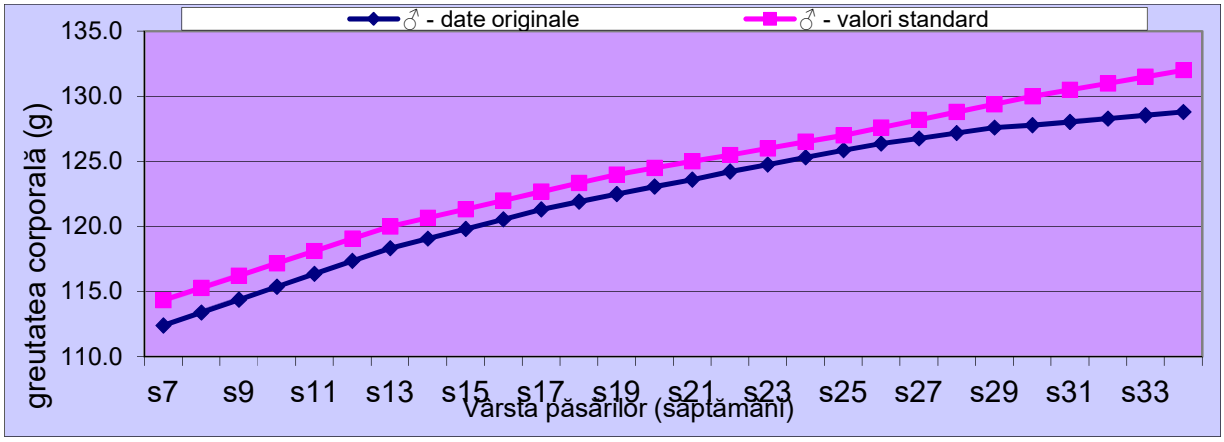
By approximately six to eight weeks of age, females had achieved body weights approximately 30% greater than those of males of the same age, culminating in a mean body weight of 132.8 g at the end of the juvenile period. This pronounced female advantage in body weight gain during the pre-laying phase is attributed to the anabolic effects of oestrogen and to the metabolic demands of reproductive organ development. These findings are consistent with those reported by Sauveur (1988) and Usturoi (2008) for intensively managed Japanese quail populations.

Fig. 2. Body weight dynamics of juvenile females from Coturnix coturnix japonica



Body weight dynamics in adult males. Following completion of the juvenile growth phase, body weight gain in males became markedly slower. The mean body weight at seven weeks of age was 112.4 g, and this increased only gradually to a final value of 128.8 g at 34 weeks. The reduced growth energy during the adult phase, compared to the juvenile period, is a physiological characteristic of the species and reflects the attainment of skeletal and muscular maturity. Importantly, population uniformity declined substantially during this period, with coefficients of variation ranging from 15.7% to 19.8%, suggesting an increasing divergence in individual body condition among adult males.

Fig. 3. Body weight dynamics of adult males from Coturnix coturnix japonica

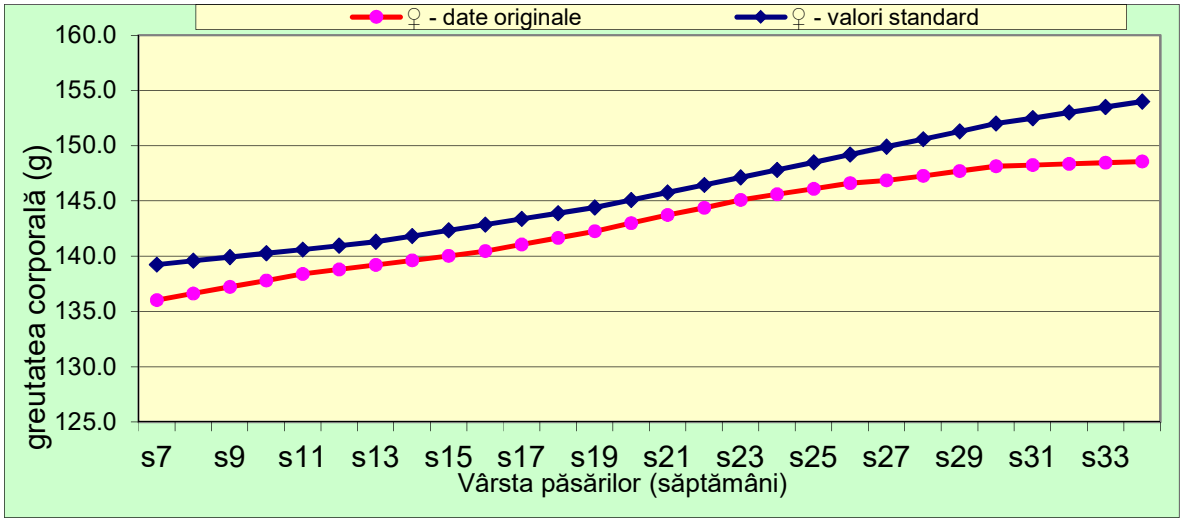


Body weight dynamics in adult females. A broadly similar pattern was observed in adult females, though with some important differences attributable to the onset and progression of egg-laying. The initiation of the laying period, which typically occurs at around five to six weeks of age in this breed, was associated with a redistribution of nutritional resources towards reproductive functions, resulting in a slower and more limited trajectory of body weight gain relative to the juvenile phase. Throughout the laying period, females maintained a mean body weight that increased gradually to reach 148.6 g at the end of the observation period.

These values are in close agreement with reference data for the breed (Vacaru-Opris, 2002; Usturoi, 2008), confirming that the quail populations in Bihor County express growth and productive potential consistent with the upper performance range characteristic of the Japanese quail breed. This finding is of particular practical relevance, as it suggests that the existing genetic stock in the study farms already

approaches the ceiling of breed-typical performance under local management conditions.

Fig. 4. Body weight dynamics of adult females from Coturnix coturnix japonica



The summary of mean body weight values at key developmental stages for both sexes is presented in Table 2.

Table 2. Mean body weight (g/bird) at key developmental stages in Coturnix coturnix japonica by sex

Age / Stage	Males – mean BW (g)	CV males (%)	Females – mean BW (g)	CV females (%)
Day 0 (hatch)	5.2	3.2–8.4	5.9	3.2–3.8
3 weeks	77.0	decreasing	–	–
4 weeks	89.3	–	–	–
5 weeks	101.3	–	–	–
6 weeks	109.2	–	132.8	–
7 weeks (adult onset)	112.4	15.7–19.8	–	–
34 weeks (final)	128.8	15.7–19.8	148.6	–

BW = body weight; CV = coefficient of variation. Values for females at 3–5 weeks are intermediate between hatch and 6-week data (linear progression); adult female CV data were not separately reported at each time point in the source farms' records.

CONCLUSIONS

The present study provides a systematic characterisation of the morpho-productive performance of Japanese quail (Coturnix coturnix japonica) populations maintained in small commercial farms in Bihor County, Romania. The principal findings may be summarised as follows.

Both male and female birds exhibited a predominantly linear pattern of body weight gain throughout the juvenile period, with growth rate declining progressively during the adult phase. Female quail demonstrated a consistently superior growth energy compared with males, particularly during the pre-laying juvenile phase, achieving body weights approximately 30% greater than males by six to eight weeks of age. This sex-specific

pattern is a well-established characteristic of the species and was confirmed by the data obtained in all three study farms.

At the end of the observation period (34 weeks), males reached a mean final body weight of 128.8 g, while females attained 148.6 g at the close of the laying period. These values are consistent with upper reference ranges reported in the international literature for intensively managed Japanese quail, indicating that the study populations express their productive potential close to the genetic ceiling characteristic of the breed.

Population uniformity was very high at hatch in both sexes (CV < 10%), but declined during adult life, particularly in males, where CV values of 15.7–19.8% were recorded. This increasing heterogeneity among adult birds suggests the progressive expression of individual variation in body condition and constitutes a relevant consideration for selection and culling decisions in farm management.

Given that the existing populations already approach the upper performance limit for the breed, future improvement efforts are likely to require the introduction of higher-yielding genetic lines or targeted selection of superior individuals within the current stock, as further gains through purely nutritional or management interventions are expected to be limited. The present dataset provides a valuable baseline for monitoring population performance over time and for supporting evidence-based breeding decisions in quail production in Bihor County.

REFERENCES

1. Balasescu, M., Baltan, Gh., Dascalu, AL., Vancea, I. (1980). Avicultura. Ed. Didactica si Pedagogica, Bucuresti.
2. Dodgson, J.B. (2000). Integrating quantitative and molecular techniques in selection for disease resistance. XXI World's Poultry Congress, Montreal, Canada, Aug. 20-24.
3. Dodu, M. (2010). Contributii la identificarea si dezvoltarea fondului genetic aviar din judetul Bihor. PhD Thesis, USAMV Iasi.
4. Driha, A. (2000). Curs de Tehnologia cresterii pasarilor. Editura Mirton, Timisoara.
5. Gilca, I. (1996). Aprecierea valorii de ameliorare a animalelor. Ed. Periscop, Iasi.
6. Grosu, H., Oltenacu, P.A. (2005). Programe de ameliorare genetica in zootehnie. Ed. Ceres, Bucuresti.
7. Mallard, J., Donaire, M. (1990). Evaluation de la selection. C.R. Acad. Agric. Fr. 76, 6, 81-91.
8. Margarint, I., Boisteanu, P.C., Chelaru, A. (2002). Fiziologia animalelor domestice. Ed. Ion Ionescu de la Brad, Iasi.
9. Oroian, T.E., Vlaic, A. (2001). Ameliorarea genetica a populatiilor de animale domestice. Ed. Academic Press, Cluj-Napoca.
10. Popescu-Vifor, St. (1990). Genetica populatiilor de animale domestice. Ed. Ceres, Bucuresti.
11. Sandu, Gh. (1995). Modele experimentale in zootehnie. Ed. Coral-Sanivet, Bucuresti.
12. Sauveur, B. (1988). Reproduction des volailles et production d'oeufs. INRA, Paris.
13. Tirlea, S. (1995). Consideratii privind producerea si difuzarea materialului biologic avicol in Romania. Simpozionul Stiintific National "Dezvoltarea zootehniei-o certitudine pentru viitor", Iasi.
14. Usturoi, M.G. (1999). Incubatia la pasarile domestice. Ed. Ion Ionescu de la Brad, Iasi.
15. Usturoi, M.G. (2004). Producerea oualor de consum. Ed. Ion Ionescu de la Brad, Iasi.
16. Usturoi, M.G. (2008). Cresterea pasarilor. Ed. Ion Ionescu de la Brad, Iasi.
17. Usturoi, M.G., Boisteanu, P.C., Vacaru-Opris, I. (1999). Indici de calitate pentru ouale de prepelita destinate incubatiei artificiale. Simpozion Stiintific de Zootehnie cu participare internationala, Iasi, 9-10 Dec.
18. Vacaru-Opris, I. (1993). Tehnologia cresterii pasarilor. Vol. I si II. Lito, Universitatea Agronomica, Iasi.
19. Vacaru-Opris, I. (2000, 2007). Tratat de Avicultura. Vol. I. Ed. Ceres, Bucuresti.
20. Vacaru-Opris, I. (2002). Tratat de Avicultura. Vol. II. Ed. Ceres, Bucuresti.