ABSTRACT

Birds rearing (poultry) is one of the oldest human occupation, which has sought over time to tame, to grow, multiply and refine different bird species, creating breeds, lines, populations and hybrids still greater.

Thus, durin the XII century, Asia has begun the process of domestication of wild common quails. Of the 5-6 species of the genus Coturnix, who live on the plains of Asia, Europe and Africa, the species Coturnix coturnix japonica was first domesticated in China and then in Japan. Domestic Japanese quail gradually spread in Europe and America and elsewhere in Asia. With domestication, wild quail undergone obvious morpho-physiological and behavioral transformation.

Thus, plumage color has beun to be very diversified, occurring colors such as white, black, red, arginiu, brown, and increased body weight from 100 grams, the common form (wild) to 150-300 grams of egg and meat breeds. Egg production increased from 8 to 12 pieces per year / per bird in the wild, more than 280-350 pieces / year / capita poultry, egg breeds (domestic species. Domestic quail does not nest, can not fly and do not migrate, as happens in the wild. Coturnix coturnix japonica subspecies comprises, international standards, six races with 60 lines, such as: race French, Italian race and varieties: Negro-Grey, Jumbo, Tuxedo, Golden-Manchu, Brown, Rosetta, Tibetan, Pharaoh , Asian, Blue, Fawn, Blue Scalled, Golden Speckled etc.

The Domestic quail has the following common characteristics: the female weighing 150 grams (at maturity); on the chest and neck plumage is dark reddish brown, without spots (Fig. 1.2.) and can produce a 300-350 eggs per year, each with an average weight of 10 grams. Weight of eggs produced in one year by these birds (10 x 300 = 3000 grams) are more than 20 times their body weight. The male has an average body weight of 120-130 grams (at maturity) and his feathers on the chest and neck is lighter and speckled with black (Fig. 1.2.). These elements of sexual dimorphism can be distinguished from the age of three weeks. There are other elements opposed to the two sexes, namely: female cloaca is elongated transversely while the male, it has a pink lump, which is not covered with feathers. The first egg it is deposited at age of 40 days (6 weeks) and egg incubation period is of 16-17 days. Japanese quail is very sensitive to light, it

requires a system of continuous 14 hours-light per day, which positively influence egg production. Shedding phenomenon is poorly and rarely expressed, while the ambient temperature is kept constant at values of + 20 to 22° C throughout the year. When birds are isolated, their egg production is reduced and then stops. From the eggs produced in one year, 180-240 chicken are viable. This race is so specialized lines of quail egg production and specialized lines for meat production, the latter having higher body weight. (Hikaru, Yoshikura, 1972).

In Romania, the rearing of quail began about 4 decades ago, at first sporadically and very shy, but after 1990 the growth of these birds has increased to some extent, but without reaching large farms. There are lots of small quail breeders, small family farms, with an actual order of 100-500 head, mainly producing eggs. Unfortunately in our country, large poultry farms have so far ignored this species of birds, although very valuable biologically and economically.

Quail eggs are extremely valuable under chemical, nutritional and therapeutical aspects. Because it contains several B vitamins (thiamin, riboflavin, pantothenic acid, biotin, choline, folic acid, pyridoxine, cyanocobalamin), less cholesterol and saturated fats, phospholipids, fat soluble vitamins, minerals (phosphorus, cobalt, magnesium, iron) quail egg has a good therapeutic value and is recommended for people suffering from heart, lungs, liver disease.

However the literature is very poor in information about this species of bird. There are some general data on the external form (plumage color, weight, egg production and some egg related aspects of composition), but there is very little or nothing about the morphology and structure of organs and tissues of this species, on embryonic development, the structure and chemical composition of quail eggs, or about the quality values of the hatching eggs. We hope to define issues and reasons for this work. These are some facts and reasons which define the purpose of this paper.

The quails from wich over 500 eggs have been collected and studied by us, belonged to the Faculty of Animal Science, the Biological Section. These were healthy and normally developed specimens, but with different age and body weights, consistent with the four phases of the laying cycle.

Thus, the quail at the beginning of the laying period were aged 60-65 days, representing on average, nine weeks and body weights of 120-130 grams. Later when the peak of the curve of laying has been reached, the quail from wich the eggs were harvested, were aged 77-84 days (11-12 weeks) weighing 125-135 grams. In the plateau phase of laying, the quails from wich the eggs were harvested, had an age of about 105-112 days (15-16 weeks), weighing 130-145 grams. At the end of laying period, these birds were aged 231-238 days (33-34 weeks) having a body weight of 140-155 grams.

With regard to these quail eggs collected, they were characterized by a specific pigmentation, by weights and measures, which moved upward with increasing age of the birds that came from. Thus, the quail eggs collected at the beginning of the laying period, weights were between 7 and 12 grams and dimensions of 26-35 mm for the longitudinal diameter and 22-26 mm for the transversal diameter.

A number of quality indices have been watched regarding the eggs: morphological indices (egg weight, egg weight and components ratio, mineral shell thickness, egg diameters and circumference, volume, density, size and specific gravity of eggs, egg size), physical (pH value of the white, yolk and egg mixture, the white index, yolk index, yolk color, shell mineral index and Haugh index) and chemical (components and whole eggs content in water, solids, minerals, organic substances, proteins, fats, nonnitrate extracted substances, carotene - from yolk and caloricity from whole egg and egg components) of hatching eggs.

To these were added data on the incubation process analysis (fertility, hatching process), but also the embryos resulting from this process. Thus, eggs were weighed and measured before being placed in an incubator. Also, embryos were also weighed and measured, determining the rate of increase of their weight, length, etc..

After obtaining and processing these data, several conclusions were reached that will be outlined below.

Quail eggs weight has evolved upward from the beginning to the end of laying, from a value of 10,232 grams to 11,814 grams, the difference between the two time (phases) of laying cycle beeing of 15,46%. The average weight of quail eggs layed throughout the entire laying period was 11,075 grams.

The dimensions (longitudinal and transverse diameter) of quail eggs increased with the increasing age of birds, with 7,40% and respectively 4,02% (from the beginning to the end of laying).

Quail egg volume increased from value of 9,645 to 9,851 cm^3, as it was at the beginning of laying, reaching values of 11,223 to 11,390 cm^3 at the end of the laying process, the average volume beeing of 10,478 to 10,694, and the increase being from 15,62 to 16,36%.

The specific gravity and density, for the quail eggs produced during the laying cycle, has not changed much, the values for these indicators are close (1,0358 to 1,0300 grame/cm^3) (0,9667 to 0,972 cm^3/grame).

Regarding the structure of quail eggs, their three major components (mineral shell, albumen, yolk) have evolved as the weight of whole egg, as follows: the albumen decreased from 62,02% at the beginning laying to 58,70% at the end of laying (by 3,32 pp) the average throughout the period beeing of 59,90%, yolk increased from 30,22% at the start of laying, to

33,58% at the end of this process (with 3,36 percentage points), its average being 32,28% and mineral shell remained constant (7,76 to 7,77%), with an average of 7,80% over the period of laying.

The PH values of the albumen, yolk and mixture of these two components has not changed much during the 3-4 stages of the laying cycle. We found average values of 8,639 Uph for albumen, 5,998 Uph for yolk and 7,530 Uph for the egg mixture.

The albumen (Ia) and yolk (Iy) index, at the studied quail eggs varied little with the birds age, and their average for the entire laying cycle was 0,0839 for the albumen index and of 0,445 for yolk index. Haugh synthetic index had a value of 93,88 UH at the eggs from the begining of layin; 89,48 UH in the plateau phase and of 91,03 UH at the end of laying. The average index for all laying period is from 91,46 UH.

The chemical composition of the three components of quail eggs (shell, albumen, yolk) was different in the three phases of the laying cycle, studied by us (top, shelf, end of lay).

Quail eggs whites had an average of 87,54% water for the entire period of lay, with small variations from 87,48% to 87,63%. The same white containned an average of 0,834% minerals, 10.21% protein, 0,101% fat and 1,314% carbohydrates.

Quail egg yolk has an average water content of 48,65%, but increased from 45,30% at the begining of laying up to 50,86% at the end of laying. Yolk also contains, on average 1,96% minerals, 16,94% protein, 31,02% fat and 1,45% and carbohydrates. The quail eggs mineral shell contain on average 1,18% water, 89,40% minerals and 8,53% protein. The chemical composition of whole quail eggs is represented by water, the average rate of 68,32%, minerals at the rate of 8,09%, protein at the rate of 12,24%, fat in the proportion of 10,04% and carbohydrate at a rate of 1,33%.

The quail eggs caloricity had an average value for the three phases of the laying cycle of 170,708 kcal EB / kg (714,72 kJ / kg) or 18,884 kcal EB / egg (79,063 kJ EB / egg).

Of the three components, the egg yolk has a average caloricitate of 14,144 EB kcal / egg, representing 74,89% of whole egg caloricitatea.

The quail eggs under incubation process to study embryonic development in this species, were collected in the peak phase of laying curve and had an average weight of 10,696 grams, an index format of 79,455%, a volume of 10,224 cm^3; and in their structure, the albumen represented 60,50%, yolk represent 31,62% and mineral shell 7,82%.

For the conditions for eggs incubating, the average temperature was of + 39,64°C in the incubator, and in the incubation chamber of + 22,80°C, mean relative air humidity of the incubator was 70,86%. Incubated eggs were turned 2 to 3 times daily, except the last two days of incubation.

Incubated quail eggs have lost their original weight daily, with about 0,682 grams, on average, which is 6,44%.

The weight of quail embryos developed from 0,105 grams in day 4 of incubation, to 4,817 grams in the day 14 of incubation. The fourth day of incubation, the embryo represented 1,04% of the whole egg weight, and in the last day of incubation it represented 46,78% of the egg weight.

The average daily growth rate in quail embryo weight was 0,471 grams, or 48,08%.

Similar with the embryo weight, evolved their different dimensions (length and thickness of body, long wings, legs, neck, beak, head diameter, eye, otic orifice, etc.).. For example, the average increase in length of embryos was 3,912 mm and 1,052 mm thick.

Newly hatched quail chicks weight was 7,878 grams, which represents 72,58% of the weight of eggs from which they originated.

At the end of the hatching process following results were obtained: the fertility of quail eggs was 88,62%, the proportion of dead embryos and chicks throughout the period studied was 13,01%; process of hatching success was 85,32% and hatching capacity was of 75,61%.