SOME PHYSIOLOGICAL STUDIES ON JAPANESE QUAIL COTURNIX COTURNIX JAPONICA UNDER EGYPTIAN ENVIRONMENTAL CONDITIONS

By

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A Thesis Submitted in Partial Fulfilment
of the Requirements for the
Degree of Mastr of Science

Department of Animal Production
Faculty of Agriculture
Ain Shams University

1976

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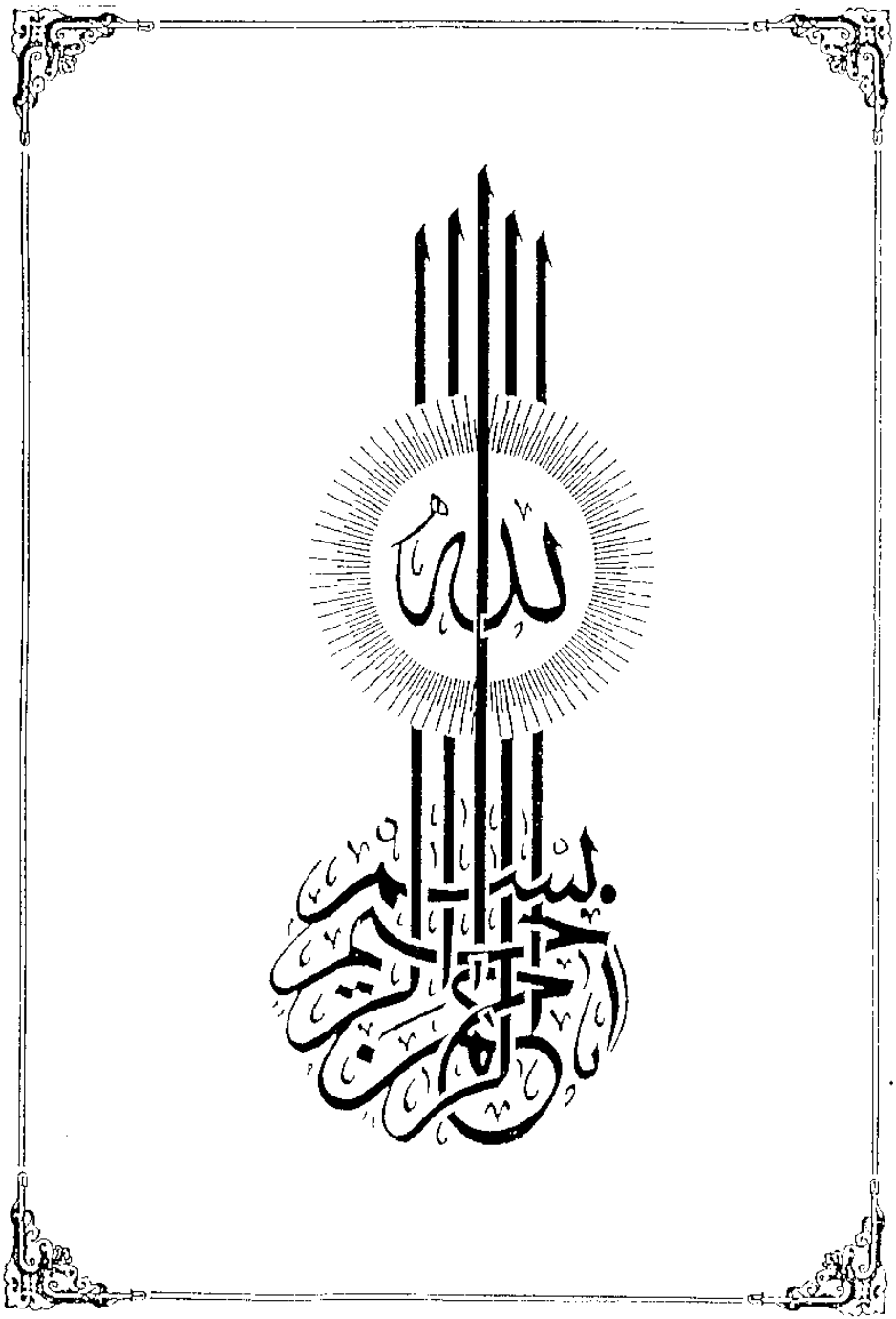

A C K N O W L E D G M E N S

The author wishes to express his sincere appreciation to Dr. S.S. Khishin, Professor, Animal Breeding and Head of the Animal Production Department, Faculty of Agriculture, Ain Shams University, for his sincere encouragement throughout this study and for providing facilities.

Sincere appreciation is also expressed to Dr.S. Kotby, Associate Professor, Environmental Physiology, for his suggestions during the course of this study and preparation of this manuscript.

Kind acknowledgment is deserved to Dr. Maie F. Ali, Associate Professor, Poultry Physiology, for her guidance during the course of this study.

The author wishes to thank Dr. F.A. Tawab, Department of Genetics, for his assistance in the statistical analysis and for giving the outhor the opportunity to use the electrophoresis.

Thanks are also due to Dr. M.A. Kheir El-Din, Ministry of Agriculture, for help and providing incubator.

The cooperation of the members of the Animal Physiology group, Animal Production Department, Ain Shams University is deeply appreciated.

C O N T E N T S

I N T R O D U C T I O N

Japanese quail, Conturnix coturnix japonica has been domesticated for the last several hundred years in Japan. The bird was loved for its distinctive sound before the close of 19th century. Recently, these birds have been suggested as a possible pilot animal for more extensive studies involving chickens and turkeys.

Available data point out that the Japanese quail offers real possibilities as a very useful laboratory research animal for certain poultry investigations. However, additional information is needed regarding various responses of these birds under Egyptian environmental conditions. Japanese quail Coturnix coturnix japonica has been introduced to the Department of Animal Production, College of Agriculture, Ain Shams University, Egypt, from the University of Maryland, U.S.A. since 1973.

It is hoped that if Coturnix quail can be used successfully as a laboratory research animal for chickens, it can provide real savings in cost, time and space for current and future poultry research studies.

REVIEW OF LITERATURE

Body weight of Japanese quail

In the domestic fowl body weight has been extensively studied by many workers. However, body weight of Japanese quail has not been studied in Egypt.

The effect of age, sex and physiological state on body weight in the domestic fowl has interested poultry investigators since the early part of the present century.

Ghany *et al.* (1966) reported average body weights of Japanese quail to be 7, 43 and 70 grams at one - day old, two weeks and four weeks, respectively.

Ernst and Coleman (1964) noticed that average body weight of Japanese quail at six weeks of age was 108.8±2.6 grams. However, Ruban *et al.* (1969) found that it was 120 grams in average.

Krejci, *et al.* (1972) demonstrated that average body weights of Japanese quail at eight weeks of age of normally coloured male and female were 109 and 117 grams, respectively.

Vogt (1965) reported that body weight at 8-10 weeks of age averaged 115 and 145 grams for males and females, respectively.

El-Ibiary et al. (1965) noticed the difference that existed between male and female Japanese quail in body weight. They reported that the females were consistently heavier than the males till 100 days of age, although insignificant differences were reported before the sixth week of age. The sex differences in body weight increased from six percent at six weeks to approximately 22 percent at 100 days old body weight.

It was reported, also, that the sex differences in body weight existed in all ages. Average body weights for Japanese quail males were 7.03, 43.47 and 69.22 grams while females were 6.88, 43.58 and 70.77 grams at one-day old, two weeks and four weeks, respectively (Ghany et al. (1966)).

The differences between sexes or female minus male in the eviscerated body weight was + 2.0, + 4.1 and -11.6 grams at 2,4 and 25 weeks of age, respectively. Comparison between male and female in body weight could be attributed to genetic and environmental variances (Kawahara (1970)).

The relationship between egg weight and chick weight in Japanese quail was studied by various workers. Ghany,

et al. (1966) found that one-day old chick weight/egg weight ratios were 65.31 and 67.17 for male and female, respectively. They concluded that females tended to utilize more of the eggs and to grow at a higher rate than males. Ali and Godfrey (1970) reported that the percent of the wet weight of the one-day old chick of initial setting egg weight was 68.1 for Japanese quail. In Bobwhite quail average chick weight as a percentage of initial setting egg weight was 51.1 to 66.2 (Mahmoud, 1971).

Ali and Godfrey (1970) noticed highly significant correlation coefficients between egg weight and embryo wet weight at the 12th, 14th through 16th day of incubation and also at hatching.

The correlation coefficients for egg weight / chick weight which have been reported by Ghany et al.(1966) was found to be 0.720, 0.197 and 0.052 for males and 0.771, 0.063 and 0.037 for females at one - day old, one - week and two weeks of age, respectively. Mahmoud (1971) reported the correlation coefficients between egg weight and one - day old chick weight of Bobwhite quail to be 0.81, 0.81 and 0.86 for first, second and third year of production, respectively.

Growth rate

Various workers have calculated growth rate of domestic fowl. However, in Japanese quail, EL-Ibiary et al. (1965) found that percentage of growth rate was higher in both male and female between the first and the third weeks of age (56.5 to 58.3 percent) and decreased sharply (16 to 17.9 percent) at five to six weeks of age. They concluded that in selecting for fast growth in Japanese quail, the most appropriate criterion for selection would be the percentage growth rate from one to two weeks of age.

The relationship between embryonic and post - natal growth in Japanese quail was studied by Ali and Godfrey (1970) who reported insignificant correlations between embryo wet weight at 12 days of incubation and post - natal weights up to six weeks of age.

Growth rate of Japanese quail was found to be affected by domestication, Kawahara and Mita (1968) demonstrated that the wild line was always lighter than the domestic

one, the difference being 14.5 % for females and 13.1 % for males on the average of various stages.

Growth rate of Japanese quail was noticed to be sensitive to the environmental temperature. The critical environmental temperatures for growing Japanese quail which have been reported by Pran Vohra (1967) was between 35-37 °C at day - old and narrows to 35° and 31 °C at first and second weeks of age, respectively. Then a rapid widening occurs to give above the following ranges for the various ages: 25-27 °C, 21-25 °C, 19-23 °C and 19-21 °C at three, four, five and six weeks, respectively.

Barrott and Pringle, 1947, 1948, 1950, reported that brooding temperature schedule for Japanese quail was similar to that for chickens. Aho, et al. (1969), however, demonstrated that a suitable brooding temperature schedule for Coturnix chicks was as follows : 35 °C, 32 °C, 26.7 °C and 21 °C. for the first four weeks, respectively. The relative humidity may be either 30 or 60 % without harmful effects.

Fertility and Hatchability

In Japanese quail, Novy and Valencik (1973) reported that fertility averaged 51.8 percent and hatchability of fertile eggs averaged 39.2 percent. Athough, Vogt (1965) demonstrated that average quail egg fertility and hatchability were 65.3 and 65.1 percent, respectively. While El-Ibiary, et al. (1965) reported that fertility and hatchability percentages were 75.7 and 63.3, respectively.

The effect of age of dam on fertility and hatchability was studied by Vogt and Steinke (1970). They found that fertility in Japanese quail was highest when eggs were produced by birds aged 70 - 180 days and decreased thereafter. Hatchability of fertile eggs, also decreased with increasing age of dams. They concluded that collection of eggs for hatching should be limited to dams aged two to six months.

Woodard and Abplanalp (1971) showed that maximum fertility was attained shortly after the onset of egg production, then gradually declined, and that the percentage of hatchability was higher than that of fertility of quail eggs during the first year of production.

Sefton and Siegel (1973) noticed that mating activity of Japanese quail was at its maximum between 70 and 210 days, of age, after which it began to decline.

The influence of the Foamy material which produced by the cloacal gland of Japanese quail males on the fertilizing capacity was studied by Kobayashi, et al.(1972). They found that inclusion of the Foamy material with the semen did not result in any significant improvement of fertility. The fertility percent were 47.7 and 45.8 for the experimental and control birds, respectively.

The effect of male to female ratio on fertility and hatchability was studied by Vogt and Steinke (1970). They compared between three ratios of male to females 1 : 1, 1 : 2 and 1 : 3 in fertility and hatchability of quail. Their results indicated that 1 : 1 ratio gave best egg fertility. However, hatchability was not affected by the number of females per male.

Effect of domestication was also studied. Kawahara and Mita (1969) calculated fertility and hatchability of wild and domesticated types of Japanese quail. They reported that the percentage superiority of the domesticated over the wild strain was 22.5 for fertility and 20.9 for hatchability.

The effect of wave length of light on fertility and hatchability were studied by Woodard, et al.(1969). Fertility of quail eggs laid under blue, green, red and white light was

reported as 77.1, 86.8, 88.5 and 85.9 percent, respectively although, hatchability was not affected by the colour of light.

Pigareva, et al. (1973) studied the effect of X-irradiation of quail males on egg fertility and hatchability. They exposed Japanese quail males to X-ray doses of 0, 50, 100, 200, 400, 600 and 1200R and mated them to non - irradiated females. They found that fertility of eggs set one to five days after irradiation were 52, 32, 32, 44, 47, 41 and 38 percent, respectively. Fertility of eggs set 6 to 17 days after irradiation were 50, 16, 44, 39, 40, 49 and 51 percent, respectively. Fertility of eggs set 3 months after irradiation were 58, 72, 80, 49, 48, 81 and 77 percent, respectively. Average hatchability of six batches, however, were 88, 86, 87, 81, 87 and 86 percent.

The effect of egg weight on hatchability of quail eggs was studied by Insko, et al. (1971) who found that fertile eggs weighing less than 7 grams showed highly significant decrease in hatchability. Fertile eggs weighing from 9 to 11 grams hatched better than the average of all fertile eggs. They concluded that Japanese quail eggs weighed less than 7 grams should not be incubated for hatching.

Marks, et al. (1969) reported that average fertility and hatchability were 69.4, 72.2 and 68.8, 74.3 percent for transporting quail eggs which were packed in normal quail egg flats and in chicken egg flats, respectively.

The improvement of hatchability of Japanese quail eggs by Ethylene - diaminetetra acetic acid (EDTA) was studied by Vohra, et al.(1970). They found that egg fertility averaged 57.8, 60.0, 58.0, 75.8 and 42.0 percent, and hatchability of fertile eggs averaged 62.0, 82.5, 58.0, 64.8 and 43.0 percent for the levels of 0, 0.5, 1, 2 and 4 percent EDTA diets, respectively.

The effect of inbreeding on fertility and hatchability was studied by Lucotte (1973). He reported that average fertility percent in Japanese quail eggs were 98.9, 99, 98.5 and 97.1, while hatchability percent were 71.4, 53, 23.2 and 14.9 for non - inbred parental stock, first, second and third generations, respectively. Shinjo, et al. (1971) reported that serious breeding difficulties were encountered in the fifth generation of inbreeding in Japanese quail.

The effect of inbreeding on hatchability according to its effect on the resistance of Japanese quail embryos