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Raising Japanese Quail in the Laboratory

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Introduction

Within a few years, the use of *Coturnix coturnix japonica*, popularly known as Japanese quail, as a laboratory research animal has increased tremendously in the United States and also abroad. Currently, a variety of laboratories conducting investigations on different aspects of biological and related areas are using this bird as an experimental animal. We have learned from its use in both individual and class experiments that it is also a very useful animal for classroom experimentation. The material is discussed under the following headings:



Arora

1. *Coturnix* quail—A laboratory research animal

2. General features of the birds
3. Housing of birds
4. Ambient temperature
5. Feeding and watering
6. Fertility
7. Care and incubation of hatching eggs.

Dr. Arora is Associate Professor of Biology at Drake University. His research interests are in the areas of genetics and developmental biology, particularly in the investigation of "Genetic and Environmental factors influencing the development of Vertebrate Embryos."

1. *Coturnix* Quail—A Laboratory Research Animal

The following are some important advantages of using coturnix as a laboratory research animal:

a. *Small size and ease of handling:*

Quails can be handled easily without any danger or fear. Birds can not fly a long distance and can be controlled without much difficulty.

b. *A short breeding cycle:*

Post-natal development of the birds is very rapid. Newly hatched chicks reach their sexual maturity within six to seven weeks, and are in full production within fifty to fifty-five days. Quails are very prolific egg producers. Five or six generations of birds can be raised during the span of one year very easily.

c. *Space:*

Quails can be raised in a com-

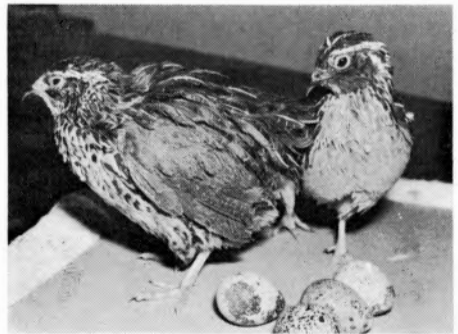


Figure 1

Fully grown Japanese Quail: Male (right) and Female (left).

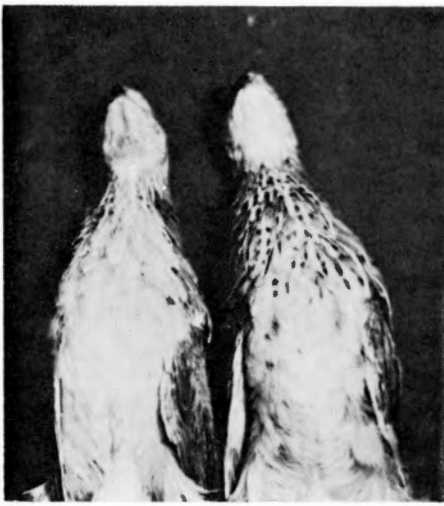


Figure 2
Adult sexual dimorphism: Female (right)
and Male (left).

paratively small space compared to chickens. Ten to twelve birds can be raised in the space ordinarily required for one chicken. When cages are used for housing birds, the cages can be stacked one upon the other leaving some space between the levels of cages to permit cleaning.

d. Economy:

Birds are inexpensive to maintain. Feeding is very simple. Feeds are readily available from commercial feed dealers. Suitable cages and other related equipment can be constructed in a simple workshop. Material for building cages is available at most hardware stores.

c. Availability of the material:

Fertile eggs, chicks of various ages, or adults are available throughout the year and can be obtained from various laboratories raising quail for experimental purposes. Efforts are being made in some laboratories to develop a more

uniform quail stock exhibiting various inherited features.

f. Hardiness:

Coturnix are very hardy birds and are known to be resistant to most avian diseases.

2. General Features of the Birds:

The *Coturnix japonica* is currently being raised for experimental purposes in many research laboratories in the United States and abroad. This bird is a native of Asia and has been imported into the United States from Japan. It is quite different from Bobwhite quail (*Colinus virginians*) and other native varieties.

Coturnix grow very fast and reach sexual maturity at about six to seven weeks of age. After about three weeks of age sex differences are easily recognizable. The male has a uniformly reddish-brown breast and throat. The female has a white throat and gray and speckled breast. Males are a little smaller than females. The average weight of a fully grown female is 135 grams, whereas that of a male is about 115 grams.

If given proper care, quail hens lay between 200 and 300 eggs per year. The eggs weigh from eight to eleven grams, which is about 6 to 7 per cent of the body weight of the hen. The color of the egg is quite variable ranging from white to mottled brown. The eggs hatch in sixteen to seventeen days. Newly hatched quails weigh about six grams and are yellowish in color with brown stripes.

Experiments have shown that the fertility and hatchability in *coturnix* declines when hens reach about eight months of age, although they continue to lay eggs at a high rate after this period. Some mortality occurs during

the first few days of life, largely due to chills and drafts. Special care is necessary during the early age when baby quails are unable to maintain their body temperatures.

3. Housing of Birds:

Young chicks are removed from the brooders when they are eighteen to twenty days old. At this age they are sexed. Two different methods are available for housing birds; individual cages or colony units, depending largely on the purpose for which the quails are being kept. In general the birds, before starting to lay eggs, are kept in small colonies. Cages of 18" x 18" x 18" dimensions were found to be adequate for a colony of twelve birds (giving each bird a floor space of twenty-seven inches). Just before the hens start laying, the floor space for each of the birds is increased either by reducing the number of birds in the cage or by increasing the space. Overcrowding results in depression in growth, lower fertility, increased mortality, and it may induce cannibalism. Smaller cages may be built if individual records are desired. Floor area of about forty square inches (5" x 8") is large enough for housing one or two birds.

The most common material used for cage construction is welded wire of a suitable mesh. Hardware cloth of half-inch mesh supported with wooden or steel framework is very suitable for this purpose. Mesh size should be large enough for the droppings to pass through and fall into a receptacle (tray) placed a few inches under the cages. Generally, wrapping paper of a suitable size and strength is placed inside the receptacle to receive drop-

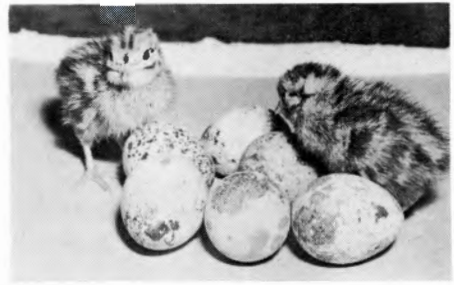


Figure 3

Eggs and day-old chicks: Eggs weigh 8-11 grams and exhibit variegated colors.

pings and can be changed as frequently as desired. Additional care is needed to avoid odors and bad sanitation during the summer season.

Continuous light is recommended for the first two weeks. This may be reduced to sixteen hours by the fourth week of age. When the birds are transferred to the cages for the first time, it is better to cover the floor with paper or cardboard for the first few days. During the brooding period, wood shavings or finely ground corn cobs are good litter material.

4. Ambient Temperature

Newly hatched baby quails require careful attention during the first few days. Most of the post-natal mortality occurs during the first two weeks when

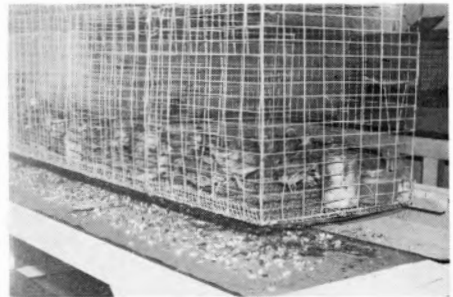


Figure 4

Cages used in the Drake University Laboratory: Droppings are collected on the wrapping paper placed under the cages.

chicks are unable to maintain their body temperature and are extremely sensitive to chills and drafts. It is necessary to provide them with heat for the first eighteen to twenty days. Generally, an ambient temperature of 95-100°F is provided for the first two to three days, which may be gradually reduced to 75-80°F by two weeks of age. Heated brooders are preferable, but ordinary light bulbs have given equally good results in this laboratory. Depending upon the size of colony, ordinary packing cases (cardboard boxes, etc.) of suitable sizes (from grocery stores) can be used as brooders. A bulb of 100-150 watts power should be placed about one to one and one-half feet above the floor, providing a temperature of 95-100°F. Bulb should be lowered if temperature is low for the birds (chicks will crowd together under the lamp if temperature is low). For adult birds, the ambient temperature of 75-80°F is quite beneficial for both fertility and rate of egg production. Both the rate of egg production and fertility will decrease if room temperature is allowed to fall below 65-70°F.

5. *Feeding and Watering*

Feeding and watering of baby chicks requires very careful attention. Chicks during the first two to three days should be prevented from wetting themselves with water and drowning. As mentioned earlier, baby chicks are very sensitive to chills and drafts during early post-natal periods, and proper care is necessary to sustain them and to help maintain their body temperatures. Water troughs for baby quails should be the smallest possible. Small fingerbowls covered with hardware cloth (one-eighth or one-fourth

inch mesh) or petri dishes containing marbles or pebbles have worked satisfactorily. After about one week, the birds are capable of drinking from an open bowl. Water should be available to them at all times, preferably through automatic water fountains attached to the outside of the cages. Water kept in open bowls within the cages will be soiled quickly by the fecal material and splashed out by birds stepping or jumping into the water. The water trough should be rinsed or otherwise cleaned daily to avoid the accumulation of dirt and feed sludge.

Commercial turkey starter (Wayne or Purina brand) has served as an adequate diet. Commercial wild bird starter can also be used. In general, birds require a high protein ration. Feed containing 26 to 28 per cent protein is quite beneficial for growth and for egg production. For very small chicks, the feed is scattered on the paper for the first few days. Later it may be placed in small fingerbowls. For adult birds, feed is best provided in troughs with turned-back edges in order to minimize feed wastage. It is better to keep only a small amount of food before the birds, and wastage can be further minimized by placing a small mesh hardware cloth on top of the feed in the trough. Troughs containing food should be attached to the outside of the cages, and both feed and water should be available at all times. Crushed oyster shells should also be supplied to birds to prevent the occurrence of soft shelled eggs.

6. *Fertility*

Japanese quails decline in reproductive efficiency at about eight months of age. Although the females

continue to produce eggs at a high rate, the fertility and hatchability declines. In females of this age, a high proportion of incubation mortality has been observed. For laboratories raising birds largely as research animals, the reproductive efficiency is very important for economical reasons. Accordingly, it has been suggested that the best eggs for experimental studies should be collected from birds between three and eight months of age.

Overcrowding decreases fertility and should be avoided. Satisfactory fertility is maintained when a ratio of one male to four females are kept in the cages. Rotation of males or separation of males from females for a certain period is suggested for improving fertility in the flock.

7. *Care and Incubation of Hatching Eggs*

Quail eggs are delicate and have very fragile shells. Careless or frequent handling may produce cracks in the shells. Cracks (which are sometimes difficult to detect) may lead to dehydration and death of the embryo. Careful handling of hatching eggs is needed. Cracked shells can be avoided by minimum handling and collecting eggs soon after they are laid. The eggs should be placed directly into egg flats which may then be placed into an incubator or storage room.

If it is necessary to store eggs, they should be kept in a room maintained at 55-60°F and 75 to 80 per cent relative humidity. Viability of the embryos is seriously affected if the eggs are left at room temperature for more

than four to five days. In general, the hatchability and developmental potential of the embryos declines as the storage period is extended beyond seven to ten days.

Eggs are incubated at 99-100°F and 80 to 85 per cent relative humidity. During incubation the eggs should be turned at least four times per day. Incubator temperatures in excess of 100°F are harmful to developing embryos and may reduce hatchability drastically. Quail eggs require a higher humidity level than chicken eggs during incubation for optimal hatching. In laboratory incubators, water kept in open pans at all times during the incubation period gives satisfactory results. Chicks hatch in about sixteen days, plus or minus ten hours. Humidity level should be raised during the last day of hatching for highest hatchability. The chicks should be transferred to the brooder when they are completely dry.

Note: Fertile eggs, quail chicks, and adult quail can be provided by the Biology Department at Drake University with a month's notice.

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