

RAISING AND PROPAGATING Japanese Quail

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Since 1960 there has been much American interest in Japanese quail (*Coturnix coturnix japonica*) as experimental animals for biological research, as well as for subjects in classroom science projects. Amateur bird fanciers and hobbyists have also become interested in raising them because they are hardy, easy to handle, and the equipment needed for their culture is simple. They have a short reproductive cycle, and may lay eggs when only 35 days old. The bird is an excellent food source; it is delicious prepared whole-bodied and charcoal-broiled, and many people enjoy pickling hard-boiled quail eggs for use as hors d'oeuvres.

Japanese quail should not be confused with bobwhite quail (*Colinus virginianus*) or other indigenous quail such as the California quail

(*Lophortyx californica*). *Coturnix* are native to Europe and Asia and date back to the ancient civilizations of these continents. In some parts of Japan they have been raised in captivity for many centuries.

In the U.S. at least 18 states have attempted to establish the species as a wild population, but only Hawaii has been successful. Recent studies suggest that these failures may have been due to the fact that the stock used had a long history of domestication, thus making it unsuitable for life in the wild.

Certain problems arise when those unfamiliar with bird husbandry try to rear Japanese quail for the first time. This publication provides some of the basic information needed to make such attempts successful.

CHARACTERISTICS

The adult female quail usually weighs from 110 to 150 grams (4-5 oz.); males are slightly smaller. Heavier strains have been developed for meat purposes. Average eggs weigh about 10 grams ($\frac{1}{2}$ oz.); they are a mottled brown color, and are often covered with a light-blue chalky material. *Coturnix* chicks weight 5 or 6 grams ($\frac{1}{2}$ oz.) when hatched and have yellowish down with brown stripes. The adult male has a loud, castanet-like crow which has been described as "ko-turro-neex".

Crowing usually begins at 5 to 6 weeks of age and is quite frequent thereafter.

In recent years several strains with new plumage color patterns have been developed. These strains include white (English White), black (British Range), a black with white vest (Tuxedo), wheat color (Manchurian Golden), as well as a strain which lays almost white eggs.

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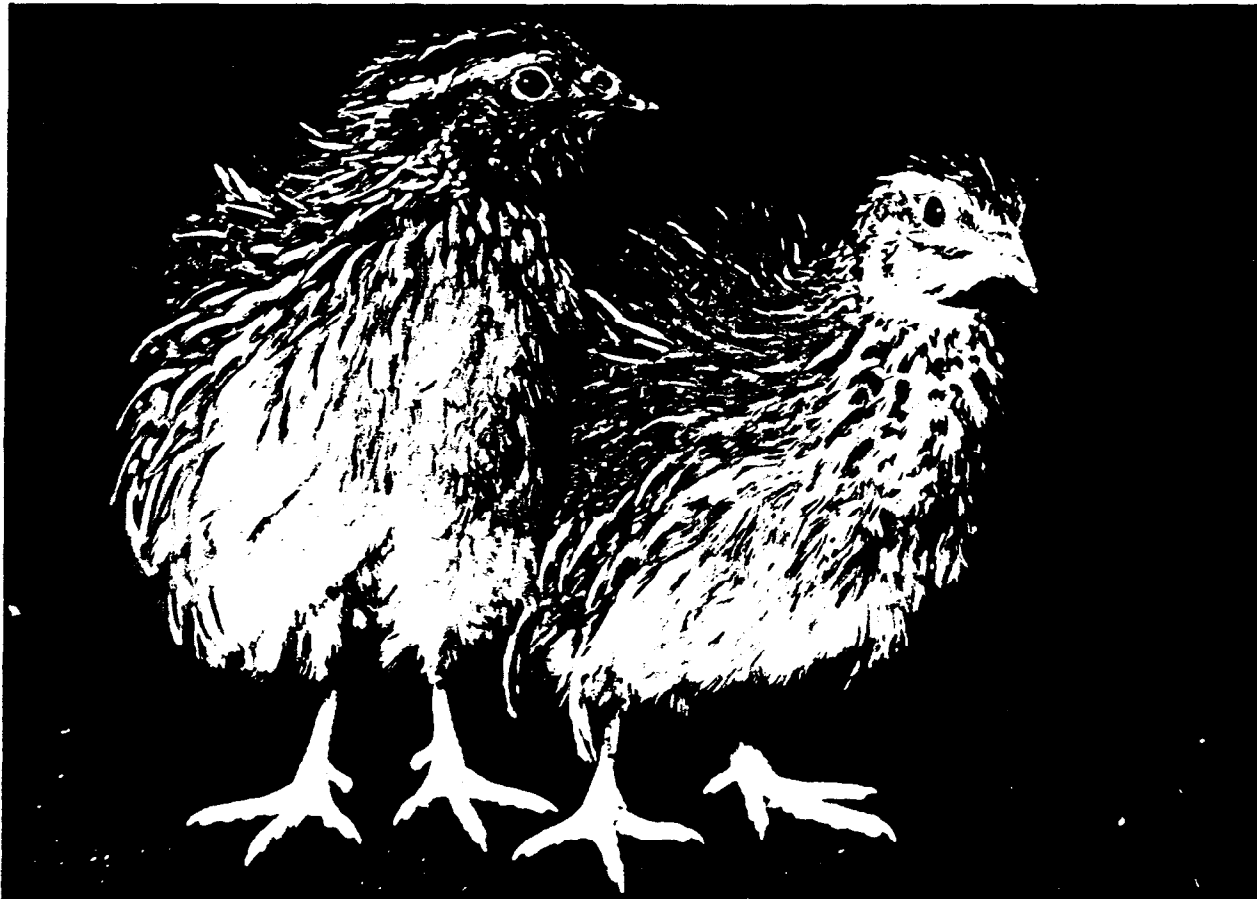
SEX DETERMINATION

At 3 weeks of age the female is characterized by light-tan feathers on the throat and upper breast; the breast feathers are black stippled. Males have rusty brown throat and breast feathers. Mature males also have a cloacal gland in a bulbous structure located at the upper edge of the vent; the gland secretes a white, foamy substance when the male is sexually active.

The sex of day-old Coturnix can be determined by cloacal (vent) examination. Beginners can achieve about 90 per cent accuracy after practicing on 100 chicks. For details consult "Identification of Sex of Day-Old Quail (*Coturnix coturnix japonica*) by Cloacal Examination", K. Homma, T. D. Siopes, W. O. Wilson and L. Z. McFarland, Poultry Science Journal, Vol. 45, No. 3, May, 1966.



Japanese quail eggs.



Japanese quail. Left; male. Right; female. Note difference in breast-feather color pattern.

INCUBATION PROCEDURES

Quail eggs can be incubated in any standard-size incubator. A fan-ventilated incubator is preferable, but a still-air machine works well if carefully operated. In some machines, modification of egg trays may be necessary to hold quail eggs successfully. This can be done with hardware-cloth or, in some machines, by cutting strips of chicken-egg flats and placing them in the tray to hold the quail eggs. Several types of small incubators, specially designed for quail eggs, are commercially available.

Hatching time

Quail eggs hatch in 16 to 18 days depending upon temperature, humidity, and genetic variability. Under the incubation conditions suggested herein, quail eggs hatch in about 17½ days. If eggs are to be transferred to a separate hatcher, do this on the 14th to 16th day of incubation. Newly-hatched chicks often tend to spraddle in hatching trays — to prevent this, crowd the eggs into a small area, or cover the bottom of the tray with cheese-cloth before chicks begin to hatch.

Temperature

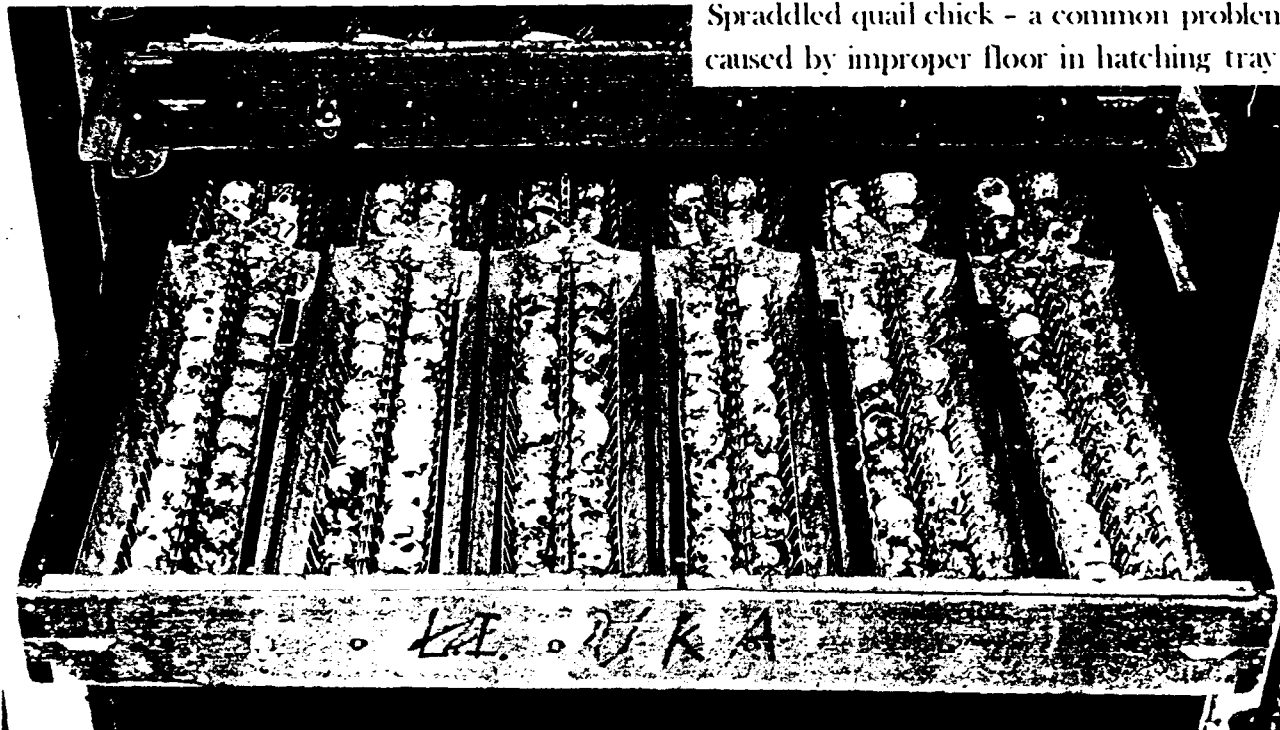
Fan-ventilated incubators should be set at 99.5°F to 99.8°F; incubators with gravity ventilation should be set at 101 to 103°F as measured at the top of the egg. If the temperature of the incubator exceeds these recommendations, many embryos may die. During hatching, the temperature should be lowered ½ to 1 degree F.

Humidity

A relative humidity of about 60 percent is satisfactory during incubation and should be raised to about 70 percent during the hatching period.



Spraddled quail chick - a common problem caused by improper floor in hatching tray.



Incubator tray modified with wire inserts to hold quail eggs.

Pans of water, or spray systems, are necessary to provide adequate humidity levels. Humidity in fan-ventilated incubators can be measured with a wet-bulb thermometer, which is merely a dry-bulb thermometer with its bulb wrapped in a damp cloth wick. At a temperature of 99.5° F dry bulb, a reading of 85 to 86° F wet bulb is equivalent to 60 percent relative humidity. During hatching, a wet-bulb temperature of 88 to 90° F is desirable. Maintaining proper humidity in small incubators can be a problem, particularly if the incubator is often opened for observation or for turning eggs. When turning eggs by hand, be careful not to disturb conditions in the incubator more than necessary.

Ventilation, position of eggs

Developing embryos use oxygen and give off carbon dioxide and heat, and therefore the incubator must have proper ventilation. Little air-exchange is needed at the beginning, but the requirement increases as incubation progresses.

Quail eggs will hatch successfully if they are placed in an incubator in any position except with the large end down. Be sure the eggs are placed with their large ends up or placed flat in a horizontal tray.

Turning

Turn eggs regularly to prevent the embryos from adhering to the shell membranes. If eggs are turned mechanically, set the timer to operate once every 2 to 4 hours. If eggs are turned by hand, turn them at least three times a day and oftener if possible. Turning is critical only during the first few days of incubation and may be discontinued after 14 days.

Egg care

Collect eggs frequently and store them large end up in a cool (55-60°F) room; a room with 70 percent relative humidity is best. Cracked eggs hatch very poorly. Best results are obtained when eggs less than 1 week old are set. Set only clean eggs. Soiled eggs can be cleaned with sandpaper or other abrasives. Never wash hatching eggs in cold water!

Sanitation

Clean and disinfect the incubator thoroughly after each use. Fumigation is not necessary in small incubators unless disease problems occur.

Empty incubators can be fumigated by using 1 teaspoon potassium permanganate and 4 teaspoons of formaldehyde for each cubic foot of incubator space. Heat the clean incubator to just above 70°F, with water pans filled and vents closed. Use an earthenware or enamelware dish with a volume 10 times that of the ingredients and add the formalin to the permanganate. After 20 minutes open the incubator. Fumigation should be done outdoors or in a well-ventilated area. Avoid inhalation of fumes.¹ In fan-ventilated incubators leave the fan running and the air vents closed during fumigation.

BROODING AND CARE OF YOUNG QUAIL

Starting quail

Following these preparatory steps will help assure the young birds a good start in life.

- Thoroughly clean the brooding cage or pen and all equipment to be used. After the droppings and litter are removed, wash with a detergent.
- If disease problems have been encountered in stock previously raised, disinfect the pen and equipment with an approved disinfectant (for details see U.C. Cooperative Extension Leaflet 2627, "Cleaning and Disinfecting Poultry Equipment and Poultry Houses").

¹ Formaldehyde solution (40 percent formalin) is highly irritating. Follow the precautions on the container label. Wear goggles, respirator, long-sleeved shirt and liquid-proof gloves when handling the fumigant. If the fumigating chamber is within another room, be sure the outside room is well ventilated. If the chemical solution spills on you, wash it off immediately.

- When the pen is thoroughly dry, place 2 to 4 inches of clean litter on the floor (omit litter in wire pens) and cover the wire or litter with paper. Use soft, rough types of paper, as chicks tend to spraddle on smooth paper; old newspaper can be used. Remove the paper after 5 to 10 days or replace it regularly.
- Start the heater and adjust thermostat to provide desired temperature well before chicks are to be started.
- Fill water containers. Place feed on the paper floor and fill feeders full. This will help chicks to start eating. As soon as chicks learn to eat from feeders, stop feeding on the floor and lower the feed level in the feeders to reduce wastage.

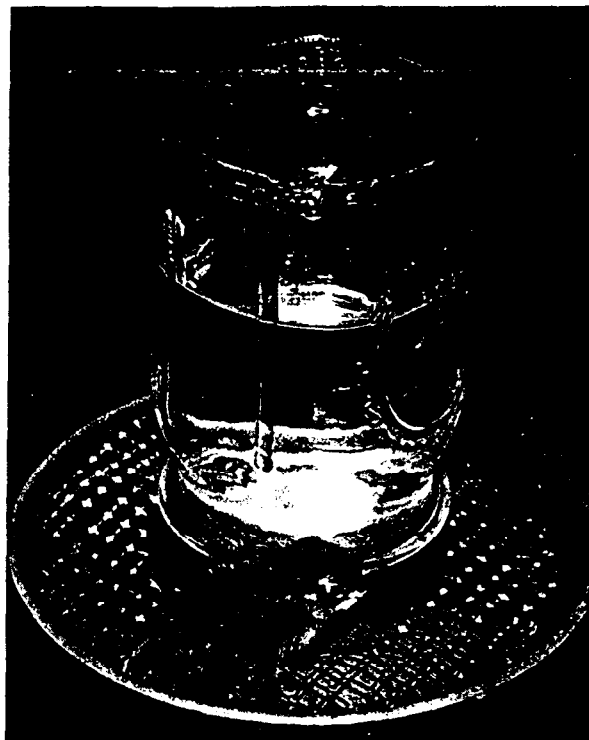
Heat

When hatched, quail chicks require careful attention. Heat is needed for the first 3 or 4 weeks following hatching; heat lamps may be used successfully and should be placed at least 18 inches above the floor of the pen. (Any other heat source that provides sufficient heat can be used.) Maintain the temperature at about 95 to 100° F during the first week. Measure temperature at the level of the chicks. As the chicks age, gradually decrease the temperature about 10 degrees per week as long as heat is needed.

The best guide for adjusting the heat is the behavior of the chicks — if they crowd near the heat source and seem cold, the temperature is too low; if they tend to settle a few inches from the hottest area, the temperature is about right. A common error made by the beginner is failure to provide adequate heat during the early days of the brooding period. If the entire room is heated, a temperature of about 90° F is best during the first week.

Water, litter

Care must be taken to prevent small chicks from drowning in water troughs. A pint Mason jar with a glass fountain base makes a good drinking vessel, but it should be modified by placing a round (doughnut-



Water fountain with wire insert in base to keep chicks from drowning.

shaped) piece of hardware-cloth in the trough at the base. Petri dishes or other shallow pans ½-inch deep filled with marbles or pebbles can be substituted; the dishes can also be covered with hardware-cloth (1/8- or 1/4-inch mesh). When chicks are 1 week old, the water can be uncovered with reasonable safety.

Provide clean water at all times. Clean water containers daily.

Several litter materials can be used. Wood shavings, finely ground corncobs, sugarcane fiber, chopped straw, peanut hulls and cat litter are good.

CARE OF ADULT QUAIL

Space

Adult quail will live and produce successfully if they are allowed at least 12 square inches of floor space per bird. If quail are reared indoors, you can minimize odors by providing more space and cleaning cages

frequently — under these conditions, 25 to 30 square inches of space per quail should be sufficient. The space required for birds in individual cages is discussed under "Cages and equipment".

Adult Japanese quail need a minimum of ½-inch of feed trough space per bird. When the feeders are filled once per day, more feeder space may be desirable. Clean, fresh water should be provided at all times with a minimum of ¼ inch of trough space per quail.

Lighting

For good egg production provide 14 to 16 hours of light per day with an intensity of at least ½ foot candle (5 lux). If the daylength is allowed to decrease, egg production and mating activity will decline or stop. Continuous light may be the most practical and convenient system for small groups of quail because time clocks to control lights are not required. Young quail should be grown under natural daylight or shorter days. An example of a good lighting program for laying quail is shown below.

Age	Light per day	Light intensity
1 to 7 days	24 hours	2 to 5 ft. candles
8 to 40 days	natural or 8 hours	½ to 2 ft. candles
41 days on	16 hours	½ to 2 ft. candles

If meat production is desired, it may be desirable to restrict light to 8 hours per day to retard the onset of sexual activity. This will result in heavier birds that will yield more meat per unit of live weight.

Mating and fertility

To obtain fertile hatching eggs from quail, equal numbers of males and females are not necessary. Research indicates that for single male matings, a ratio of one male to two or three females is optimum. When quail are kept in larger groups, keep one male for each three to five females. Pair matings in individual cages usually will give good

fertility but occasionally a male will be infertile.

Do not mate closely related individuals — inbreeding causes greatly reduced reproductive performance. Older birds are also less fertile and their eggs have lower hatchability.

Cages and equipment

Cages can be constructed in any desired size. If individual records are to be kept, small cages (5 to 8 inches) are large enough for one or two quail. The best material for cage construction is 1 x ½ inch welded wire. Hardware-cloth or screen can be used if it is attached to a wooden or steel framework. If cages are constructed of welded wire, small pig-rings can be used to join the cage parts. Cages 5 to 8 inches high are preferred to higher pens because quail suffer fewer head injuries in cages of that height. If cages are constructed with a wire top, a solid roof of wood, metal, or cardboard placed over them will reduce head injuries.

Cannibalism control

Pecking is an inherent characteristic of all birds. If quail begin to injure their pen mates, corrective action should be taken immediately. The beaks can be clipped (use finger nail clippers) to reduce pecking, or bits can be applied (special anti-picking bits are available for quail).

Cannibalism is prevented by avoiding excessive crowding or high light intensity. Injured birds should be isolated immediately.

Ventilation

When quail are confined in large groups, fresh air must be provided (the odor of ammonia in the air is an indication that additional air is needed). Temperatures above 90° F or below 40° F should be avoided whenever possible as they will result in reduced egg laying, slower growth, discomfort, and at extremes even death. Necessary housing will depend on local weather conditions.

FEEDING SUGGESTIONS

Appropriate feeds for coturnix can usually be obtained from local feed stores. The following feeding schedule is recommended.

Life stage of quail	Protein needs	Type feeding program recommended
Starting (0 to 3 weeks)	25% - 28%	Turkey or game bird starter mash, free choice
Growing (3 to 6 weeks)	20%	Chicken starter mash or crumbles, free choice
Laying	17%	Chicken laying mash or crumbles
Breeding	20%	Chicken starter mash or crumbles plus calcium (free choice)*

*Fine oyster shell or limestone must be available to provide adequate calcium for egg shell formation.

Some small growers may wish to supplement feeds with small seeds, cracked grain, vegetable peelings, lettuce or grass clippings. This is safe as long as the feedstuffs chosen are free of toxic materials. Fine grit should be provided free choice when quail are fed whole seeds or plant materials or are allowed to graze in outside pens. Never feed moldy or rotten materials.

It is best to maintain feed troughs about half-full to minimize feed waste. The trough lip should be at the height of the quails' backs. Troughs 2 inches wide and 2 inches deep have been used successfully.

A strip of ½-inch mesh hardware-cloth placed on top of the feed will greatly reduce feed wastage causing by billing.

MARKING

Japanese quail can be marked by banding, or color marking. Leg bands and wing bands can be used to identify quail of all ages and are available from commercial companies. Color marking is sometimes used for small groups of quail. Oil paint can be placed on the wing feathers of adult birds (not on skin or down of young quail).

MAINTAINING HEALTH

Coturnix are not as susceptible to disease problems as are some other domestic birds, but they can be affected by several common disease organisms. The following procedures are recommended to keep birds in good health.

- Keep them away from other birds.
- Remove dead birds as soon as possible and dispose of them properly.
- Keep pen floors dry.
- Clean water containers daily.
- Isolate sick birds as soon as observed.
- If serious disease problems occur, take a sample (1 to 3 birds) of sick or freshly-dead birds to a competent veterinarian for diagnosis. Follow his advice for treatment or prevention.

OBTAINING QUAIL

Many people raise Japanese quail, but if you cannot locate a source of supply consult local pet stores, your County Farm Advisor's office, or the UC Davis Department of Avian Sciences for information on possible sources.

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