

# CARE MANAGEMENT PROPAGATION

# JAPANESE QUAIL (COTURNIX)

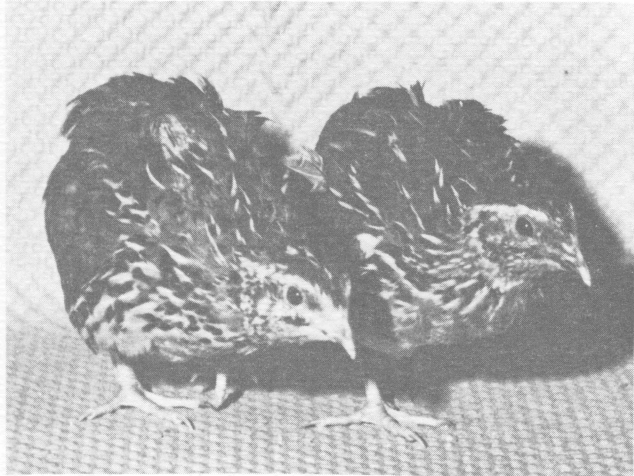


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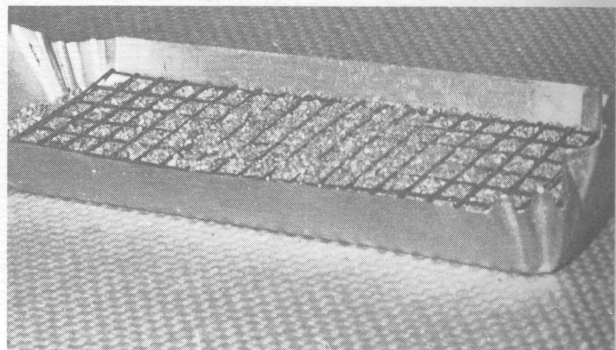
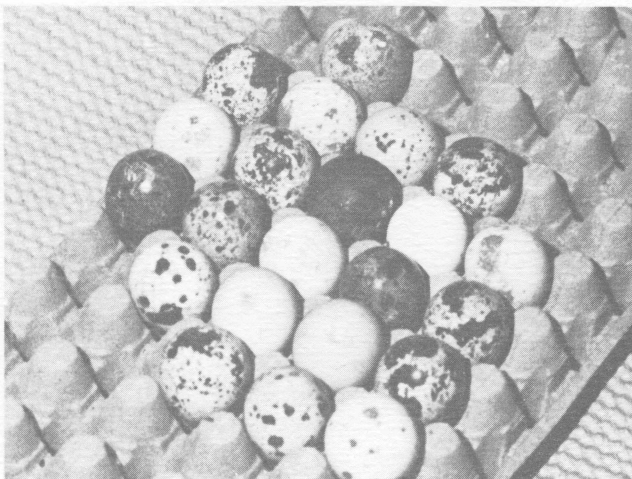
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## Care Management Propagation



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# Japanese Quail

## (Coturnix)

J. R. Cain and W. O. Cawley\*

In the past decade, Japanese Quail, or coturnix, have become important experimental animals for scientific research in universities, federal and state laboratories, private industry and individual investigations. Coturnix are used extensively in genetics, nutrition, toxicology, embryology, physiology, endocrinology and pathology. At the same time, many fanciers and hobbyists have become interested in raising these quail. Science classes and 4-H clubs find them excellent subjects for projects. Sportsmen find them desirable for use in training hunting dogs because of their habit of sitting very tight until flushed. Gourmets enjoy Japanese quail eggs and meat—hard-boiled, pickled quail eggs are popular as hors d'oeuvres, and barbecued or charcoal-broiled quail are a delicious treat.

### HISTORY

The Japanese quail (*Coturnix coturnix japonica*) was imported into the United States from Japan. It should not be confused with the bobwhite quail or other indigenous quail species. Coturnix are widely distributed in Europe, Africa and Asia where they are regarded as a migratory species. Records of their existence date to the ancient civilizations of these continents. Apparently coturnix were either domesticated in Japan about the 11th century or domesticated coturnix were brought to Japan from China at about this time. They were first raised as pets and singing birds, but by 1900 coturnix in Japan had become widely used for meat and egg production.

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Game departments in the United States attempted to establish Japanese quail as a game bird species as early as 1870. During a period of 4 or 5 years in the mid-1950's, at least a million birds were released over a third of the United States. All attempts to establish wild breeding populations of this species on the continental United States have failed, apparently because the birds migrate almost immediately following release or fall victims to predators. Wild coturnix do inhabit the Hawaiian Islands. Subsequent to the initial conservation efforts, this species was found to have important advantages in laboratory experimentation.

## DESCRIPTION

Japanese quail are hearty birds which thrive in laboratory cages and are relatively inexpensive to maintain. They are fairly disease resistant but are affected by some common poultry diseases. Coturnix mature in about 6 weeks and are usually in full egg production by 50 days of age, Figure 1. With proper care, quail hens may lay 200 to 300 eggs in a lifetime of 1 to 2 years. If properly mated, birds have high fertility and good egg hatchability.

The adult male coturnix weighs about 100 to 140 grams (3½ to 5 ounces) while the females are slightly heavier, weighing from 120 to 160 grams (4 to 5½ ounces), as shown in figure 2. The females are characterized by light tan feathers with black stippling on their throats and upper breasts. The males have a rusty brown throat and breast feathers. Males also have a cloacal gland, a bulbous structure located at the upper edge of the vent which secretes a white, foamy material. This unique gland can be used to assess the reproductive fitness of the males.

Coturnix eggs are a mottled brown and are often covered with a light blue, chalky material. Each hen's eggs appear to have a rather specific pattern or color, figure 3. Some strains lay only white eggs. The average egg weighs about 10 grams (⅓ ounce), about 8 percent of the body weight of the quail hen. Young chicks weigh 6 to 7 grams (¼ ounce) when hatched and are brownish with yellow stripes.

Japanese quail have been proposed for use as laboratory animals for research much the same as white mice or rats are used. They also have been used as pilot subjects for poultry studies. As research subjects, they have certain advantages. Their small size permits ease of housing and reduced feed costs; they have a short life cycle; they generally lay five to seven eggs per week; they have a large egg volume per unit of body weight; they are apparently more disease resistant than other forms of

poultry; they respond favorably to laboratory manipulation; they have a higher metabolic rate than chickens or turkeys; they have a relatively short life span and thus the physiological maturing and aging processes are rapid; and they respond rapidly to changes in the environment, such as lighting or temperature fluctuations.

There are some disadvantages to using or raising coturnix, however. They have a particularly high ammonia content in their droppings and thus the odor may be objectionable (may be reduced by proper ventilation); a rapid decline in reproductive efficiency occurs after approximately 8 months of age; shell damage occurs frequently in the quail eggs; the colored egg shells of coturnix may make candling or writing on the shells difficult; fertility and hatchability percentages generally are lower than those of commercial strains of chickens or turkeys; newly hatched chicks are sensitive to drafts and must be given special care during the first week or two of age; and Japanese quail are more easily excited by sudden noises than other types of poultry. These disadvantages must be avoided or compensated for if Japanese quail propagation is to be successful.

## PREINCUBATION EGG CARE

Successful quail propagation begins in the preincubation period. Collect eggs daily—more frequently in hot or cold weather. Store eggs large end up at a temperature of 50 degrees to 60 degrees F; a household refrigerator is not satisfactory because it is too cold. A room with 70 percent relative humidity is recommended for optimum hatchability. Cracked eggs hatch very poorly, if at all. Best results are obtained when eggs are held no longer than a week before setting.

## Sanitation

A dirty incubator or hatchery area is a major source of contamination and disease. Thoroughly wash and disinfect the hatching unit after each use with quaternary ammonia or commercial disinfectant. Set only clean eggs, as dirty eggs are a source of disease or infection. Soiled eggs can best be cleaned with sand paper or other abrasives. If you must wash eggs, use warm water (105 degrees F). Never wash hatching eggs in cold water; contamination will be drawn into the egg.

Eggs should be fumigated shortly after they are collected or at least within 12 hours after they have been placed in the incubator. Do not fumigate embryos between 2 and 5 days of age.

Fumigation procedures are as follows: use 1 teaspoon of potassium permanganate and 4 teaspoons of formaldehyde for each cubic foot of incubator space. Put

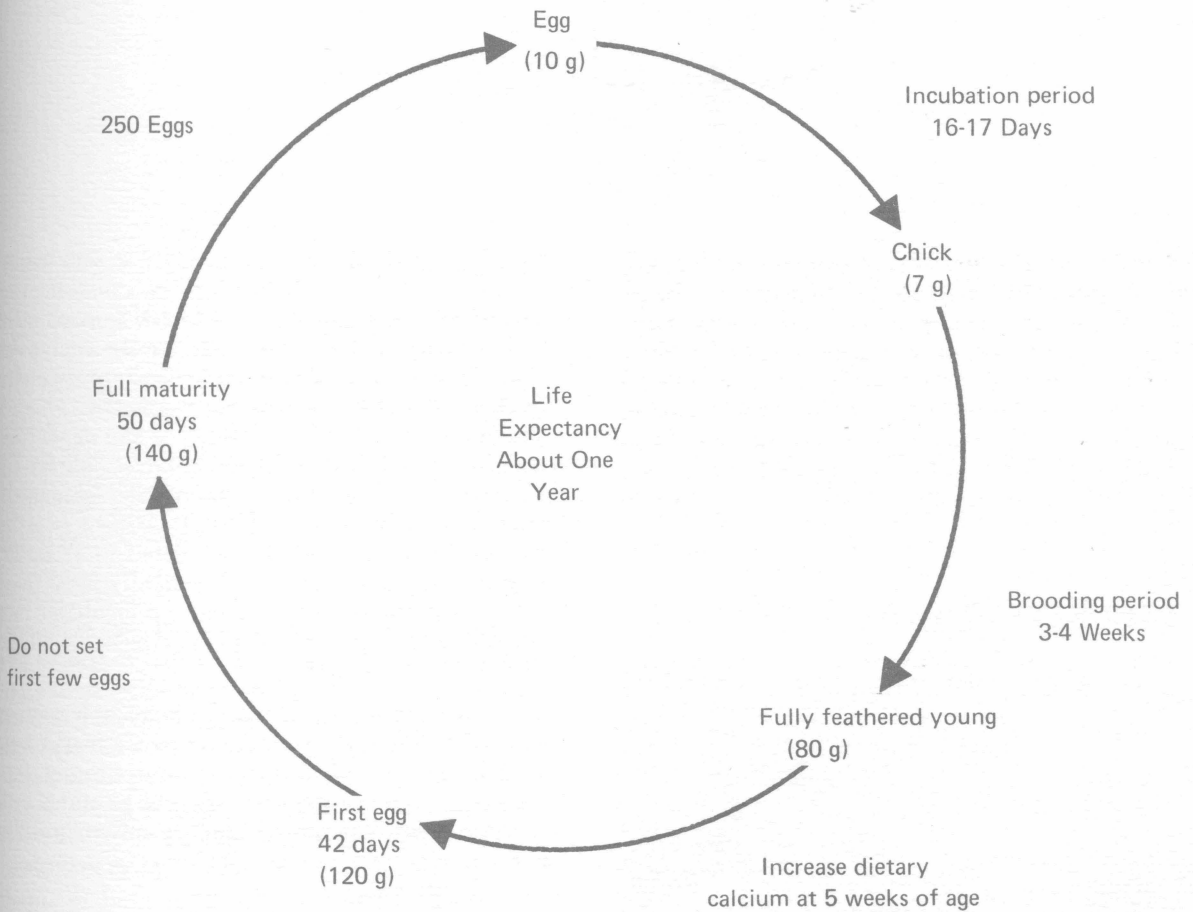


Figure 1. Life cycle of female Japanese quail with approximate body weights in grams (1 ounce = 28.5 grams).

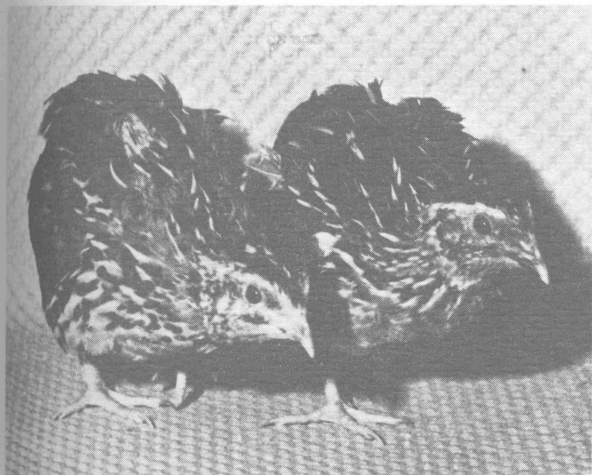
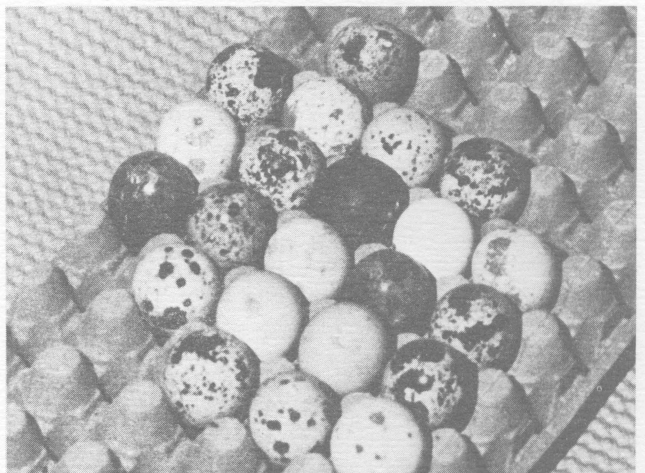


Figure 2. Male coturnix (right) are distinguished by their smaller size and the rusty brown color on neck and breast feathers; female coturnix (left) are larger than males and have light tan feathers with black speckles on the throat and breast.

Figure 3. Japanese quail eggs are quite varied in their color patterns. They range from snow white to completely brown. More commonly they are tan and dark brown speckled or mottled brown with a chalky blue covering.



the permanganate in an earthenware or enamelware dish (volume 10 times that of the ingredients) and add the formalin last. Avoid inhalation of fumes. Fumigation should be done outdoors or in a well-ventilated area. In forced-draft incubators, leave the fan running and the air vents closed during fumigation; open vents after 20 minutes. In still-air incubators, open the incubator and vent after 20 minutes. During fumigation, high humidity is desirable, and the temperature must be at least 70 degrees F.

## INCUBATION AND HATCHING

Successful hatches depend upon a good understanding of your incubator controls; study the manufacturer's recommendations carefully, and save them for further reference. The two types of incubators generally available are fan ventilated (forced-draft) and still-air machines. A forced-draft incubator is preferable, but a still-air machine works well if carefully operated. Some models are designed especially for game birds, bobwhite and coturnix. Japanese quail eggs can be incubated in any chicken-egg type of incubator although some machines may require a modification of the egg trays. This can be done easily with hardware cloth as shown in figure 4. Eggs should be placed large end up in the setting tray. The tray should be left for 2 to 4 hours before being placed in the incubator so that eggs will be at about room temperature when set.

### Fan Ventilated Models

Forced-draft incubators should maintain an incubating temperature of  $99.5 \pm 0.3$  degrees F and a relative humidity of 60 percent (wet bulb reading of  $86 \pm 0.5$  degrees F) until the fourteenth day of incubation. Eggs should be turned every 2 to 4 hours to prevent embryos from sticking to the shell. On the fourteenth day, candle and remove any cracked eggs, infertiles and dead embryos. Transfer the eggs to hatching trays and discontinue turning. A separate hatcher should be operated at 99 degrees F and a relative humidity of 70 percent or wet bulb 90 degrees F. If the incubator is a combined setter and hatcher, it should be operated at a temperature of 99.5 degrees F, but the relative humidity should be increased to 70 percent (90 degrees F wet bulb). The hatcher should not be opened during the hatching process. If all recommended incubation procedures have been followed, the chicks may be removed on the seventeenth or eighteenth day of incubation (depending on genetic strain).

### Still-Air Models

If a still-air incubator is used, normal incubating temperature is 101 degrees F for the first week, 102 degrees F for the second week and not exceeding 103 degrees F until hatching is completed. Temperature should be measured at the top of the eggs. Humidity should not be less than 60 percent (wet bulb 85 degrees-87 degrees F) until the fourteenth day of incubation; it should then be increased to 70 percent (wet bulb 90 degrees F) until hatch is completed in 17 or 18 days. Maintaining proper humidity in small still-air incubators can be a problem; do not open the incubator more frequently than necessary for turning the eggs or leave open for long periods of time.

The eggs must be turned by hand, at least three, and preferably five, times per day. A pencil mark on the side of each egg may help to insure proper turning. It may be necessary to move eggs to different locations in the incubator in case the temperature is not uniform throughout.

Newly hatched chicks often tend to spraddle in hatching trays. To prevent this, crowd the eggs into a small area or fasten cheesecloth to the bottom of the hatching tray before the chicks begin to hatch.

### Natural Incubation

It is also possible to set coturnix eggs under a broody hen. A group of eggs should be saved and then placed under her so they will hatch together. Any chicken eggs should be removed from the nest. Some coturnix hens will sit on their own eggs in a nesting box, but this is not the general rule.

## BROODING, CARE OF YOUNG BIRDS

### Heat

Newly hatched quail chicks are small, and proper brooding temperature for young coturnix is very important. They need heat for about 4 weeks after hatching. A commercial brooder or any other heat source that provides sufficient heat can be used. Infrared heat lamps may be used successfully and should be placed about 18 inches above the floor of the pen. Maintain the temperature at about 95 degrees F during the first week of brooding. Measure the temperature at the level of the chicks. This temperature may be decreased about 5 degrees per week until 75 degrees F is reached and the chicks are fully feathered. The best guide for adjusting



the temperature is chick behavior. Chicks that crowd near the heat source and seem cold indicate the temperature is too low. When the chicks tend to settle a few inches from the hottest area, the temperature is about right. Failure to provide adequate heat during the early days of the brooding period will invariably result in mortality. Chicks should be protected from drafts of cold air, especially at night. A satisfactory humidity range is about 30 to 80 percent relative humidity.

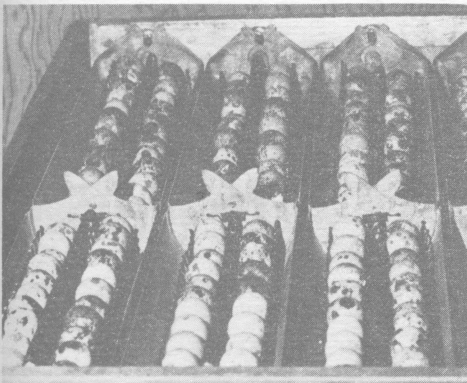
### Water

Care must be taken with small quail to prevent drowning in water troughs. A canning jar with a glass or plastic base works well. It should be modified by placing a donut-shaped piece of hardware cloth in the trough at the base, figure 5. A shallow dish or pan filled with pebbles or marbles also works. When chicks reach 1 week of age, the pebbles or wire protection can be removed with safety. *Provide clean water at all times; clean water containers or troughs daily.*

### Litter

Litter is used to dilute the droppings and absorb moisture. Wood shavings, sugar cane fiber, finely ground corn cobs, chopped straw, ground bark, peanut hulls and sand are good litter materials. Litter should be 2 to 4 inches deep on the floor and covered with rough paper or burlap for the first week. Use soft, rough types of paper as chicks tend to spraddle on hard, smooth paper. A disposable paper drop cloth purchased from a local paint store can be cut to desired size and works very well. Sprinkle food on the paper to encourage young

**Figure 4.** A chicken egg incubator tray can be modified to hold quail eggs by bending strips of hardware cloth or 1/2-inch x 1 inch welded wire.

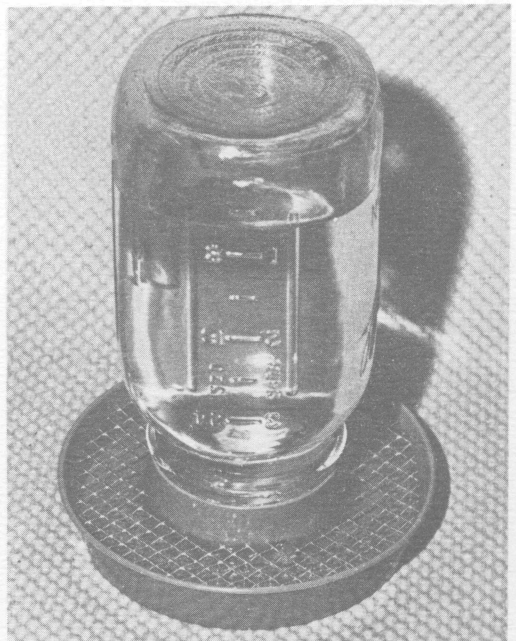


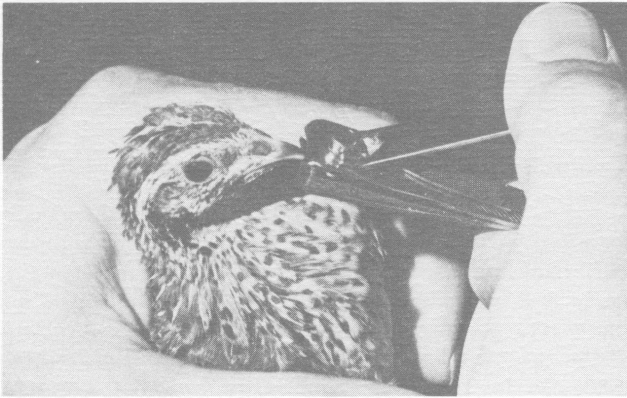
chicks to eat. If chicks are raised in wire cages or batteries, the wire floor must be covered with paper for the first week or two.

### Cannibalism

Feather picking or other forms of cannibalism occur frequently when coturnix are kept on wire. The signs are bare backs and heads. Debeaking may be necessary as early as 2 weeks of age and is usually done with a hot blade-type commercial debeaker. Cauterization is done at the time the beak is being cut. The tip of the upper beak can be removed temporarily with nail clippers, figure 6. After birds are debeaked, the level of feed and water in the troughs may need to be increased. Another generally effective preventive measure is to reduce the number of birds per pen; avoid crowding. Other steps may be taken such as reducing the light intensity and increasing the dietary fiber and grit. Never put new birds into a cage where many others are living; coturnix are territorial and will defend their home against the intruders. If two groups of quail are to be combined, put them together in unfamiliar cages or pens, even if it is temporary.

**Figure 5.** A doughnut-shaped piece of 1/4-inch mesh hardware cloth in the water pan will prevent drowning. This can be removed after 10 days.





**Figure 6.** The tip of the upper beak can be removed temporarily with fingernail clippers. This is done to prevent feather picking and cannibalism. If the beak is clipped too much, excessive bleeding will occur.

## CARE OF ADULT QUAIL

Japanese quail may be managed much the same as chickens except for size and nutritive requirements. They need to be protected from predators such as cats, rodents and predatory birds. Excessive handling of coturnix may result in mortality. If laying birds are moved to new quarters, a pause in egg production for 2 or 3 weeks is likely. Laying hens should be housed in an area where outer disturbances are at a minimum. Housing should be designed to insure comfort for the birds, to make food and water readily accessible and to permit easy and effective sanitation.

The adult facilities should reflect the purpose of the project. For example, if the birds are to be raised for breeding experiments, egg production or meat production, small pair cages probably are best. If the quail are raised by a fancier, hobbyist or dog trainer, floor pens are generally desirable. The dimensions of these pens are left to the discretion of the individual. One-half inch hexagonal mesh wire is recommended, although 1-inch mesh is satisfactory for pen construction. Adult quail live and produce successfully if allowed 20 square inches of floor space per bird. Often, coturnix in community pens will not build a nest but will hide their eggs in the litter. If quail are raised indoors, odors can be minimized by providing more space (25 to 30 square inches of space per bird) and cleaning the cages frequently. Adult coturnix need  $\frac{1}{2}$  to 1 inch of feeder space per bird. Ample feed should be present; however, if the trough is too full, excessive wastage will occur. Clean, fresh water should be provided at all times with a minimum of  $\frac{1}{4}$  inch of trough space per quail.

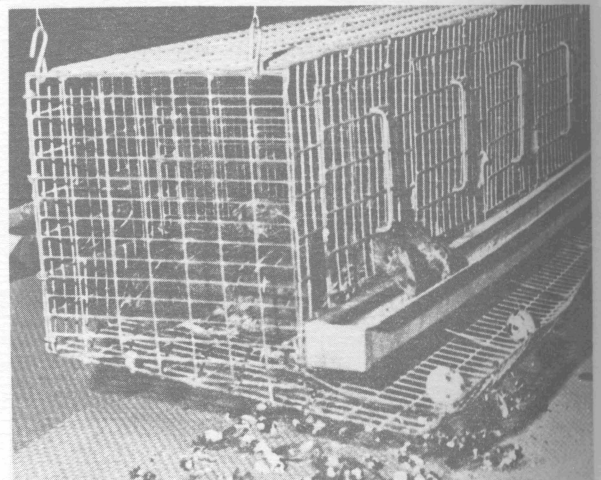
Pair cages can be constructed in any desired size. If individual egg records are kept, small cages, 5" x 8", are

large enough for one or two quail. The best material for cage construction is  $\frac{1}{2}$ " x 1" welded wire; cage clips or hot rings can be used to join the cage parts, figure 7. Hardware cloth or poultry mesh can be used if it is attached to a wooden or metal frame. Cages 5 to 8 inches high are preferred to higher pens since quail sustain fewer head injuries in cages of this height. A solid roof of metal, wood or cardboard placed over the cages also reduces head injuries. Quail hens lay more eggs in these small cages than they do in large floor pens. Additionally, greater egg production and reduced mortality will occur if males are not kept with females; the eggs will of course be infertile.

## LIGHT REQUIREMENTS

Japanese quail require 14 to 16 hours of light per day to maintain maximum egg production and fertility. This means that additional lighting must be provided except in summer. Since it is important for the on- and off-times to be consistent, a time clock is recommended. Birds generally do not remain in peak production when subjected to light 24 hours per day.

Males not used for breeding or any quail to be used for meat birds can be fattened by being given only about 8 hours of light per day. This is not enough for sexual maturity; therefore, the birds do not expend energy on fighting and mating. These coturnix are effectively castrated and will be in good condition for table use. The same end may be achieved by having very dim lights. Maintain meat birds on starter diet (see nutrition section) until slaughter at 9 weeks of age.



**Figure 7.** Laying cages or pair breeding cages can best be constructed from  $\frac{1}{2}$ " x 1" welded wire held together with cage clips or hog rings. Make the top and front of one piece 3 or 4 feet wide and the back and bottom of another. The sides, from small pieces, strengthen the cage section as well as separate the birds. Feed and water troughs are of galvanized sheet metal.



Reduced day length can be used to hold breeders in good shape until needed or to hold males together without fighting. About 2 weeks are necessary for return to breeding conditions following an increased day length to 14 hours. Bright lights will not increase egg production. If it is bright enough for you to read by, it is bright enough for the quail.

## BREEDING AND PEDIGREE

Equal numbers of males and females are not necessary to obtain fertile hatching eggs from quail. Research indicates that a single male with two or three females will give optimum results. When quail are kept in colony pens, one male for each three to five females is sufficient and reduces fighting among males. Pair matings in individual cages will give good fertility. Fertility and hatchability percentages will decrease markedly in older birds. Avoid mating closely related individuals because inbreeding causes abnormalities and greatly reduced reproductive performance. For this reason, it may be advantageous to record hen numbers on eggs, incubate them in groups, and permanently mark the chicks at hatch time. Pedigree records can be kept by using commercially available wing bands or leg bands to identify quail of all ages. It is also possible to identify groups of birds by toe clipping. Fingernail clippers or small shears can be used for this purpose. Temporary identification can be made by using oil paint on the wing feathers (not on skin) or fingernail polish on the toes.

## NUTRITION

The exact dietary requirements of coturnix are still subject to some debate—a standard ration may not be available commercially. Tables 1 and 2 list the ingredients used at the Poultry Science Department, Texas A&M University. Until more specific data are available, a good quality, fresh, commercial turkey or game bird diet is recommended, preferably fed as crumbles to minimize feed wastage.

For the first 6 weeks of age, young coturnix should be fed a high protein ration which contains an energy content of some 2,000 productive energy calories per kilogram (910 per pound). A good-quality commercial starter ration for game birds or turkeys contains about 25 to 28 percent protein. If this is not available, a chicken starter ration (20 to 22 percent protein) can be used; however, it will retard growth and maturation. High-quality protein (hard-cooked eggs or meat scraps) can be added to improve the chicken starter ration. For birds nearing maturity, the dietary requirements are similar except that calcium and phosphorus levels must be in-

creased. Oyster shell flour or ground limestone can be added to the diets between 4 and 5 weeks of age or ground oyster shell, provided free choice. Laying quail have a lower protein requirement than do chicks, probably below 25 percent, but again the exact requirements are not well established. Laying diets should contain 2.8 to 3.0 percent calcium; this may need to be increased to 3.5 percent in hot weather when quail eat less food but still require calcium to maintain egg production.

Always buy fresh feed and store it in covered containers with tightly fitting lids in a clean, dry, cool area free from animals and vermin. Feed stored longer than 8 weeks is subject to vitamin deterioration and rancidity, especially in summer months.

Before chicks are placed in the brooder, cover the papered floor with feed and troughs filled to overflowing. After about a week, when the paper is removed and the chicks have learned to eat, lower the level of feed in the trough to about half full. Coturnix pick around in the feed and are wasteful. Additionally, it may be desirable to place strips of ½-inch mesh hardware cloth in the feed troughs, figure 8. Adult Japanese quail eat between 14 and 18 grams (approximately ½ ounce) of food per day, not including feed wastage. In overfilled feed troughs, wastage may double feed requirements per bird per day.

## DISEASE PREVENTION AND CONTROL

Sanitary management practices are the best guarantee against disease. Equipment, such as cages, feeders, waterers and tools should be cleaned and sanitized frequently. A commercial disinfectant is recommended or a detergent and rinse followed by quaternary ammonia. Make every effort to screen out wild birds, rodents and vermin that might introduce disease. Remove dead birds immediately upon discovery. Birds which appear sick should be isolated from healthy birds and, if possible, be

Figure 8. Strips of ½-inch mesh hardware cloth in the feed troughs reduce feed wastage.

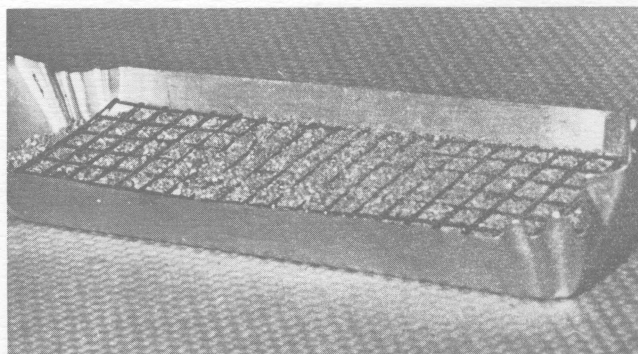


Table 1. Quail Starter Diet

Ingredients	Lb.	Protein	Fat	Ca	P	M.E. Cal/lb.	Agri-nine	Lysine	Methionine	Cystine	Trypto
Soybean meal 44%	860	387.00	6.90	2.16	5.17	879240	29.31	25.00	5.78	5.78	6.03
Corn	300	26.70	11.40	.06	.84	468000	1.50	.63	.60	.48	.24
Milo	500	45.00	14.00	.10	.50	740000	1.65	1.40	.80	.75	.60
Alfalfa leaf meal	50	8.90	1.50	.65	.12	25000	.40	.45	.15	.20	.20
Poultry byproduct meal	100	58.00	13.00	3.00							
D.D. solubles	50	13.50	4.00	.10	.70	126000	3.80	3.70	1.00	1.00	.50
Vitamin mix					.33	55500	.45	.45	.22	.13	.10
(in 30 lb. fishmeal)	50	18.30	2.34	1.50	.84	36000	1.20	1.53	.63	.30	.24
Fat	20		20.00			80000					
Dical phosphate	60			14.40	.10						
Salt	4										
Methionine	2	2.00							2.00		
Aureofac 50	2										
Trace mineral mix	1										
Sulfaquinoxaline	3/4										
Manganese sulfate	1/4										
Total	2000	559.40	73.14	21.97	21.60	2409740	38.31	33.16	11.18	8.64	7.91
%		27.97	3.66	1.10	1.08	1205	1.92	1.66	.559	.43	.40
Per therm						1000	1.59	1.38	.464	.36	.33

Table 2. Quail Layer Diet

Ingredients	Lb.	Protein	Fat	Ca	P	M.E. Cal/lb.	Agri-nine	Lysine	Methionine	Cystine	Trypto
Soybean meal 44%	484	217.80	3.88	1.21	2.91	494700	16.49	14.07	3.25	3.25	3.40
Corn	400	35.60	15.20	.08	1.12	624000	2.00	.84	.80	.64	.32
Milo	684	61.56	19.15	.14	2.05	1012320	2.26	1.92	1.09	1.03	.82
Alfalfa leaf meal	60	10.68	1.80	.78	.14	30000	.48	.54	.18	.24	.24
Poultry byproduct meal	100	58.00	13.00	3.00	1.70	126000	3.80	3.70	1.00	1.00	.50
D.D. solubles	50	13.50	4.00	.10	.33	55500	.45	.45	.22	.13	.10
Vitamin mix											
(in 30 lb. fishmeal)	50	18.30	2.34	1.50	.84	36000	1.20	1.53	.63	.30	.24
Fat	15		15.00			60000					
Oyster shell flour	100			38.00							
Dical phosphate	50			12.00	9.25						
Salt	5										
Methionine	1	1.00							1.00		
Manganese sulfate	1/2										
Trace mineral mix	1/2										
Total	2000	416.44	74.37	56.81	18.34	2438520	26.68	23.05	8.17	6.59	5.62
%		20.82	3.72	2.84 <sup>1</sup>	.92	1219	1.33	1.15	.4085	.33	.28
Per therm						1000	1.09	.94	.335	.27	.23

<sup>1</sup>Should be increased in the summer by giving ground oyster shell or other Ca supplement.

diagnosed by a local veterinarian. Coturnix appear to suffer from many of the same diseases that affect domestic poultry; local feed stores often carry poultry medication. Japanese quail appear to be more hearty than chickens and with proper management, serious mortality should not be a problem.

## OBTAINING BIRDS AND EQUIPMENT

Japanese quail are available from many sources. Local pet or feed stores may know of breeders. Sporting magazines and ornamental fowl or game bird journals often list Japanese or Pharaoh quail in their advertise-

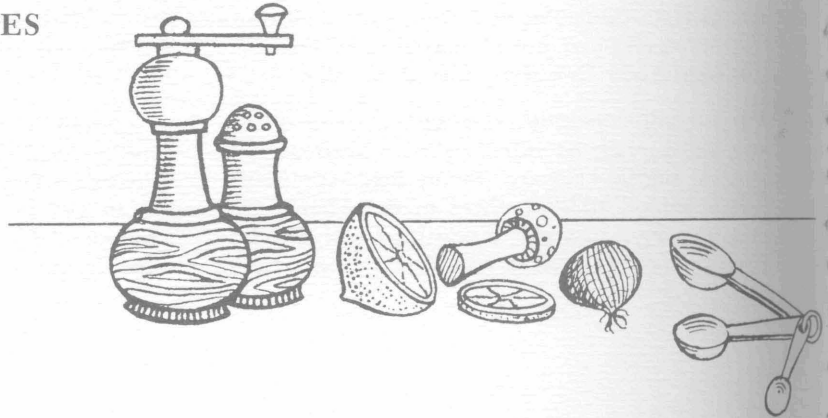
ment sections. If you cannot locate a source, contact your county Extension agent or the Department of Poultry Science at Texas A&M University for information.

Since your entire operation will depend on the quality of your initial quail, be sure to start with healthy, vigorous stock. Fertile eggs are usually less expensive than chicks or adults. Additionally, a smaller chance of disease transmission is probable if you start with fertile eggs. If you prefer chicks or adult breeders, be sure they

are judged to be healthy by a competent individual. Accept no birds that appear sick or listless. In any event, know what you are buying.

Equipment manufactured especially for quail may be difficult to obtain locally. Many feed stores, pet shops or poultry supply firms carry equipment which will suffice or can be easily modified. A list of some of the manufacturers who provide special equipment for quail may be obtained from Extension poultry specialists.

## JAPANESE QUAIL RECIPES



### FRIED QUAIL

4 quail  
¼ cup flour

1 teaspoon salt  
½ teaspoon pepper

Dredge quail with mixture of flour, salt and pepper. Have deep skillet half filled with hot fat. Brown quail on both sides. Cover skillet and reduce heat. Cook slowly until tender, about 20 minutes, turning once to brown evenly. Serves 2.

Optionally, quail are excellent when stuffed with dressing. Serves 2.

### DRESSING

1½ cup dry bread crumbs  
½ cup finely chopped celery  
½ onion, finely cut  
¼ teaspoon poultry seasoning  
1 egg

¼ teaspoon dried savory  
¼ teaspoon salt  
¼ teaspoon powdered rosemary  
¼ cup broth (or water)

### EUROPEAN QUAIL DELIGHT

4 quail  
4 tablespoons vegetable oil

Salt and pepper  
1 cup chicken broth  
Dressing (see recipe)

After stuffing lightly with dressing, shake on salt and pepper, and place quail in a deep saucepan with vegetable oil. Cook over a good flame for a few minutes until well browned, then reduce heat and cook slowly for 20 to 30 minutes. Make a gravy of the drippings thickened with flour and add the chicken broth or hot water. Pour over the quail and serve hot with steamed new potatoes. Serves 2.

Combine and lightly pack into quail (sufficient for 6-8 birds).

### HARD-COOKED QUAIL EGGS

Hard-cooked quail eggs taste just like bitesized chicken eggs. They make delicious appetizers, snacks or can be used to dress up salads, etc. They can be pickled (follow standard canning procedures) by adding hot, white vinegar (diluted to taste), salt and pepper, and such things as bacon bits, polish sausage or hot peppers for flavor. Let stand for 24 to 48 hours before serving.

### ROASTED QUAIL WITH MUSHROOMS

4 quail  
4 slices of bacon  
1 tablespoon butter  
or margarine

Juice of half lemon  
½ cup hot water  
⅓ ounce can mushrooms, drained

Wipe quail inside and out with a little vegetable oil. Bind each bird with a slice of bacon and season with salt and pepper. Put bird into a buttered pan and roast at 425°F for about 15 minutes or until tender. Remove birds and add butter or margarine, water and lemon juice to drippings in pan, stirring to make gravy. Add mushrooms. Serve the birds on toast with gravy poured over them.

Place 2 to 5 dozen quail eggs in cool water with a pinch of salt and bring to a boil. Boil for 5 minutes and stir frequently to prevent yolks from settling to one side. Pour off hot water and cool under running water. The eggs peel easier soon after cooking and if they are about 1 week old before cooking. The shell can be dissolved, thus avoiding this painstaking task. Place boiled eggs in full strength vinegar for about 12 hours, agitating every several hours. This still leaves the egg enclosed in a membrane or skin. The skins can then be removed easily by hand, the eggs washed in clean water, and canned or refrigerated.

## MARINATED QUAIL BREASTS

12 quail breasts  
½ cup butter  
¼ cup minced onion  
1 cup dry, white wine or  
lemon juice

2 tablespoons celery flakes  
½ teaspoon tarragon  
Shake salt

Saute quail for 5 minutes or until lightly brown. Add wine, onion, celery, salt. Cover and simmer over low heat for 20 minutes. Add tarragon and simmer uncovered for 15 minutes.

## QUAIL VERONIQUE

4 quail  
1 carrot, finely minced  
1 onion, finely minced  
1 celery stalk  
3 tablespoons butter

1 bay leaf  
½ cup white wine  
½ cup chicken broth  
2 tablespoons flour  
Pinch of thyme

Roast quail in buttered pan at 425°F for 15 minutes. Meanwhile simmer vegetables in butter until light brown. Add wine and broth. Thicken sauce with equal parts butter and flour. Season to taste with salt and pepper. Add quail and cook for 10 minutes. Serves 2.

## PICKLED QUAIL EGGS (FANCY)

12 boiled quail eggs  
1½ cups mild vinegar  
3 tablespoons tarragon  
vinegar

1 tablespoon pickling spices  
2 medium size pieces of root  
ginger  
½ teaspoon salt

Place vinegars, spices and salt together in a pan and simmer all ingredients for 15 minutes. Place shelled eggs in a bowl and completely cover with the pickling solution. When the eggs and mixture have cooled, cover the bowl and place it in a refrigerator for at least 24 hours. Food coloring may be added to the pickling solution as desired.





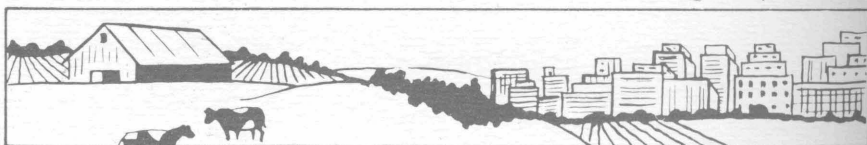
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