

# REPRODUCING, RAISING, AND RELEASING GRAY PARTRIDGE

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## INTRODUCTION

The Hungarian or gray partridge was introduced into the western United States early in the 20th century. It has proved itself to be a worthy game bird in the areas where it has become established. The Canadian plains, the north central and the northwestern United States are the predominant areas where large populations of these partridge have established themselves following the release of penreared young. In the future, this partridge may be established in other areas of the United States.

#### **Good Potential**

Increasing interest has been generated for the introduction of exotic birds to new areas. Gray partridges are worthy adversaries of the hunter and desirable additions in habitats where they can be established. They are quite strong fliers and do well in cultivated as well as marginal agricultural areas. They are primarily seed eaters but also consume insects. In the wild the hens lay from 8 to 21 eggs, and with the help of the male they often manage to rear up to 90% of their broods. A brood frequently stays together as a family group until the following spring.

#### **Propagation Perplexity**

The particular difficulties that have been encountered with successful releases of gray partridges relate to the propagation problems of this bird. The gray partridge is pugnacious and difficult to raise in large numbers since it is very intolerant of density, particularly during the breeding season.

For one who has experience raising birds, the gray partridge makes a particularly interesting addition and a worthwhile challenge to his skills and abilities, since it presents most of the problems that face anyone engaged in game bird progagation. The gray partridge is monogamous, quarrelsome in groups, prone to disease, erratic in egg production, nervous and difficult to handle, and, until recently, difficult to rear. On the positive side the species is readily sexed, easy to hatch, and fairly accommodating about diet.

#### **Purpose of Bulletin**

This publication is designed to provide some guidelines for reproducing, rearing, and releasing of gray partridge. Most of these guidelines have been tested at several locations and have proven generally reliable for the initiation of a Hungarian partridge propagation unit. Once the basic principles have been thoroughly established, the propagator may innovate and experiment with the bird at will, for surely there are many unexplored avenues for improving the success of this process. Before starting a partridge propagation unit as either a hobby or a business, it is advisable to check with state fish and game personnel about the requirements for obtaining permits, licenses, and other clearances for the maintenance, propagation, sales, and exchange of game birds.

## REPRODUCTION

In early spring gray partridges begin to demonstrate the natural urge to choose a mate and to fulfill the biological drive of reproduction. The observer will notice increases in the calling and squawking by the birds, strutting, tail flipping, and mock fights among both males and females. This will signal the approach of the breeding season. Since these partridge are monogamous and density intolerant, it is important that the propagator isolate pairs of partridge as soon as these premating signs are evident.

A system that has been found to be successful in establishing mated pairs is to arrange mating pens with the doors facing a central courtyard, keeping the entire unit of pens and courtyard enclosed (Fig. 1). Several pairs of partridge are then released into the central courtyard, with all the pen doors opened into the courtyard. The females will select males of their choice and will entice them into a pen. It is then simply a matter of closing the doors and mated pairs will be established in residence pens of their choice. This process can be continued until each bird has selected a pen-mate and a pen, and the doors have been closed.



Figure 1. Central courtyard arrangement for partridge breeding pens.

Sometimes not all birds will establish themselves as pairs, and if after a period of some weeks there are still random males and females in the central courtyard, one of the sexes should be replaced so that other pairs can be formed. Once the pens are closed the birds should be watched for fighting, for it is possible that every pair is not completely compatible. The central courtyard should be empty of birds during the breeding season.

If the breeder wishes, he can rear the males in isolation from the females. When the sexes are combined, pairing will be faster. However, this system requires additional rearing pen facilities. Dividers between the pens should be at least a foot high to prevent visual contact between birds in adjoining pens (Fig. 2). Pen size can vary from  $4 \times 8$  feet to  $8 \times 16$  feet with equal success, so long as each pair of birds is prevented from seeing pairs in adjacent pens (Fig. 3).



Figure 2. Partridge breeding pen (8 x 16 feet). Note sideboards to prevent visual contact with adjoining pen and shelter board over feeder.

If pens are separated, care should be taken to place together pairs that are apparently compatible or to place males and females that have not been reared together in the pens; then they should be watched carefully for a few days to be sure the pairs are compatible. When possible, the female should be placed in the pen a day or two before the male is introduced. Each pen should be provided with feed and water and should have some natural or installed cover. A sloping board  $(1 \times 10 \text{ inches})$  over the feeder will prevent precipitation from souring the feed in the feeder (Fig. 2). It also provides shade in summer and protection in winter. Since these birds are highly nervous, the caretaker should wear clothes of subdued color and should move slowly and cautiously in his daily checks of feed, water, and eggs.



Figure 3. Breeder pens of corrugated metal construction (4 x 8 feet). These are inexpensive to build and produce satisfactory results.

The birds tend to hide their eggs, particularly in the hot days of summer. Egg laying usually begins about mid-May and continues until the first of August. Egg production is erratic; mated pairs will produce an average of about 30 eggs, although some pairs will produce no eggs and others as many as 60. The caretaker must endeavor to know each individual pair and the birds' favorite spot in the pen for hiding and possible burying their eggs. On hot summer days the eggs may be buried to a depth of as much as six inches in soft, sandy soil. Eggs should be collected at least once daily or if possible twice daily. Sometime before noon and early in the evening are the best times for egg collections, for this will leave the birds a minimum amount of time to bury the eggs. It will also keep the eggs in better condition for hatching in an incubator. Eggs for hatching should be stored in a cool, damp place, preferably at 55° F and 90% relative humidity. If facilities for storing eggs are not available, usually the cupboard underneath a sink is a good storage location. Hatching eggs should never be stored longer than ten days before incubation. After the first eggs are placed into the incubator, the pens in which the chicks will be raised should be cleaned, rototilled, and repaired.

#### **Selection of Breeders**

At first inspection it appears relatively difficult to distinguish male from female among Hungarian partridge. The observer is tempted to use the horseshoe-shaped, reddish-brown marking on the breast of the bird as a sex indicator. This is not a reliable index since there are considerable variations in color markings. A mature Hungarian partridge weighs about three-fourths of a pound and is about 12 inches long; the male is usually a few ounces heavier than the female. Sex may be identified with a high degree of accuracy by inspecting the secondary wing coverts. These are the small feathers covering the secondary flight feathers between the shoulder and the elbow of the wing. With a bird in hand, one may easily examine the secondary wing coverts. The female will show a buff-colored median stripe following the shaft of the feather and buff-colored crossbars, which are clearly indicated, crossing the feather laterally. The male will have a buff-colored median stripe following the shaft of the feather but will not have the definite buffcolored crossbars perpendicular to the shaft. While the bird being sexed is held, it should also be examined for physical defects. In particular, look for eye defects, twisted beaks, and deformed or damaged feet. Birds with any physical defects should not be used as breeders. The conformation of the bird and its fleshing can also be checked at this time. Birds with humped (roached) or twisted backs or poor fleshing should not be utilized for breeding. If the bird is not the type to have in the next generation, it should not be used as a breeder.

#### **Incubation and Hatching**

The eggs can be incubated in almost any incubator. Fan-ventilated incubators are preferable since there is much better control of temperature and ventilation within the machine. In some machines modification of the egg trays will be necessary to handle the small partridge eggs, since the original design usually is for chicken eggs. These modifications can be made by bending hardware cloth to fit the trays and also to hold the eggs securely, yet not so tightly as to break the shells (Fig. 4). Material utilized to hold the eggs in the machines should allow free movement of air over the entire surface of the eggs. The incubating egg depends upon four primary factors for the successful development of a live chick: temperature, humidity, ventilation, and turning.

#### Temperature

The temperature should be set at  $99^{\circ}-100^{\circ}$  F for forced air machines and  $101^{\circ}$  F for still air machines, as measured at the top of the eggs in the machines. If the temperature of the incubator exceeds these temperatures, many embryos may die or the hatches

will result in inferior quality chicks. During the hatching period the temperature should be lowered  $0.5^{\circ}$  to  $1^{\circ}$  F and the humidity should be increased slightly.



Figure 4. Incubator tray with hardware cloth inserts for gray and Chukar partridge eggs.

#### Humidity

The moisture content of the air in the incubator during incubation and hatching is of vital concern. A wet-bulb thermometer or hygrometer is the best instrument for determining relative humidity. During incubation, wet-bulb readings should record  $84^{\circ} - 85^{\circ}$ F. A wet-bulb reading of  $85.5^{\circ}$ F represents a relative humidity of 60%. The humidity must be adjusted as embryonic development advances. At the time of transfer, the wet-bulb readings should read  $84^{\circ} - 86^{\circ}$ F. During hatching, humidity must be increased to wetbulb readings of  $91^{\circ} - 93^{\circ}$ F. This last initial increase in humidity during hatching is essential to prevent the chicks from sticking to their shells during hatching, causing them to expend all their energy in attempts to emerge. If this should occur, considerable weakening of the young chicks will result and many will die.

Whenever wet-bulb readings are taken, the instrument recording the wet-bulb reading should be carefully checked. In particular, keep the wick that connects the water reservoir to the thermometer from becoming clogged with mineral salts. A good preventive maintenance procedure is to wash this wick at least once weekly in clean water. Once the hatch is complete, the humidity should be lowered to approximately  $86.5^{\circ}$ F wet-bulb reading. This will dry and fluff out the newly hatched chicks before they are removed from the incubators.

#### Ventilation

Air movement in an automatic forced air machine or a still air machine is controlled by following the manufacturer's recommendations for adjusting the openings for entrance and exit of air.

#### Turning

The purpose of turning the eggs is to prevent the developing embryo from making permanent contact with the side of the shell, which it will do if maintained in one position throughout the incubation process.

Turning in an automatic machine is effected by the program built into the machine. With most still air machines, hand turning is necessary. If hand turning is used, a mark should be made on one side of each egg. The eggs should be turned three or five times a day, making sure that an odd number of turns is made. For example, if turnings were at 8:00 am, 12:00 noon, 4:00 pm, 8:00 pm, and 12:00 midnight, the mark on the side of the egg would be uppermost at the first, third, and fifth turnings of one day and on the second and fourth turnings of the second day.

#### Hatching

At 21 days of incubation the turning can be discontinued, as the partridge embryo then completely fills the egg and there is no longer any danger of the developing embryo adhering to the innermost surface of the shell. In many operations the eggs are transferred from the incubator to a separate hatching compartment to complete this last portion of the incubation cycle. If a separate hatcher is used, the temperature should be reduced to  $98.5^{\circ}-99^{\circ}F$  and the humidity increased to a wet-bulb reading of  $88^{\circ}-90^{\circ}F$ , which indicates a relative humidity of 70%.

The section of the incubator or hatcher in which the eggs will complete their development and hatch the young chicks should be equipped with a rough surface of either hardware cloth, burlap, or crinkle-type craft paper, to provide the young birds with a floor on which they will not slip (Fig. 5). A slick surface will cause the birds to slip, which will permanently damage the legs of newly hatched chicks. The hatching compartment should also be enclosed and covered with wire mesh to prevent escape of the chicks from the hatching compartment. As these are wild birds, they have a strong escape tendency; they will leave the tray at the slightest noise upon opening of the compartment and will incur injury from either the fall or mechanical components of the hatcher. Hungarian partridge usually hatch after 24-25 days of incubation.



Figure 5. Hatching tray for partridge. Note the tight fitting lid and pedigree dividers.

## BROODING

Once the young chicks have emerged from the shells they should be left in the hatching compartment for at least 12, and preferably 24, hours before being placed in a brooding unit. This will allow the chicks to dry off thoroughly and to regain the strength they expended in emerging from the shell. A wet chick is susceptible to chilling and the slightest draft can be detrimental to the future health and survival of the young chicks.

With small groups of birds the young can be reared under broody hens. However, since we are discussing the propagation of these birds in larger numbers we leave the reader to study rearing under broody hens from other sources, preferably poultry management guides of 1950 or earlier. Partridge chicks can be reared successfully under various types of brooders heated by gas or electricity (Fig. 6). Heat-lamp brooding has not proven to be desirable for the brooding of the Hungarian partridge. They can also be very successfully raised in commercial brooder batteries (Fig. 7). One of the main criteria for the successful brooding of young partridge is brooding in groups of no more than 30 chicks. Their pugnacious nature is evident even in the young birds, and it becomes a survival-of-the-fittest encounter with the weaker birds being kept away from the feed and water and eventually dying.



Figure 6. Floor brooding arrangement for newly hatched partridge chicks.



Figure 7. Battery brooding of newly hatched partridge chicks.

In small groups, all birds have a greater chance of access to feed and water in the first and most important days of life. The feed should be placed in shallow feeders at the edge of the area under the heaters, and an extra handful of feed can be scattered on a crinkle or craft-type paper underneath the heat source of the brooder to encourage the initiation of feeding. Water should be placed in shallow containers. Jar lids (3 to 4 inches in diameter) are adequate for this purpose. Small quarter-inch gravel placed in the jar lids before adding clean tap water will prevent the birds from entering the water and becoming wet.

As the birds grow, small feeders and bigger water containers with large stones can be introduced to the brooding pen. Some propagators prefer to add the crumbled yolk of hard-cooked eggs on top of the mash for the first few days after the chicks are introduced to the brooders. The hard-cooked egg yolk is a succulent, nutritious food and duplicates the young grubs and insects that make up the entire diet of young partridges in the wild. The birds will soon convert their dietary requirements to the mash, and the introduction of egg yolk will no longer be necessary after the first week.

Temperature of the brooder should be at least 90°F, preferably 95°F, at the shoulder height of the chicks. If the chicks are being brooded on a wire floor, the temperature should be 100°-105°F at the shoulder height of the chicks. The chicks can be maintained in battery brooding units, for three to six weeks. The longer they can be maintained in the brooder units, the higher the percentage of the hatched birds that will be reared. Any birds showing foot deformities or other obvious physical defects should be ruthlessly culled out, for they will never become quality birds and only add to the possibility of introducing disease to the flock. With each successive week the temperature can be reduced 5°F, until supplemental heat is no longer required.

When the birds are five to six weeks old they can be placed in small, wire-covered outdoor runs (Fig. 8). However, during the night they should be herded back into brooder units with thermostatically regulated heat sources to provide supplemental heat during cool evenings. Five or six square feet of pasture space or yard space per bird is a reasonable allocation for the young birds. Vegetative cover in the starter yard should be less dense than in the growing and developing (flight) pens. At ten weeks of age the birds can be turned into larger growing and developing pens that are equipped with feed and water (Fig. 9). Supplemental heat is no longer required. If possible, the propagator should endeavor not to mix age groups of birds, for the younger birds in the group will lose in any competition for feed, water, or space.



Figure 8. Starter yard for young partridge. Note access door to brooder, vegetative cover, and recessed shelter.

Pens for rearing young partridge should be constructed of oneinch wire mesh. Although larger meshes would hold the birds in and be cheaper to build, they also provide access for wild birds and certain small predators. Also one-inch wire mesh has small enough openings so that when the young birds begin to fly at about four weeks of age they are not able to extend their heads through the wire and break their necks during flight.



Figure 9. Growing and developing pens of one-inch wire mesh. Note shelters and mowed areas.

Strips of plastic surveyor's tape cut into 24-inch lengths and then tied through the overhead mesh of the pen, to form two 12-inch flags at random intervals throughout the pen approximately three feet apart, will deter the young birds from flying into the pen cover wire (Fig. 10). The pens in which the birds are placed at ten weeks of age should be well provided with a cover of vegetation. However, care should be taken that the vegetative covering is not so thick that the birds cannot move freely about the pen area (Fig. 9). If necessary, trails can be cut or mowed through the pen prior to the introduction of the birds. Rearing pens should provide a minimum of 20 square feet of ground space per bird. The birds can be maintained in these rearing pens throughout fall and winter.

Figure 10. "Flags" of surveyor's tape to prevent damage from the young birds flying into the pen ceiling.

If the cover in the pen becomes flattened or sparse during winter months, supplemental cover can be provided by creating brush piles of evergreen boughs and surplus or discarded Christmas trees (Fig. 11). These brush piles will provide excellent temporary cover until spring. However, they do constitute a potential fire hazard and should be removed as soon as they are no longer necessary in the pen. During severe weather, some type of permanent range shelters should be available to the birds. Most of these shelters resemble open-fronted doghouses. During snow storms it will be found that these shelters are filled with birds, although they use them at no other time (Fig. 12). These shelters also make excellent places for putting feed, and they protect the feed from inclement weather and subsequent spoilage that can result in disease problems, particularly from mold and fungus infections. At least 25 square feet of permanent shelter per 50 birds should be provided. Several small shelters are recommended rather than one large shelter.



Figure 11. Winter arrangement of flight pens. Feed is also available under the shelter.



Figure 12. Range shelter (4 x 6 feet) which will accommodate 50 birds during severe winter storms.

As soon as fall and winter pass, the young males and females begin to talk and call to each other more frequently. Soon the propagator will notice his community of birds squawking, strutting, and performing a variety of amusing antics. This is the propagator's signal that the breeding season is forthcoming. If the sexes are to be separated prior to establishing the mating pens, this signal serves as a warning to divide the sexes before pair bonds are formed. If allowed to nest on their own the hens will set and the cocks will stand guard. However, if the birds are too crowded, intensive and continuous fighting will break out, resulting in many severely pecked birds that are lost to the propagator. With the onset of courtship behavior, the schedule for establishing mating pairs should be intitated.

There is no cause for alarm if the birds do not establish their pairs within a few days after being placed in the breeding areas. As the season progresses, the hormonally induced drives to form the pair bonds will become stronger and the pairs will soon select their pen-mates and initiate the cycle of propagation.

### NUTRITION

If a commercial feeding program is not selected for the nutrition of the game birds, great care should be taken with this aspect of the management system. The nutritional requirements of the gray partridge are not as well investigated and defined as are those of domestic fowl, quail, or pheasants. However the following basic recommendations should produce good results by utilizing standard feeds, which are available from local feed suppliers.

Age of birds	Type of feed	Protein content	Type of poultry ration to use
0-6 wks.	Starter	22-24%	Chick starter
6-16 wks.	Grower	18-20%	1/2 turkey grower 1/2 chick grower*
16-44 wks.	Winter maintenance	20%	Pullet developer and grain mixture** (equal parts milo, wheat, and corn)
44 wks end of laying season	Breeder	22%	1/2 turkey starter 1/2 turkey breeder

\* Supplement with cereal grains if birds are to be released in the fall.

**\*\*** Feed in separate feeders, not mixed together.

Two primary factors to be considered in these diets are the protein levels and the mineral contents of the feeds, which are designed to meet the requirements of birds at different stages of development. Feed should be available to the birds at all times and should be sheltered from rain and snow. Wet, spoiled, or otherwise damaged feed should be removed from the pen and discarded. Range feeders should be moved regularly to eliminate potential problems caused by birds standing in areas where spilled feed and droppings have accumulated.

Should specific questions concerning ration formulation and utilization arise, your Extension Poultry Specialist, available through the state university, can be consulted by letter or telephone for clarification of nutritional problems.

#### RELEASING

The problem of making the best use of the partridges produced must be considered. How, when, and where should the birds be released? There are many variable factors involved and more trials can be conducted to establish the best mechanisms of releasing these birds. Pen-reared birds are somewhat dependent upon their keepers and care should be taken during the release to consider this fact.

#### **Timing of Release**

Hauling a crate of birds to a release site and then quickly releasing the birds and driving off does not accomplish the purpose for which the effort has been expended to produce and raise these birds. Portable release pens that measure approximately 10 feet long, 10 feet wide, and four feet high, and that are covered with one-inch wire mesh, should be established in the area in which the release is planned. Groups of 12-15 birds can be placed in these pens and maintained therein for a few days, with feed and water provided, to permit the birds to acquaint themselves with the type of cover and the area itself. Once acclimation to the area has been established, one end of the pen can be opened, allowing the birds to slowly leave and drift away from the release site. Some propagators prefer to release two-thirds of the birds and maintain two or three birds in the pen for a few additional days. They feel that this tends to hold or anchor the group in the area of the release more satisfactorily than does releasing the entire group at one time. Food and water should be provided both inside and outside the pen until the last bird has been released and the pen has been removed. Release points should be at least 200 yards apart and birds should be released at intervals of about one week. Otherwise, the members of one release will tend to form a community with the birds of the next release.

#### Age of Release

It is wise to release birds more than ten weeks old and preferably at least 16-20 weeks of age. If the releases are strictly for hunting purposes, it has been demonstrated that shooting recoveries are usually higher from the release of older birds than from the release of younger birds.

#### **Release** Sites

The particular geographic and topographical conditions of each area require some study to determine the best point of release. The ideal spot is usually between two suitable feed crops. These crop areas should also provide shelter and places for sunning. The releases can be made adjacent to areas where grain or corn crops are to be planted. However, it is possible that the harvesting of these crops will disturb the established colonies of birds. Uncultivated land that offers good cover would be a suitable release site, but it should be within reasonable distance of some crop that will provide cover for the birds during the shooting season.

#### **Releasing Adults**

Small groups of adults may be released as early as February or March, but releases should be performed as late in the spring as possible to insure a satisfactory establishment of the pairs. This requires that they be able to find suitable feed and cover and yet be able to adjust themselves to the new terrain. When food and cover requirements are more adequately catered to, the pairs can be released earlier. Since the partridges are density intolerant and tend to fight if they are too numerous in a particular area, privacy is best attained by suitable vegetative cover. Once the birds have been released it becomes difficult to determine the success of the establishing birds in the area. Observations of the number of birds in the field is a better measure than the actual recovery from the field by hunters, as the birds are extremely difficult targets for even the most experienced hunter. However, the thrill of having bagged one of these gray "cannon balls" is worth the effort on the part of the sportsman. If sport is not the intended function in the release, the antics and pugnaciousness of these birds in the vicinity will in themselves be a reward for the efforts expended in establishing a colony of Hungarian partridge.