The Propagation And Commercial Use Of Bobwhite Quail

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Alabama Cooperative Extension System
Alabama A&M and Auburn Universities

The Propagation And Commercial Use Of Bobwhite Quail

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Few thrills are as exciting to hunters as the sudden whir of a bobwhite covey rise. When the birds burst forth in all directions, your eyes blur, your heart pounds, and your palms sweat.

Sadly, this once familiar experience is becoming increasingly uncommon in Alabama. Changing land-use patterns during the last several decades have reduced bobwhite quail to but a shadow of its earlier status.

With most of the state's land in private ownership and more quail habitat being used daily for industry needs, the hunter of today is having difficulty finding a place to hunt quail. The solution to the problem lies partly in the hands of interested landowners who can operate hunting preserves as a supplement to areas that are still managed for native bobwhites.

This circular is designed to assist those who have already ventured or who may venture into raising bobwhites in an effort to supply the growing demand of hunting preserves and restaurants. There are many ways to raise bobwhite quail. Take the information in this publication, adapt it to your situation, and, most importantly, use common sense.

Your local Soil Conservation Service can help you decide the best use of farm land for propagating and releasing bobwhite quail. The ASCS (Agricultural Stabilization and Conservation Service) can provide information on any financial assistance that may be available for wildlife establishment and conservation.

Management: The Key to Success

The difference between good management and poor management is the difference between a profit and a loss. More than 80 percent of all health problems brought to diagnostic laboratories could have been prevented by closer attention to basic management principles. It is cheaper to prevent diseases than to treat them. Good management is the answer to the problem.

Always remember—quail are living beings. You stress them when you take them out of their natural environment and crowd them into close quarters. They become totally dependent on you, the producer. You alone make the business a success or failure. Once you accept this, you have the right perspective for being a success at raising quail.

There are certain rules, laws, and regulations that apply to bobwhite quail rearing and marketing in Alabama. For information and details, contact your local conservation officers or the state conservation office below:

Alabama Department of Conservation and Natural Resources
Division of Law Enforcement
64 North Union Street
Montgomery, AL 36130

Marketing: Your Primary Consideration

If you are considering going into the business of raising quail or if you are already in the business, your major objective is to make a profit. The love of working with bobwhites and the pride and pleasure of producing a top bird certainly contribute to success. But, unless you market your product for a profit, your love, pride, and pleasure will be short-lived.

Many producers contract a year or two ahead for the sale of their birds or eggs. Such contracts are excellent, but they usually come only to those who have proven that they will provide a quality bird.

You should not end the production year with mature birds on hand, other than selected breeders. You cannot justify the expense of carrying these birds over to next season. Too many producers lose money because of failure to market all of their birds.

The following suggestions will help you with marketing:

- Join the Southeastern Game Bird Breeders Association. This organization will help you in many ways, one of which is marketing.
- Join the North American Game Breeders Association. Attend their annual meeting; you'll make some profitable contacts.
- Advertise, advertise, and advertise some more—it pays. Be certain the ads

are attractive, clear, and concise. Seek local printers' professional advice and assistance.

- Keep a neat farm. As a prospective customer drives up, he or she judges you by the appearance of your farm. Neat, well-constructed pens will also help sales (Figure 1).
- Make every attempt to have satisfied customers. Tell them what you offer and then be sure to provide this and more. If you give more than is expected, your customer will return and bring new customers.
- Never force a customer to accept birds he or she does not want. Even though there may be a prior agreement, if the customer does not feel you produced what he or she wanted, accept the refusal gracefully. If the customer is worth keeping, attempt to produce what is wanted the next time. Locate someone else who will be satisfied with the birds.

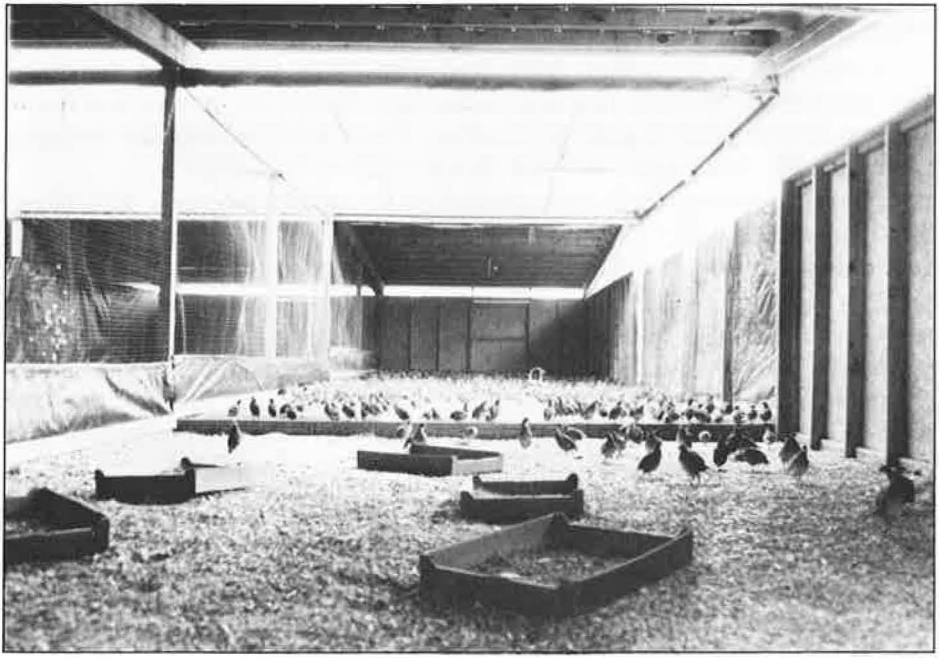

Figure 1. Neat, well-constructed pens that exhibit your birds to prospective buyers will help sales.

Managing Breeding Stock

If you start off with undesirable breeders, you will end up with undesirable offspring. The following suggestions will help you select the right kind of breeding stock:

- Buy only from reputable breeder dealers. Get the best breeding stock available. Your future in the business depends on good breeder stock.

• Visit the dealer's farm and look at facilities, birds, and records. Equally important, size up the management.

If you plan to buy birds or eggs:

• Check the breeders for conformation in size, shape, and color.

• Check for size, body, or leg deformities, off-color, and other abnormalities.

• Check records, if available, for a past history of disease and mortality.

• When buying eggs, insist on uniformity in size and shape. A large egg produces a large chick; a small egg, a small chick. Extra-large eggs seldom hatch. A mixture of sizes results in unfair competition and can give the birds a slow start.

• When buying chick quail for future breeding stock, check the points mentioned above and then look for alertness and vigor in the chick quail. Demand close culling; do not accept cull chicks with the idea that you can bring them out.

If you plan to keep birds from your own stock, select those that show the best growth, stamina, and feathering. Save birds from your earlier hatches each season prior to peak production. These birds usually are stronger, healthier, lay more eggs, and are more resistant to disease.

Always save more birds than are needed for breeder selection. This allows for the continual culling of undesirables. Having a few extra cocks and hens is advisable so you can quickly replace an infertile male or unproductive hen.

The type of breeder desired is determined by the market. Larger birds are wanted for table meat, but they do not make good fliers. Some hunting preserves, however, will use these slow fliers for beginners and poor shots. A smaller bird (about 6 to 7 ounces) is desirable for the hunting preserve that caters to experienced hunters. This size bird is more active and flies faster.

If you plan to carry the same breeders over for two or more years, closely observe and cull throughout each laying season. When the same breeders are used for more than one laying season, you may be inviting any one or a combination of the following: low egg production, low fertility, low hatchability, weak offspring, and less disease-resistant birds.

With small breeding operations, bring in unrelated breeder stock at least every third year to prevent inbreeding problems. You may exchange males with another breeder who has an unrelated strain, buy new birds, or buy eggs and raise your own new bloodline.

When bringing in new stock, quarantine these birds for three weeks before placing them with your stock. Observe them and eliminate any that appear to have a disease. Buying day-old chicks or eggs from unrelated stock is highly recommended for introducing new blood into your breeder stock.

Some large producers do not drag out egg production. Shortly after peak production is reached, they cut off production. After peak production, hatchability tends to get poorer.

As an individual producer, determine if cutting off production will be a good practice to follow. Often, because of their individual attention to management, smaller producers will surpass the achievements of large producers.

The last, but not the least important suggestion, is to have your breeders blood tested each season—prior to egg production—for pullorum typhoid disease. Waiting to test until the birds are laying will affect egg production.

Many qualified testing agents are located throughout the state. Most chicken hatcheries have lists of these agents, as do county Extension agents and Extension poultry specialists at Auburn University. The cost for this work is very reasonable if you live near one of the qualified testing agents.

Managing Breeders

All producers have their own ideas on managing breeders. The following suggestions may be helpful in your program:

- Overwinter breeders in pens of 20 or more. If on wire in raised pens and exposed to the cold, use drop curtains to avoid drafts.
- Use wire flooring to minimize exposure to internal parasites. Ground or wood flooring with litter will work, but it requires much closer observation, cleanup, and general management.
- Blood test for pullorum before laying season.
- Pair breeders four to six weeks before their normal laying season. Normally, the natural laying season in Alabama begins around the middle of March and continues through September. Bobwhite quail are monogamous which means one cock mates with one hen.
- Put each pair of breeders in individual 12- x 24-inch cages. If sectional cages are used, have a solid partition between cages to keep cocks from fighting. Fighting can cause egg breakage, mortality, and lower fertility even though birds are in separate cages.

Indoor Breeding

Indoor breeding allows the use of artificial light to induce preseason and year-round egg production. If you prefer this program, a 17-hour day is recommended. All-night lighting does little to increase egg production. However, some producers do find it helpful in preventing the birds from flying as much and injuring themselves. Generally, use of lights begins in December to induce preseason egg production in January.

Caution—Never reduce the total amount of light during the laying period. Reducing light time will reduce egg production. Time clocks are inexpensive and can be used effectively to turn lights on and off.

Continuous egg production or preseason production will result in production during the winter. For best egg production results, place breeders in pens where the temperature can be controlled. Keep the temperature during the winter at least 60°F. and during the summer below 85°F.

Watch the birds closely and keep records. The failure to mate should be detected early and the cock replaced. Egg fertility is also a method of checking mating performance. When quail are paired, this is simple. However, in colony breeding, it is more difficult to identify infertile cocks (Figure 2). If an individual hen continually lays soft-shelled eggs, replace the hen. But if a number of hens lay soft-shelled eggs, topdress the feed with pullet-sized oyster shell.

Figure 2. Some producers colony breed. Small pens work best in colony-type situations. However, more problems usually result with colony breeding than with pairing breeders.

Outdoor Breeding

If you have outdoor breeding pens, position the open ends facing south for sun and warmth. Also, enclose the area with a wire fence for protection from dogs, skunks, weasels, cats, and other animals.

Protect breeders from general disturbances caused by workers, children, and curious visitors. Any disturbance may cause the breeders to injure themselves. Injury leads to cannibalism which will affect egg production as well as mating.

Visit the birds several times daily to be sure there is enough feed and water. The lack of these provisions can lead to greater and costlier problems.

Egg Production

The number of eggs per hen will vary, depending on breeder characteristics, breeder selection, and your general management program. Follow these guidelines:

Normal mating season (no artificial light)	50-100 eggs
Normal mating season (artificial light—17-hour day)	70-150 eggs
Preseason or year-round production (17-hour day or all-night lights)	150-200 eggs

When using artificial lights, never decrease the total hours of light per day during the laying season. If you decide on a 17-hour day, this means more hours of artificial light when the days are short and less when the days are long, if your breeders are exposed to daylight.

More attention to breeder selection can result in more eggs per hen each season. Improved feeds can also boost production, and more attention to management can add to the total production per bobwhite each year.

Egg Care

You can ruin a perfectly good egg by improper care. Each egg lost is costly since it represents one less bird for sale. Observing the following tips will help you get better quality eggs:

- Collect eggs twice daily, three times daily if they are exposed to high temperatures.
- Transfer eggs to a cool, humid storage area. The temperature of the storage area should be 55°F. with a relative humidity of 75 percent. Do not use a standard air conditioner (as used in your home) for cooling the eggs. This will remove moisture from the air. The idea is to add moisture to the air. The egg is mostly water. If you take away this moisture, the egg is worthless.
- Do not wash dirty eggs or wipe them clean with a damp cloth. You will remove the natural protective coating of the egg and leave it exposed to germs and other organisms. Some people discard dirty eggs; however,

moderately dirty eggs may be salvaged with some work and care. Remove dirt and matter by lightly sanding off only the dirt with fine sandpaper. Do not sand any area that does not need cleaning.

• Store the eggs with the small pointed end down (Figure 3). If eggs are held more than three or four days before setting, turn them at least twice daily. Tilt to an opposite slant each time to an approximately 45-degree angle to prevent the yolk from sticking to the shell membrane. Holding eggs longer than 10 days in storage may affect hatchability. Therefore, plan your quail operation so egg storage will not be required longer than 10 days.

• Before placing eggs which have been stored at 55°F. into the incubator, allow them to warm to room temperature. Otherwise, the shock of going from 55°F. to 100°F. may reduce hatchability.

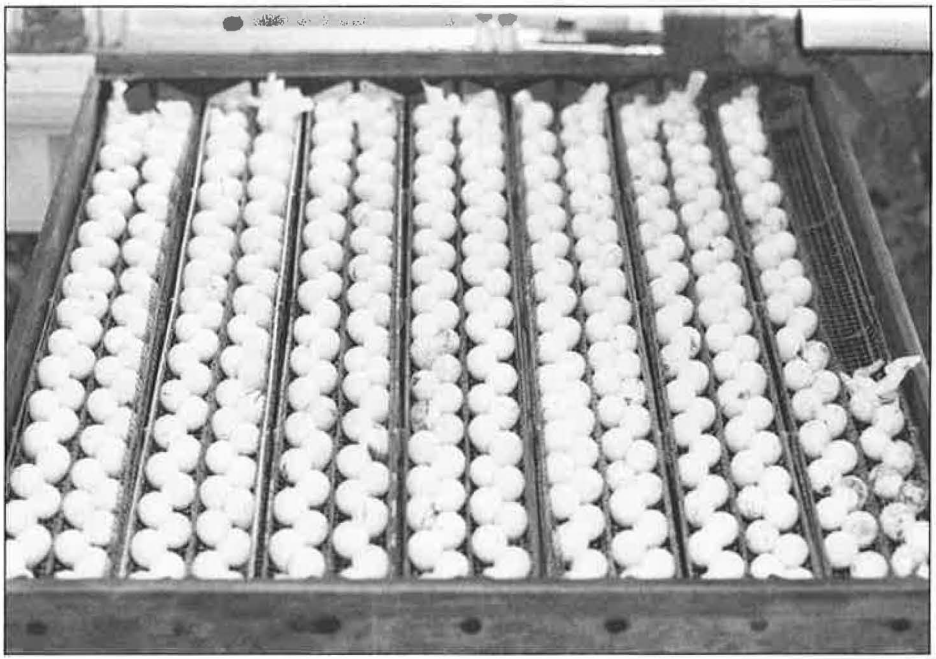

Figure 3. Store quail eggs with the small end pointed down in incubator trays.

Egg Incubation

Improper adjustment of the incubator or carelessness at this stage of propagation can ruin all plans. The following pointers may serve as reminders of correct incubation procedures:

• The size and type of incubator to buy should be based on your future business plans. Game bird equipment suppliers can furnish you with capacities and capabilities of various makes and models. For continuous setting, you need an incubator with a hatcher or a separate hatcher (Figure 4).

• Thoroughly clean and disinfect the incubator and hatcher before using.

• Constantly check the incubator and hatcher during operation to be sure the temperature and humidity are correct. Correctness of both is essential for a good hatch. The incubator and hatcher should be in a room where no major variance in temperature or humidity occurs.

Follow the manufacturer's recommendations for incubator settings if they are given for quail. If not, use the following guide. Note the difference in the temperatures listed for still-air and forced-air incubators. Forced-air incubators are those with internal-fan air circulation. Still-airs usually have a very small capacity—up to 50 quail eggs. Place the thermometer ½ inch above eggs when set.

Period of incubation		23 days
Incubator temperature (at set)	Forced-air	99¾-100°F.
	Still-air	102°F.
Humidity (at set)		84-86°F. wet bulb
(at pip)		90-94°F. wet bulb

Following the manufacturer's recommendations at first on temperature and humidity settings is very important. More quail raisers have problems with humidity than with temperature. After a few hatches, you may find you need to vary from the manufacturer's guide for best results.

If the incubator contains trays, keep them in the incubator at all times (with or without eggs) during operation to maintain proper temperature and humidity readings.

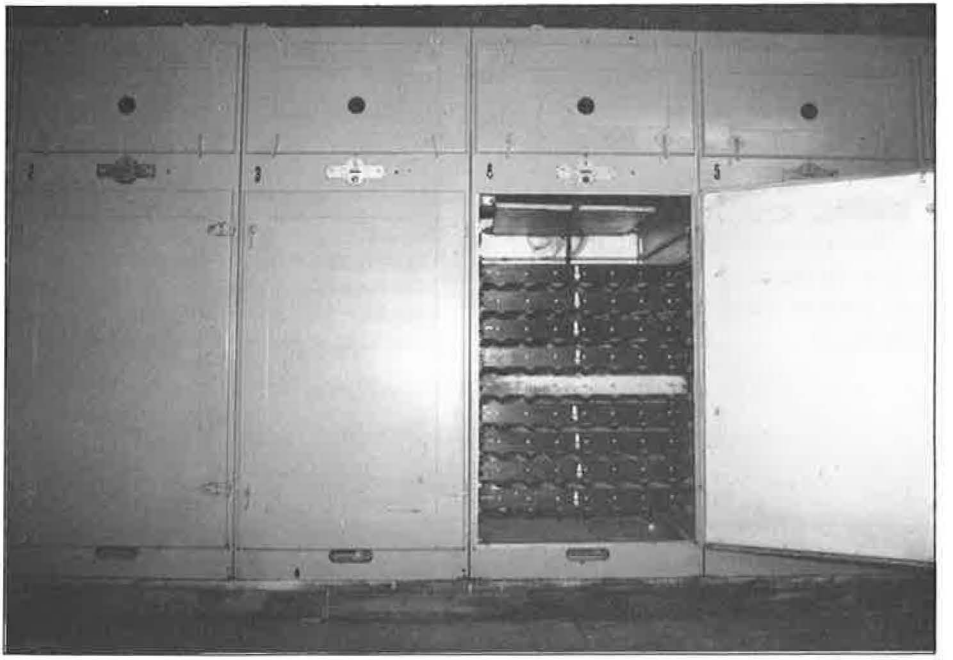

Figure 4. Large, forced-air incubators are appropriate for commercial operations.

For continuous incubation and where trays contain eggs in various stages of incubation, a temperature setting of 100°F. and a wet bulb reading of 90°F. should work.

Move the eggs to the hatcher on the 21st day of incubation. A temperature of 99 to 100°F. and a wet bulb reading of 90°F. is recommended for hatching. No turning is necessary after the 21st day. Hatchability of total eggs set should be 75 to 85 percent.

Poor Hatchability

The following factors can contribute to the poor hatchability of bobwhite quail eggs:

- Continuous disturbance of breeders during mating season.
- Keeping the bloodline more than three years.
- Using eggs from old breeders.
- A crippled or deformed hen or cock.
- Too many hens per cock.
- Holding eggs in storage too long.
- Improperly storing eggs before incubation.
- Failure to turn eggs.
- Not allowing stored eggs to reach room temperature before incubating.
- A wide variation of temperatures during incubation.
- Improper humidity during incubation and particularly during the hatch-out period in the 21st to 23rd day.
- Poor sanitation and a failure to clean the hatcher.
- Washing eggs.

Good hatchability is directly related to management of breeders, proper egg care, proper incubation and sanitation (Figure 5).

Figure 5. Good hatchability is directly related to management of breeders, proper egg care, proper incubation, and sanitation. Shown is a 1-week-old chick.

Brooding

The brooding or starting period is that time from hatching until five to six weeks of age. This is perhaps the most important phase of bobwhite quail propagation. During this period, the chicks require a high-protein diet, a high environmental temperature, and careful attention. Failure to brood properly can result only in disappointment. The following are some basic guidelines for brooding bobwhites.

Sanitation

First, thoroughly clean the brooding area and all equipment. One of the best aids is strong water pressure to knock down dust, waste material, cobwebs, etc. Take all equipment outside and wash, clean, and disinfect it. After cleaning, use a commercial disinfectant on the walls, ceiling, wire, and floor.

Place moisture-absorbing litter on the brooder floor. Wood shavings, peanut hulls, crushed corn cobs, or pine straw serve as good litter material. Do not use sawdust, sand, or any other fine-grained material that may be eaten by chicks.

Provide at least a 2-inch depth of litter in the brooding area and keep the litter dry. Wet litter causes many health problems.

Brooder Types

There are three general types of brooding facilities: battery brooders, floor pens with litter, and pens with elevated wire floors. The major advantage of a battery brooder is the lower requirement for floor space because the brooders are stacked one on top of another.

The litter floor pen with a hover or infrared brooder is the simplest method of brooding and generally gives good results. Various makes, models, and capacity brooders of each type are available. Poultry and game bird equipment suppliers can give you additional information on the various types of brooders.

Build brooder buildings so they can be closed during cold weather and opened for ample ventilation in hot weather. To keep out rodents, the floors and the lower 3 feet of walls should have no cracks or holes larger than $^{5}/_{16}$ inch.

Brooder Temperatures

Brooders should be on and operating correctly at least 24 hours before the arrival of the chicks. This not only allows sufficient time for necessary adjustments, repairs, or replacements, but it also takes the chill out of the brooding area.

Check the temperature at the outer edge of hover brooders and at about a 3-inch height from the litter. The correct temperature is very important to the health of chick quail (Figure 6).

Always check to see if the chicks are comfortable. If they tend to pile up or crowd near the center of your heat source, more heat is needed. If they stay way out and do not go under the center, it is too hot.

With the proper temperature, chicks should spread out comfortably in a circle under the edge of the brooder. Use the following guide for selecting the proper temperature for your brooder.

Age	Temperature
First Week	100°F.
Second Week	95°F.
Third Week	90°F.
Fourth Week	85°F.
Fifth Week	80°F.

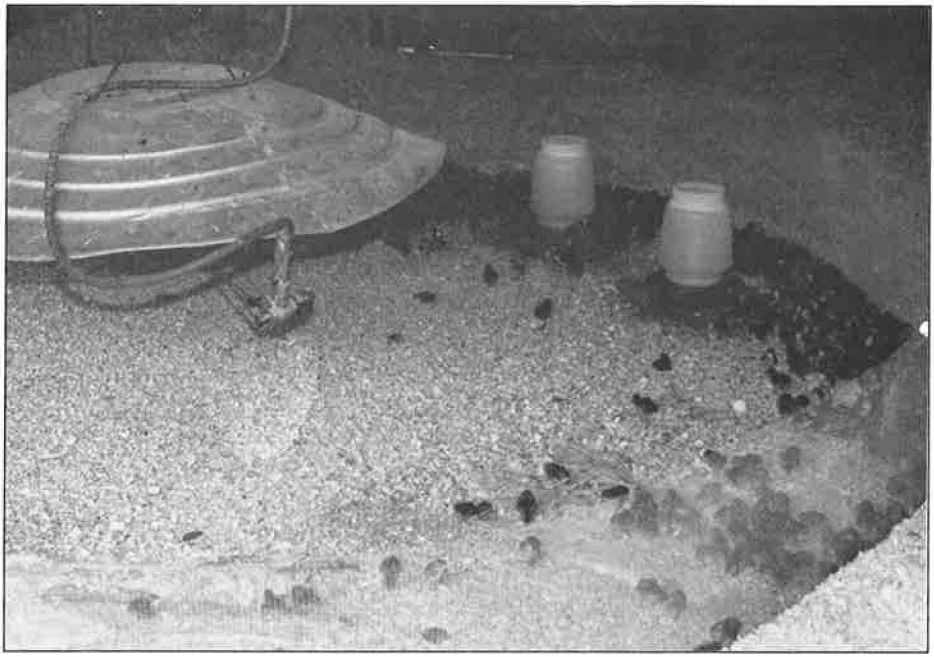

Figure 6. Check brooker temperature daily. Waterers and feeders should be near brooder.

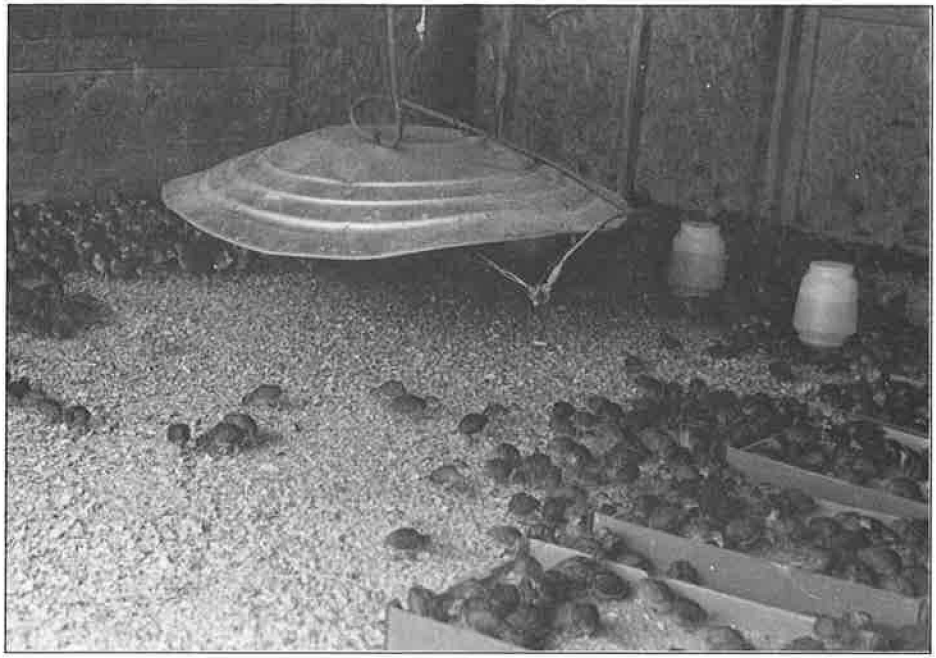

Figure 7. Most quail health problems occur during the brooding period. Adjusting the brooder temperature according to standard recommendations, the influence of environmental temperature, and the comfort of the birds are all important. An overheated or chilled chick is likely to develop a serious problem.

Time will vary as to how long heat should be provided. In warm weather, after one month, only night heat may be needed. Whenever quail are sick, provide heat regardless of the weather. A sick quail will chill; however, by providing heat, you help the bird overcome the problem and you usually lose fewer birds (Figure 7).

Provide as much ventilation for brooding facilities as possible while maintaining a proper temperature. Dust build-up and ammonia concentrations may cause eye and respiratory problems.

Use a brooder guard about 18 inches high during the first five days of brooding. It will restrict the chicks' movement away from the heat source and reduce drafts.

The guard may be made of metal, wood, or cardboard and should be placed in a circle about 5 to 6 feet in diameter around the hover. Avoid corners to prevent crowding and piling. The brooder guard may be removed after five days and should not remain longer than the ninth day.

Feeding And Watering

At least two feeding and watering areas, placed relatively close to the brooder, are needed for each brooding pen. Water troughs for starting chicks should be very shallow; preferably with bases designed specifically for quail.

At first, place feed on flat, dry surfaces (paper towels for example) or in small lip feeders. Cylindrical hanging-type feeders may be used after the chicks are one week old. Remove litter material from feeding trays and waterers several times daily during the first few days of brooding.

Space Requirements

Provide sufficient floor, feed, and water space. Overcrowding and lack of feed or water availability can result in serious problems. Space requirements vary widely with the type of equipment and facilities used.

The amount of space needed is given in the guide below. However, your conditions may require that you vary from this.

Type Of Space	1 To 10 Days	10 Days To 6 Weeks	6 To 14 Weeks
Floor space	3 birds/sq. ft.	1 bird/sq. ft.	1 bird/sq. ft
Feed space	½ in./bird	1 in./bird	1½ in./bird
Water space	2½-gal. founts/ 100 birds		1 linear ft./ 100 birds

Debeaking

Debeaking is removing the tip of the bird's beak so that it ceases to be a puncture tool. Debeaking also makes the beak an ineffective tweezer for pulling small feathers. Quail debeaking is commonly performed with nail clippers, scissors, or electric debeakers.

Debeaking can be scheduled or it can be done as it is needed. Debeaking at one day old by snipping off about one-fourth of the upper beak (from tip to nostrils) will prevent early cannibalism. It will have to be repeated every two or three weeks. Be careful not to split or crack the beak.

If you are producing birds for shooting preserves, debeak with nail clippers or scissors. Birds should have natural beaks when released.

With an electric debeaker, birds can be debeaked at one day old or at your convenience. Remove about one-half of the upper beak measuring from the tip to the nostrils. This should prove sufficient for the life of a meat-destined bird. But if pecking occurs, a second debeaking may be necessary.

Do not debeak sick or weak birds. Stress will make the problem worse. Be sure the feed level is deeper for six days after a severe debeaking. The bird's beak will be sore, and, if it must hit the bottom of the trough to get feed, the bird will not eat as it should.

Brooding Schedule

Use the following guide to schedule brooding by age:

24 hours before removal from hatcher. Turn on all brooders, set at 100°F., and check the temperature of each brooder at the edge of the hover and 3 inches above the litter or wire. Leave the brooders on. Place fresh water in jars around each side and just outside the hover so the water will be warmed by brooders. If wide troughs are used, place marbles or clean stones in the trough to prevent drowning.

2 hours before removal from hatcher. Place egg flats, paper towels, or corrugated cardboard near waterers. Place starter feed on these. Remember, do not use slick paper or slick cardboard for feed trays; birds will become spraddle-legged on slick surfaces. Place brooder guards around the brooder, feed, and water. Check the temperature of the brooders. As you transfer birds from the hatcher to the brooding area, cull weak and crippled birds. Debeak lightly if cannibalism has been a problem.

1 to 7 days. Check brooders daily and nightly to observe birds and to see if they're comfortable. Birds at this age cannot tolerate wide temperature variations. Keep waterers filled and cleaned. Each evening, remove paper or flats containing feed to prevent droppings from creating a problem. Place fresh feed on fresh paper or in clean, dry troughs daily. On the third day, move the brooder guard out so it is 5 to 6 feet in diameter around the brooder top. Weather permitting, remove the brooder guard by the fifth day. On the fifth day, place larger waterers and feed troughs in pens with the old waterers and feed flats. You can eliminate this step by starting out with the same waterers and feeders to be used throughout brooding.

7 to 14 days. Reduce brooder temperature to 95°F. on the seventh day. Allow the birds to venture farther from the heat, but use common sense in relation to weather conditions. Confine birds to the brooder area at night, but do not confine them under the brooder. Clean the jar or pail waterers at each refill. Clean watering troughs daily. Place fresh feed before birds. Remove dusty and powdery feed daily.

14 to 21 days. Reduce brooder temperature to 90°F. on the 14th day.

Keep feed and water before birds at all times. Allow birds to go into runs on warm days and provide heat in case it is needed. Do not confine birds to the brooder at night. Continue to clean waterers and remove dusty powdery feed from troughs.

21 days and after. Reduce brooder temperature to 85°F. on the 21st day and continue to reduce the temperature 5 degrees each week of brooding thereafter. Continue sanitary procedures. Keep water and feed available at several areas within each pen.

5 to 6 weeks. Transfer to grow-out pens. Cull and lightly debeak as you transfer.

Grow-Out

After a brooding period of 4 to 6 weeks, depending on weather conditions, place quail in grow-out pens. Locate grow-out pens away from your breeders and away from common disturbances such as road traffic, children's play areas, and animals.

Following these suggestions will help in successful grow-out:

- Do not crowd the birds. Watch for cannibalism. A 5- x 10-foot pen should accommodate 100 birds.
- Provide several feed and water stations. If growing out on ground or litter, place each feeder and waterer on wire. The birds are around these areas more than anywhere else in the pen. Wire stands will prevent the birds' food and water from coming into contact with droppings.
- Provide shelter and hiding places for protection from weather and from one another. Corn stalks in shocks, pine tops, panels, etc., will give the birds a place to feel more secure and will help prevent cannibalism.
- Grow meat-purpose quail on wire-floored pens. Outdoor pens should have the openings facing south. Permanent or portable pens are satisfactory. Wire floors for both are recommended (Figure 8). Raised pens with wire floors should have drop curtains around the bottom to prevent drafts.

Wire floors for permanent pens may be made in sections. Wire sections should allow for the removal of droppings. The height of the wire floor should be 4 to 6 inches from the ground.

Make the width of the support as narrow as possible to prevent a build-up of droppings on it. The purpose is to separate the birds from the droppings and thereby prevent several common quail health problems. The height of the top of the pens should be governed by convenience.

Constantly check the birds to be sure feed and water are available. Also, check for any evidence of health problems.

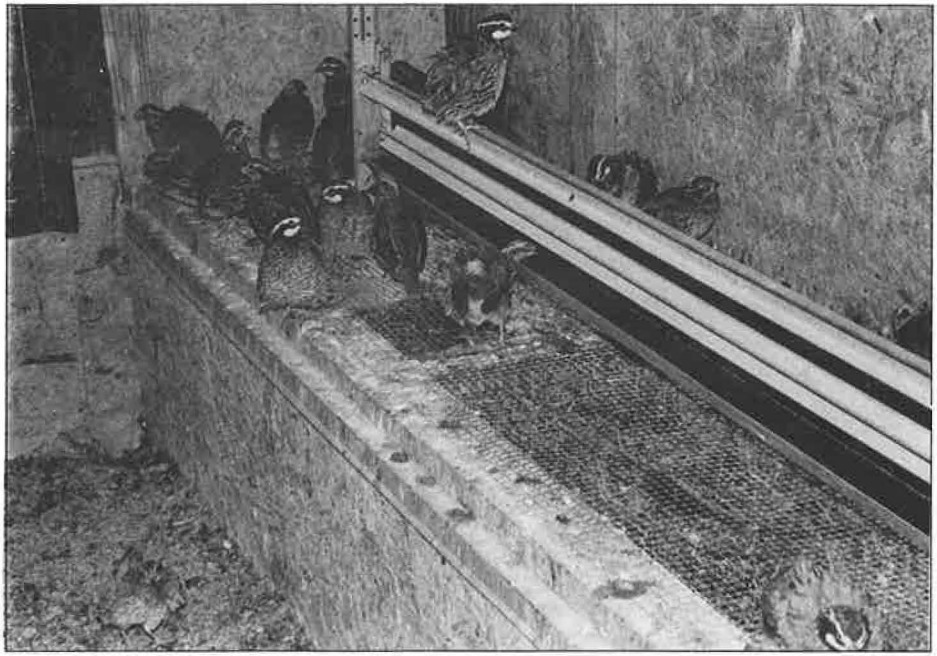

Figure 8. Wire stands for water and feed help limit the quails' exposure to droppings. This reduces the birds' exposure to harmful organisms.

Feeds & Feeding

Provide a properly prepared feed that is formulated especially for bobwhite quail. Good commercially prepared game bird feeds are available in most areas. Home mixing is possible but is usually not practical for the volume of feed required.

Direct specific questions on rations and home mixing to your county Extension agent.

Feeding By Bird Type

Breeders. Feed a game bird breeder feed at least one month before normal egg production season and continue throughout the breeding season.

Chicks. Feed a game bird starter feed from 1 day old to 8 weeks. Allow free-choice feeding.

Release birds. Feed a game bird developer from 8 weeks to maturity. Some feed companies manufacture a feed that requires no added grain. Others recommend scratch grains consisting of half corn or milo and half oats or barley fed free-choice with a developer. Follow feed company recommendations.

Meat birds. Feed a game bird grower from 8 weeks to maturity. One program recommends starting at 8 weeks with 10 percent of the ration con-

sisting of cracked corn or milo and increasing this until the birds will be on free-choice grain and grower at 12 weeks. Follow the program recommended by your feed company for meat birds.

Feeding By Age

The following guide will help you determine feed consumption by the age of the bird:

Between Ages Of:	Total Feed Consumption
1 day to 8 weeks	1.3 to 1.5 pounds/bird
8 weeks to 16 weeks	2.5 to 3.0 pounds/bird

Flight Conditioning

Hunting preserves demand a strong, aggressive, and fast bird. To get this type bird, you must condition the bobwhite quail. In reality, you must allow the bird room to fly and strengthen itself as it would naturally.

Quail released without the benefit of flight conditioning become conditioned rapidly. However, they tend to suffer greater losses to predation immediately following release.

Place birds in flight pens 4 to 6 weeks before they are scheduled for release. Flight pens should have floors of well-drained soil. There should also be cover, feed, and water throughout the area. The width should be about 12 to 15 feet with a length of 40 feet or more.

This length includes a 12- x 12-foot catching area at one end. The height should allow for the use of a tractor to turn the soil in the pens. Build feed and water stations on wire stands to limit exposure to droppings and to prevent rain from wetting and ruining feed.

To prevent birds from scalping and injuring themselves in the pens, fasten open-weave burlap, fish netting, fruit tree netting, or cheesecloth to the top, sides, and ends. Use open-fiber material to prevent cutting off light or ventilation. Mark the ends with sacks or similar material to enable the birds to see the end of the flight area.

Build more than one flight pen to allow for rotation. This is necessary to prevent health problems. When not in use, deep plow the soil.

Isolating birds in flight pens is the key to having birds that fly well. Avoid human contact as much as possible. Do not sit and watch birds or allow anyone else to disturb them in flight pens.

Locate the pens away from dogs and people. Automatic feeders and waterers also tend to reduce disturbance and help make a good flying bird.

Some producers plant a crop in the flight pen for additional food and cover. Be sure the crop you plant does not keep out too much sunlight. If the ground is shaded and remains moist for long periods, it will invite build-ups of mold and various internal parasites such as worms and coccidia.

Food poisoning (botulism) is not uncommon in shaded, moist pens, particularly if grain is scattered on the ground.

Do not overcrowd the flight pen. Two square feet per bird is enough space. Overcrowding leads to a high incidence of bob-tailed birds as a result of their pecking and pulling one another's feathers.

Do not sell an unconditioned bird to a hunting preserve unless they specify such. Nothing is more disgusting to an experienced hunter than to have a sluggish, wobbly, bob-tailed quail attempt to fly on a covey rise.

Pest Control

Check the birds regularly for lice or mites. A small dusting box containing sand mixed with an effective insecticide works well. Every time birds are handled, dust them with an insecticide. At present, 5-percent Sevin dust is effective. Insects develop resistance; therefore, check with your county Extension agent for the best insecticide in your area.

Caution—Never use DDT or cotton dust.

Control rodents with anti-coagulant baits and screen out sparrows or other birds where possible. They not only can be a source of mites and lice, but they can also transmit diseases to breeders, frighten the birds (causing injury and lowered production), and contaminate and eat a lot of feed.

Sanitation is a must throughout your entire program. Clean water troughs daily and clean feeders at least once a week.

Do not keep mixed feed stored for more than one month before using. It may become moldy, lose its quality, and be harmful to the birds, especially if it's improperly stored.

Do not raise any other type of fowl and do not allow your labor to raise any other type. They can transmit diseases to quail. This source of disease is often overlooked by quail producers. Keep visitors out of the breeder pens. This may be hard to do, but it will help prevent problems in the future.

Disease Control

The average quail producer cannot read about a disease or look at a picture and make an accurate diagnosis in the field without training, equipment, and experience. With the untrained eye, you can seldom diagnose more than a few internal parasites.

Several factors, most of which cause mental and/or physical stresses, appear to play a vital role in disease development. Many known and unknown factors can cause stress. Anything that weakens the body defenses is a stress. Of the known stresses, some are considered necessary and others unnecessary.

Among those considered necessary are debeaking, vaccinating against various diseases, and handling or moving birds. Unnecessary stresses most commonly seen are overcrowding, inadequate food or water space, and improper brooding.

Raising birds year after year on the same ground does not create a stress, but it does allow certain disease-causing agents to build up in the area, thus increasing the probability of disease outbreak when stress does occur.

Many diseases in penned quail are transmitted to wild quail or turkey. Pen-raised birds develop immunity to diseases but can still transmit infections to wild birds, especially at feeders placed at release sites.

Do not sell sick or infected pen-raised quail to customers. It is also a good policy to advise customers to move released bird feeders to prevent the build-up of parasites and diseases.

When your birds experience a serious problem, use a laboratory where equipment, trained personnel, and experience are available. You may be able to guess correctly about a problem, but you may also overlook another problem which is not obvious unless special tests are made at a diagnostic laboratory.

Much is still unknown and unsolved in the diseases of quail and other fowl. Advances are being made daily in methods of treatment and management. Diseases are also advancing; new ones replace cured ones, and resistant forms of the old diseases provide a daily challenge to researchers.

A few of the more important diseases and internal parasitic problems of quail are discussed below.

Ulcerative Enteritis (Quail Disease)

Ulcerative enteritis is the most common and destructive disease of quail in our area. Losses in young birds may reach 100 percent if not controlled. It is most commonly seen in ground- or litter-raised quail, but it may also occur in wire-raised birds. The disease is caused by an anaerobic bacterium *(Clostridium)* that is transmitted through the ingestion of feces through contaminated feed and water.

If all birds on a given farm were afflicted with the disease on the same day, the peak of mortality would occur in 5 to 14 days. However, this is not the normal situation. Since individual birds usually contact the disease organisms over a period of time on infected premises, some mortality may occur almost continuously.

Symptoms may include weight loss, partially closed eyes, ruffled feathers, and sitting or standing humped-up. Internal examinations reveal small hemorrhages on the inner wall of intestines and ceca which later become larger, yellowish ulcerations.

The livers of infected birds may appear yellow- or gray-spotted and the spleen may enlarge with hemorrhages. Secondary infections may also be present which you cannot identify; thus, a laboratory examination is still the best and most accurate method of detecting the disease.

Recovered birds may still carry the disease organisms and be a source of infection for noninfected birds. Isolate known infected stock from noninfected stock.

Pens, cages, and particularly ground or litter runs may remain infected over a long period of time. Thorough cleanup of the premises is essential for prevention. Raising birds on wire is usually effective in helping to prevent the problem, but it is no guarantee.

Treatments vary in effectiveness according to prior management and sanitation practices on the farm. Under unsanitary conditions, even the most effective drugs can be overwhelmed. Resistant disease organisms may also develop after the use of a drug over a period of years.

Coccidiosis

Coccidiosis is a widespread disease of domestic fowl caused by a protozoan parasite, *Eimeria*, which invades the digestive tract. Quail become infected by ingesting food or water contaminated with the parasite's oocysts.

Ingested coccidia attack the intestinal lining causing damaged tissue, reduced nutrient absorption, secondary infection, and death. Symptoms of coccidiosis include decreased food and water consumption, weight loss, listlessness, ruffled feathers, and bloody diarrhea.

Coccidiosis normally attacks birds at 2 to 6 weeks. The disease also attacks birds that are on litter or a ground environment. Older birds may also develop a clinical case of coccidiosis, particularly if unsanitary conditions exist in the flight pen. Older birds, however, are usually more resistant to the problem.

Preventing coccidiosis from becoming a problem is basically a management job. Wet litter and the build-up of droppings around waterers and feeders are common sources of overwhelming infections. Wire sections made to hold feeders and waterers will help in prevention.

All litter- and ground-raised birds are exposed to coccidiosis; however, quail will develop immunity to the problem. Whether or not the birds get sick as a result of the exposure is in direct relation to the sanitary condition of the pen.

Where conditions are clean, exposure is usually not overwhelming and birds develop immunity without getting a clinical case of coccidiosis. Unsanitary conditions almost always result in clinical cases which must be treated.

Some feed companies put a drug in the feed to prevent coccidiosis (commonly called a coccidiostat). This approach is good as long as you realize this is not fool-proof assurance of preventing the problem.

The idea is to develop immunity early without a clinical case and without a loss of birds. Whether you are successful in accomplishing this on your farm depends greatly on your sanitation program.

Blackhead (Histomoniasis)

Blackhead is an infectious disease of quail caused by a protozoan parasite, *Histomonas meleagridis*. Mortality due to the disease is often very high with

the greatest losses occurring 10 to 20 days following infection. Quail 3 to 12 weeks old are most susceptible, but infection can occur in adults.

Blackhead organisms are transmitted through fecal material of infected birds and in the eggs of the cecal nematode *(Heterakis gallinarum)*. Free-living organisms do not survive long outside the host, but those carried in cecal worm eggs may survive for months or years.

Infected birds exhibit ruffled feathers, droopiness, and hanging wings and tail. Increased thirst and yellow fecal droppings may accompany these symptoms. In some cases, the skin of the head becomes black.

Control of blackhead depends on effective management. Preventative measures include raising young birds on wire mesh or dry ground and controlling cecal nematodes.

Quail Bronchitis

Quail bronchitis is a contagious viral disease that appears suddenly, spreads rapidly, and is capable of affecting a high percentage of the flock. The virus is spread by direct contact, on airborne particles, and by mechanical carriers. Quail less than 4 weeks of age are more prone to quail bronchitis and are affected more severely than older birds.

Characteristic symptoms include the sudden onset and spread of wheezing, coughing, and sneezing. Birds that recover from quail bronchitis are usually immune to later exposure but may produce fewer and less fertile eggs than unexposed birds.

No specific treatment is available for quail bronchitis. Again, follow good management and sanitation practices to prevent occurrence of the disease.

Capillary Worms *(Capillaria spp.)*

Worms that affect the quail by entering the layers of tissue of the crop are sometimes called crop worms or threadworms. At the diagnostic laboratory they are referred to as capillary worms.

Capillary worms are not usually seen with the unaided eye; however, if you remove the crop from an infected dead bird and tear it, you will see tiny thread-like worms.

Capillary worms accumulate over a period of time and can result in high mortality. They cause a thickening of the crop wall. The birds give the appearance of starvation. In the final stages, they gasp as if they are having difficulty breathing.

There is no commercially available, effective drug for treatment at this time. The problem, however, can be controlled or prevented by following good management practices.

Raise all meat birds on wire. The worm eggs are picked up out of the ground and droppings. Floor- and ground-raised birds are subject to infestation. Prevention is possible by cleaning out sand and litter.

Most growers do not clean thoroughly enough. Eventually, a build-up of the worms results. Wire racks under feeders and waterers 3 to 6 inches off

the ground help birds avoid contact with droppings. Clean out regularly under these racks.

Cannibalism

The most common causes of cannibalism are crowding, lack of feed space, lack of water space, lack of heat, too much heat, and the general cannibalistic nature of wild birds placed in confinement.

Do not underestimate the importance of controlling cannibalism. Not only are birds killed directly, but they are also defeathered, which leads to health problems. It is cheaper to prevent cannibalism than to control it. To prevent cannibalism, follow these guidelines:

- Brood quail chicks in subdued light. Just enough light to find feed and water is all that is necessary. Using red bulbs in the brooder will usually eliminate cannibalism.
- Debeak at 6 weeks of age when the birds are moved to the grow-out pen. Remove one-third of the upper beak. Pecking is worse in the summer than in the winter. Every time you must catch and handle your birds, you risk injuring them.
- Provide enough floor space. Overcrowding promotes not only cannibalism but also the probability of disease outbreak.
- Provide more than enough feed and water space. Place both feed and water so that they are easily accessible to all birds. Feeding a dusty, powdery feed which readily collects on the bird's toes and beak promotes cannibalism.
- Place only uniform-sized birds together.
- Immediately remove dead and injured birds. Several visits a day to the pens will pay off. Watch for beak and toe picking; debeak if a problem exists. Isolate injured birds until they are recovered.
- Be certain each brooder is properly adjusted.
- Place in the pens ripe tomatoes, apples, turnip greens, split stalks of green corn or cane standing on ends or bales of hay. The idea is to keep the birds busy pecking at these so they won't peck at each another. This may not work once cannibalism has started, but it may help prevent its start. Providing cover in the pens is important; a place to hide or get away will help prevent cannibalism. Pine tops or other cover should be distributed evenly throughout the pens.
- When birds must be moved for any reason, move them during the cooler times of day—early morning or late afternoon. Whenever practical, move only during favorable weather conditions. Stress conditions such as heat and unfavorable weather may trigger cannibalism.

Disease Prevention Guidelines

The following general management recommendations can help you prevent disease. Many were noted previously in relation to management but they are worth repeating.

• Do not buy adult stock to add to your flock or to bring in a new bloodline. Instead, buy chicks or eggs. By growing them on your premises, they are exposed to your farm's conditions and problems and develop early immunity.

• Do not buy cheap chicks or eggs. Know the breeder's history if all possible. Isolate purchased chicks from your stock for three weeks.

• Start with clean, disinfected pens and equipment. Clean trough waterers daily (jar waterers at each refill). Clean feeders at least once a week.

• Always be sure that feed and water are not only present but are also easily accessible to the birds. You cannot overdo feed and water availability. Provide several sources of both in each pen.

• Do not crowd birds.

• Do not overstock feed. Feed which must be stored over long periods of time may become moldy. Also, old feed tends to lose some of its nutritional value.

• Provide heat for sick birds. They chill easily and should be supplied with heat for a surer and speedier recovery. Normally, mortality is not as high when heat is provided.

• Isolate young stock from adult breeders. Young birds are highly susceptible to many disease organisms. They become more resistant with age. Adult birds may be a source of infection if young stock are not isolated.

• Care for the youngest birds first and the oldest last.

• After working with sick birds, do not visit healthy birds unless you take a bath, change clothes, and disinfect or change shoes. This may sound extreme, but, if you raise many birds, it will pay off.

• Use only clean, disinfected crates or boxes for transferring quail.

• Remove individual sick and dead birds from the pens daily. Incinerate or properly bury dead birds. Isolate individual sick birds until they recover.

• Keep floor birds in well-drained pens. Standing water is conducive to parasite infestations and diseases.

• Do not allow unwarranted visitation. Curiosity seekers, feed vendors, or drug vendors should be dealt with at your house, office, or by phone—not in the quail pen. For those who must visit—prospective buyers or health and management advisors—provide plastic boots or pans containing disinfectant for their shoes before they enter the pen area.

• Do not keep other species of birds on the premises. Transmission of some problems can occur from one species to another.

• Control rodents, wild birds, flies, and other insects. Your county Extension agent can help you with the best control practices.

You will not prevent all disease problems. However, if you'll read, follow the advice of experienced people, and be willing to keep up with changing times and situations, you'll experience fewer disease problems.

Drugs

Drugs are often misused, overused, and needlessly used. Never attempt to substitute drugs for good management. Use drugs only according to a diagnostician's recommendation for a specific problem.

Those who try to guess their way through a disease problem are likely to find this a costly and drastic approach. Early and accurate diagnosis of a disease, followed by a specific treatment, is essential for a speedy and satisfactory recovery.

Many drugs do not specify quail treatment levels. A diagnostician will be able to advise the best drug and level of treatment for the specific problem at that time.

Continuous medication is not normally recommended. Overuse of certain drugs may cause more losses than the disease problems themselves. Sometimes, no drug is the best treatment.

There are conditions which may justify periodic use of a specific drug for a specific and recurring problem. Periodic use of medication should be done only on the advice of a diagnostician. Usually, management recommendations can be made to prevent constant recurrence of many quail diseases.

Once it is determined that a drug is necessary for the prevention, control, or treatment of a health problem, you must decide the best method of administering that drug. Most available drugs are produced in several forms—injectable, liquid, and water-soluble powder.

The three common methods of administering drugs, along with a few pros and cons of each, are as follows:

Injection. Injection allows an accurate dosage measure and expedites a response to the treatment. Response usually occurs within 24 hours if the drug is effective for the problem. Using this method, however, requires handling each bird. This requires more labor, more time, and likely injury to birds during the catching and handling process. Injection is normally used only in cases of extreme daily mortality where the remaining birds must be saved.

Water. Administering a drug through drinking water is the most practical method. Response to the treatment is usually seen within three to four days. It is very important to follow the drug manufacturer's directions; don't use more than recommended. Also, always consider the environmental conditions when the drug is administered in water. Birds will consume two to three times the volume of water per day at 85°F. and above compared to consumption when the temperature is 75°F. or below. This caution is particularly advisable when using sulfur drugs.

Feed. Drugs may be mixed with feed, but results are slowest by this method—usually five to eight days. When advised by a diagnostician to administer a drug for a longer than normal period, this method is commonly used. Also, it is a method used when treatment is advised but is not an emergency. A few problems many bird raisers face when wanting to use this method include:

- It is often impossible to get the drug mixed unless you produce enough birds to use several tons of feed a week or if you have your own mix mill. Mixing medication in feed with a shovel may not equally distribute the drug throughout the feed—some birds may get too much and others not enough.
- Feed consumption varies since birds eat less in the summer and more in the winter. Also, a sick bird will normally not eat well but will continue to drink. If you can't get the normal amount of feed into the bird, then the bird is not getting the full benefit of the drug.

Maturation

Much of the quail's adult plumage is present by 10 weeks of age, but adult stature is not attained until 15 to 16 weeks of age. You can tell the sex of birds by observing feather patterns and coloration at 12 weeks of age or by looking at the mandible (lower beak) color slightly sooner. Mandibles of males become uniformly black by 8 to 10 weeks old, while those of females are dull yellow or pale.

Handling Quail

Quail are subject to injury at any time during confinement. Injury causes loss of production, and non-salable birds, and often triggers cannibalism. To minimize the risk of injury, provide transfer boxes that have padded ceilings and that are only 6 to 8 inches deep.

Provide plenty of air holes, but be sure they're small enough to eliminate most of the light. This dimness gives the quail a sense of being hidden. Driving quail into transfer boxes is preferred to catching them.

When handling the individual bird, grasp it with its neck between your first and second fingers with your thumb and remaining fingers enclosing the body as much as possible. This method prevents the wings from fluttering and allows the legs to hang free, thus reducing chances of injury (Figure 9).

Never hold quail by a leg, wing, or head and never handle quail unless absolutely necessary.

Figure 9. Care in handling prevents injuries. This hold allows legs to hang free and prevents fluttering.

Releasing Quail

No precise rule or combination of factors govern what, when, and where birds are to be released. Best results are generally achieved by releasing flight-conditioned birds as soon as they attain adult size. Highest recovery rates are experienced when releases are made just prior to and during the shooting season.

No techniques have been devised to duplicate the sportiness of a wild bobwhite quail. The best that can be hoped for is a bird which does not hesitate to fly and which survives long enough after release to contribute to a reasonable recovery rate.

Releases made during the breeding season in an attempt to establish long-term populations are futile. Little can be expected from pen-raised quail as breeders in the wild.

Locating a suitable area for release is one of the more important considerations in releasing quail for sport hunting. Release sites should contain adequate protective cover. Insufficient cover may predispose birds to excessive losses to predators, thereby lowering hunting recovery rates.

Expansive, uniformly thick or brushy release sites may pose different problems but similar consequences. In these areas, coveys are often difficult to locate, reluctant to fly, and, when induced to do so, difficult to shoot.

Contact your county Extension agent and SCS personnel for advice. If you do not have suitable release areas, they can advise you on how to find them.

Once you have a suitable area for release, plan to release early in the morning so the birds will have enough light to become familiar with the area. Usually 15 to 20 birds per covey are released for hunting purposes.

One method of transporting birds to the release area is in a cardboard box. A box 6 to 8 inches deep and 24 inches square will handle about 20 birds. Regardless of what is used for transporting, it should be shallow and have the top padded to prevent the birds from flying up and injuring themselves. Also, it should be covered to keep out light and to keep the birds calm.

Place the transporting container in the cover where birds are to be released. Open one end so only one or two birds at a time can walk out. Do not frighten the birds and cause them to scatter wild; allow the quail to come out voluntarily. Go back later, after the birds are all out, and remove the box.

Fill feeding bins and place at prospective release sites prior to release. Use the same feed in the same feeders as you used before release. This is to give the birds a recognizable form and source of feed.

Although not imperative, watering troughs may be provided during the first two weeks following release. They will provide a readily available source of water while the birds are getting used to their new surroundings. Old tires that are cut in half longitudinally and filled with water serve as excellent watering stations.

Place one call bird near each release site during the first two weeks. Elevate call bird boxes to allow the bird to see the covey at considerable distance. The *call-back* bird will help orient the covey around the feeding/release site and help the birds develop a strong affinity for the release area. Remove the call bird boxes after two weeks and add the call bird to the covey.

Minimize disturbances to newly released coveys during their adjustment period. Following the adjustment period, some shooting preserve managers consider it advantageous to locate the covey with a pointing dog and flush the birds at least once. This reduces the tendency of pen-raised birds to run rather than freeze or hold when approached by a bird dog. Coveys flushed in this manner prior to hunting will simulate more realistically the behavior and flight of native coveys.

Agencies and Organizations

The agencies and organizations listed here can help you with your quail raising project.

Agency Or Organization	Type Of Assistance
Auburn University State Diagnostic Laboratory Auburn University, AL 36849	Quail health problems, management problems.
Alabama Cooperative Extension System Duncan Hall Auburn University, AL 36849	General information, quail literature sources, management advice.
Alabama Department of Conservation and Natural Resources 64 North Union Street Montgomery, Al 36130	Permits and licensing for raising and marketing quail, laws and regulations.
Southeastern Game Bird Breeders Association (contact diagnostic laboratory for address of immediate president and secretary)	Marketing, meet other breeders and producers, advertisement, informative meetings.
County Extension agent	Sources of information, literature and assistance, advice from local level, assistance by state specialists.
Soil Conservation Service (SCS)	Quail habitat, crops, soil types, advice on best release areas.
Agricultural Stabilization Conservation Service (ASCS)	Information regarding payments for wildlife conservation or release.
North American Game Breeders and Shooting Preserve Association, Inc.	Information and assistance from national level.

Every producer of bobwhite quail should subscribe to game bird publications and read available bulletins and publications on the care and management of quail.

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