Flight Quail Production

The Science of Commercially Producing Quality Isolation-Reared Flight Quail
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Acknowledgments

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Special appreciation goes to Bobby Lide, Brent Tucker, Curtis Schoeneman, John Valone and other progressive Texas flight quail producers who, knowingly and at times unknowingly, assisted in the commercial development and evaluation of the many aspects of the isolation flight quail production program and system.

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Ed Kozicky, formerly with the Caesar Kleberg Wildlife Research Institute, the Olin Corporation and the U.S. Fish and Wildlife Service and a longtime nationally recognized authority on bobwhite quail, made the following statement in a presentation, *The History of Quail Management with Comments on Pen Rearing*:

“We in the wildlife profession have abandoned game bird propagation and left the efforts in the hands of good folks in the poultry husbandry, who mostly treat the subject as an unwanted stepchild and do not understand the importance of simulating the sports aspects of wild birds with their pen-reared counterparts.”

In the presentation, Kozicky challenged academia: “The academic community must strive to find ways and means of assuring huntable supplies of bobwhite on an annual basis and help private enterprise produce better and wilder bobwhite in captivity at a reasonable price. The use of pen-reared bobwhite is a fact of life. The challenges are tremendous, but good men and women rise to such challenges, and I have a profound faith that solutions will be found and the sport of quail hunting will continue to epitomize sportsmanship afield.”

The purpose of this publication is to advise potential and current flight quail producers and hunting preserve operators about proven isolation flight-quail production practices and recommendations that will assure satisfactory flush and flight performance of flight-reared quail and improve profitability.

In this publication I explain the Texas A&M University isolation flight-quail production program and farm system, which is the result of my lifetime of accumulated knowledge of nature, birds and other animals, 40-plus years of commercial poultry industry experience, data from extensive long-term quail research and consulting efforts, and suggestions from knowledgeable quail producers in Texas and the Southeast. I hope that my efforts and those in the future by my colleague Lee Cartwright and others will fulfill Kozicky’s charge to the academic community.
Since 1960, bobwhite quail hunting has evolved into a commercial business with a significant economic impact on many landowners and rural communities in the southeastern United States and much of Texas. During this period, native bobwhite quail populations have declined dramatically in or disappeared from native ranges in most of these areas. This is occurring at a time when the recreational land market in Texas is rapidly expanding, fueled in part by an increasingly strong interest in white-tailed deer and bobwhite quail.

Although several regions of Texas still have populations of native bobwhites that can be hunted, statewide populations have declined an average of 4.7 percent annually since 1981. As a result, native quail hunting in Texas has become scarce and expensive – out of reach for the average hunter.

The causes of the decline in native quail are many and may be irreversible. Although many academic, government, and industry efforts have been made to maintain native quail populations through habitat and environmental improvement, they have, with few exceptions, proven expensive and marginally productive. Even with the implementation of the best habitat and quail management practices known, nature cannot support the volume-hunting pressures desired by today’s increasing numbers of recreational rural landowners, leaseholders, and flight-bird hunting clubs.

Any time that the demand for a natural product is greater than the supply, private enterprise will move to fill that demand. As a result, flight-reared quail are now an essential and permanent part of the bobwhite hunting industry. They are produced much more easily, conveniently and cheaply than are native quail. The demand for flight-reared bobwhites has increased significantly and may continue to rise.

Some hunters and wildlife personnel scorn flight-reared bobwhites. However, bobwhites have been farm-produced since the early 1900s. Some authorities believe that quality flight-reared quail are the only salvation for the quail hunting industry.

The demand for flight-reared quail comes from several sectors. Most flight quail are released for hunting within hours or a few days of delivery. Although they are sometimes used to supplement native quail, they are usually the only source of quail on site. Many quail are used to try to reintroduce them in places where natives have declined or disappeared. Field trials also use a sizeable number of quail. Other customers include dog trainers and nonhunters wanting to establish coveys.
Success in the flight quail production industry depends increasingly on quality control. Customers are demanding more quality in their hunting experiences. To guarantee this, the preserve must demand quality quail.

The few producers of top-quality flight quail seldom allow chicks and juveniles under 8 weeks old to see a human figure. When properly handled, these isolation-produced bobwhites approximate the performance of native quail.

Producers must adopt and implement proven practices to produce quality flight birds. Flight-reared bobwhites have been criticized because of the inferior flush and flight performance usually exhibited in the field by conventionally produced bobwhites. But producers who adopt proven isolation brooding and rearing management practices will significantly reduce – even eliminate – this criticism.

The goal of every flight quail producer should be to produce quail that perform much like wild bobs. Producers of flight bobwhites typically believe that their birds flush and fly well. But many producers would be embarrassed if they flight-tested their quail against the isolation-produced flight quail of an increasing number of their competitors. Preserve operators will change suppliers as they gain exposure and consistent access to isolation-produced quail.

Many middle-aged and younger bird hunters have never experienced the challenge of hunting native or quality flight bobwhites. Proven isolation flight-quail production programs and systems can be the key to maintaining and expanding bobwhite quail hunting and making the sport affordable for the average hunting family.
Documented Quail Performance

Shooters and others involved with quail often seem to exaggerate the performance of native quail. To document the actual performance of quail, a study was conducted in the early 1990s on native South Texas bobwhites.

Nick Kassinis, a graduate student at Texas A&M University–Kingsville, compiled comprehensive data that disproves some claimed observations and estimated measurements of quail flight. The results of Kassinis's study in 1992-93 were reported by Fred Guthery, author of *On Bobwhites*.

In measuring 300 flights of native south Texas bobwhites, Kassinis found that the average distance from takeoff to landing was only 47 yards (ranging from 4 to 148 yards). Eighty-eight percent of flights were less than 75 yards. His research also showed that the bobwhite flies at low altitudes. The maximum height observed was 13 yards, and the average maximum height was only 2.4 yards. The birds typically were back on the ground within 4 to 6 seconds after takeoff.

Kassinis found that the average flight speed over the duration of a flight was only 20 mph, with a high of 27 mph. During a phase of some flights, the maximum speed briefly reached 40 mph. Females were slightly slower fliers than males.

Virtually all captive bobwhite quail strains have the genetic ability to flush and fly in a similar manner. However, the field performance of flight quail from different producers varies greatly. That performance can also be damaged easily and quickly by poor handling and mismanagement by the customer.

Consistent, common complaints against pen-reared quail include little to no fear of humans or dogs, poor flush and flight performance and poor feather condition. Stories of hunters and guides chasing non-flushing quail with sassafras or mesquite limbs, retrievers being required to flush quail, and dogs catching quail are all too common. These occurrences give pen-reared birds a bad name and have turned many potential hunters from the sport.

However, if proven isolation production practices are applied along with improved holding practices and attention to other details, it can make the difference between mediocre and good-quality flight quail.
Isolation Brooding and Rearing

The young of many animal species imprint on the first live, nonthreatening object they become accustomed to seeing during the first day or two of life. Once imprinted, a young animal is seldom wary or afraid of the object.

Research shows that bobwhite chicks immediately imprint to the human form if a caretaker spends a short time in the lighted brood room during the first 24 hours after chicks are placed. This early imprinting intensifies with each brief exposure to a human for the next few days and will dramatically affect future flight performance.

Research by this author has documented the initial and lasting effects of brooding and rearing bobwhite chicks in isolation from humans. In one study, about 250 2-day-old chicks were divided between an isolation (black plastic wrapped) brood room and an adjacent open (clear plastic wrapped) brood room. A covered peephole permitted a view of the isolation room and chicks.

For the first 13 days, the isolation room was entered only in darkness with a flashlight. The open room was entered daily by the researcher or a caretaker, and personnel often passed in the aisle.
When the chicks were 14 days old, the isolation room door was quietly opened for a moment with the light on. The chicks panicked, piling against the wall opposite the human figure standing in the doorway. In contrast, chicks in the open room paid little attention when the human stood in their doorway.

These quail were continued under isolation or open room conditions through 7 weeks of age, when both pens were again tested. Quail reactions were virtually identical to the previous observations from Day 14. Both rooms of quail were caught, leg-banded and placed together in an open side flight pen. At least one person walked along the side of the flight pen daily.

At 15 weeks of age, the quail were cooped and moved to a shooting site. Three experienced quail hunters with two experienced dogs tested the quail. No information on the quail was provided to the hunters. The quail were placed in light cover in groups of two to four and hunted. After flushing each series of placements, the hunters scored the quail on performance.

Virtually all of the isolation-reared quail performed satisfactorily. The hunters thought some were trapped natives. Most of the quail that had been exposed to humans in the open brood room scored poorly, even though they had been with the isolated quail for the previous 8 weeks. A few were grouped with isolation quail when placed in the field. These quail usually hesitated when the isolation quail flushed.
Research results

This study found that:
- Isolation brooding and rearing is essential for the production of quality flight quail.
- Brief daily exposure to humans after 7 weeks of age appears to have little or no gentling effect on isolation brooded and reared quail.
- Quail imprinted to the human figure during early life perform poorly in the field, even when placed for a lengthy period with isolation-produced quail.

On-farm visits repeatedly show that the future performance of bobwhite chicks can be projected very accurately at 12 to 14 days of age by following this open-door procedure:
1. Partially open the door of a lighted brood room.
2. Expose the chicks to the human torso.
3. Observe their reaction.

To prevent imprinting during brooding and rearing, some producers have recommended having a caretaker wear the same color of clothing each day or having the same caretaker care for the quail. Others have used muzzled young dogs to chase quail in flight pens or humans shaking sacks to modify behavior. Such practices have seldom proven effective in attaining satisfactory performance behavior in quail.
An increasing number of producers know of the benefits and reputation of isolation-produced quail, and many claim to use the program. However, farm visits and field reports indicate that a high percentage of these producers either do not yet understand the importance of rigidly following isolation procedures on the farm or are unwilling to invest the effort necessary to raise top-quality flight quail.

Current demand and supply of flight quail is such that virtually all quail — regardless of performance quality — sell by season’s end. This situation is likely to change as isolation-produced flight quail begin to dominate the market. Economic survival for many producers may soon depend on improving the quality of the flight birds they produce.
Adult-Chick Imprinting Observation

Several reports indicate that quality flight quail can be produced by rearing small, covey-size groups with an adult and maintaining each group at release. This method is cumbersome and expensive, rendering it commercially unfeasible and not competitive with the Texas A&M mass isolation production system.

However, two Texas A&M studies by the author tested the idea of using adult quail to imprint quail chicks. These studies have yielded results and observations that may stimulate innovative approaches by others in restocking efforts or improving quality flight-quail production.

Study I

Five adults were placed separately in open-sided 10-foot-by-12-foot litter floor brood rooms equipped with infrared heat lamps. They were exposed to 17 hours of day length for 3 weeks. The adults were two recently trapped wild bobs (one male, one female), two pen-reared females and one pen-reared male. Forty to 50 day-old chicks were placed with each adult at the end of the third week of lighting.
At placement, the chicks immediately swarmed the pen-reared adults, which reacted by fluffing their feathers in a brooding manner. Within minutes, the wild bobs came down from the ceiling and in a similar manner joined their chicks. These reactions occurred while the researcher stood quietly in the aisle in plain sight.

After eventually moving their chicks to feed pans and jug waterers, each adult finally moved to its own environmental comfort zone away from the lamps and tried to cover the chicks. That night, outside temperature dropped to 42 degrees F. The chicks were under, on and around each adult. The chicks not in close contact with the adult died of exposure.

The results showed that an adult can initially brood 20 to 25 young chicks. Multiple mortality ceased after the first night. Between 12 and 14 days of age, cannibalism (ripped top beak) occurred without apparent cause in each pen, reducing chick numbers to 8 to 12 per adult. Cannibalism then ceased.

Throughout the 4-week study, the chicks followed their adult's every move and panicked when a human approached a pen. Paternal instinct was such during the first week that the wild male would occasionally attack a human entering its pen.

Study II

A second study was conducted to more closely observe the bonding relationship between adults and day-old, hatchery-produced bobwhite chicks. Supplemental heat was provided and late-spring temperatures were moderate. The study involved 12 pen-reared adults exposed to 17 hours of day length for 3 weeks and about 600 chicks. The distribution was one to three adult cocks or hens and 30 to 150 chicks per open brood room.

The reaction between chicks and adults was like that in Study I. All of the adults immediately interacted with the chicks. Some appeared to act as pairs, but most acted independently to attract and hold varying numbers of chicks.

As in Study I, the chicks followed their adult's every move and within hours would panic when a human entered or closely approached the room. The chicks remained afraid of humans throughout the 5 weeks they remained in the brood rooms.

The chicks covedied and closely followed their adult cock or hen until about 4 weeks old. Then the bond between the two appeared to weaken, and the chicks became more independent.

Throughout this study, mortality was very low in each group, indicating that the chicks may have benefited from the adults' presence. No cannibalism among chicks was observed. At least three nests were built during the brooding period.

During the first 3 to 7 days, some adult males tried to steal chicks from other adults, even while being followed by 30 or more chicks. When two
males were in the same room, they fought — often viciously — and the victorious cock tried to keep the defeated one from the chicks by chasing and attacking it whenever it approached. The paternal instinct was such that during the first 2 weeks, several adults of both sexes would occasionally attack by pecking or flying at a human entering a pen or trying to catch chicks.

At 5 weeks, the birds were moved from the brood rooms and placed in flight pens as part of an environmental study. A cold rain killed some unprotected chicks the first night in the flight pens. Once the quail entered the flight pen, an adult-chick relationship could not be definitely identified.

The remaining chicks were used at 6 and 8 weeks of age in a restocking study on 2-year clear-cut pine timberland. The young quail continued to remain wild when a human approached them in the flight pens and on the release land. Chicks released at 6 weeks flushed and flew like native quail 13 days after release.

In conjunction with Study II, four light-conditioned adult quail were also placed in a brood room with 200 12-day-old chicks. Panic and turmoil occurred in both the adults and chicks. The adults were removed after 1 hour when it became evident that immediate bonding would not occur at that age. Longer exposure may eventually create some degree of bonding between the older chicks and adults. However, the breakdown in bonding exhibited around the fourth week of Study II may not make the effort worthwhile.

Conclusions

Producers interested in imprinting chicks to adults should experiment with the chick-adult relationship on a limited basis. The adults should probably be conditioned to 17 hours of daylight for 3 weeks before the chicks are placed. Expand the bird numbers per treatment as knowledge and experience allows. If the weather is cool, use warm-room brooding. Rain or cold weather increases mortality in quail moved to flight pens before 8 weeks of age.

It may be advantageous to imprint chicks to wild adults; this practice should be studied further if state wildlife departments allow trapping of the adults.

Contrary to some reports and opinions, released quail will immediately eat some natural foods. The 5-week-old quail and accompanying adults were observed eating grass sprouts, young clover, leaves and scattered white milo within minutes of being placed in flight pens. None of the quail had ever been on green vegetation or seen milo grain.
TAMU Isolation Quail Farm Design

The author has worked extensively with producers to develop and implement farm designs that improve the quality of flight quail. The designs also lower production costs significantly below that of conventional systems.

The flight quail farm Design A (See page 14.) permits quail to be easily moved from the brood room to the brood-grow pen and flight pen without human exposure before 8 weeks old. This design has been proven commercially and can be used by new and expanding flight quail producers.

Quail are untouched by humans until sold unless quail pox vaccination is required. When necessary, the quail can be readily caught and vaccinated when being moved to brood-grow or flight pens at 4 or 8 weeks old.

In the brooding barn, a work aisle runs the length of the building along one side. The brood rooms are aligned in a row and open via inside doors into the work aisle. The outer wall door of each brood room opens into an attached brood-grow pen, which consists of a shed shelter and a fenced, net-covered pen.

The brood-grow pens in turn open via gates into a transfer lane running parallel to the row of pens. Flight pens with gates opening into the transfer lane are attached to the transfer lane on the side opposite the brood-grow pens and are aligned at a right angle to the lane. Shed shelters and feeders are aligned in flight pens on the end opposite the gates.

The brood room doors along the work aisle are equipped with one-way viewing windows so workers can check the chicks without entering the pen. Viewing of quail in brood-grow and flight pens is made possible by peep sites along each side of the transfer lane.

To make it easy to move flocks, the brood-grow and flight pen gates fit the width and height of the transfer lane.

This configuration makes it easy to observe the chicks and virtually eliminates imprinting and labor when moving quail from the brood rooms to the brood-grow pens (at 4 weeks) and from brood-grow pens to designated flight pens (at 8 weeks).

The benefits of Design A are that it:
- Is simple and uncomplicated
- Is easily implemented and can be readily expanded
- Efficiently uses land, construction materials and equipment
- Minimizes imprinting, labor requirements and mistakes
- Maximizes the use of mechanical feeders and waterers

One-way brood room observation windows are essential in the production of quality isolation-produced flight quail.
To prevent imprinting, the brood rooms and brood-grow pens must be entered only in darkness. Use a headlamp to remove mortality and to adjust and repair equipment.

Texas A&M University research shows that brief daily exposure to a human has minimal gentling effect on isolation-produced quail past 7 to 8 weeks old. At that time, the flight pens can be entered during daylight to maintain equipment and to prevent botulism by removing dead birds daily.

To prevent exposure to humans and dogs, maintain barrier curtains on the outside perimeter fencing of brood-grow pen and flight pen areas. Install curtains also on the brood-grow and flight pen fencing and gates facing the transfer lane.

At hauling time, flight quail can be caught in the flight pen with a net or a funnel and catch cages. Or they can be driven from the flight pen into the transfer lane then into a catch house at the end of the lane. (See Chapter 13, Capture and Delivery.)

When coordinated with other recommended isolation production practices, Design A farm facilities can consistently produce quality quail with the desired flush and flight performance characteristics.

A larger scale isolation flight-quail facility can be built using Design B (See page 14.). In this design, the work aisle is placed in the center of the building and the brood rooms, brood-grow pens, transfer lane and flight pens are replicated on each side of the building. The transfer lanes and flight pens can be extended as needed. All of the operational features are the same as in Design A.

In some areas, the Texas A&M University farm design can be used to convert older or inactive broiler or turkey barns to isolation flight-quail production facilities. These structures have built-up dirt floors with 8-foot sidewalls and are generally 32 to 40 feet wide and 300 to 500 feet long.
To prepare for the quail:

1. Sanitize the barn interior thoroughly. Darkling beetles and larvae must be eradicated, as should birds, rodents and other mammals. Then high-pressure wash the walls and ceiling thoroughly.

2. After washing, remove any manure and the top 3 inches of dirt pad, including that along wall foundations, posts and the entrance area where litter has spilled. Spray the walls, ceilings and floor with a coal tar distillate disinfectant labeled for use in poultry houses.

3. Then add 3 to 6 inches of uncontaminated soil to the floor and entrance area.

4. Make sure that the outside drainage is effective and seepage is not a problem. A concrete pad for brood pens and the shed area of brood-grow pens is a must for darkling beetle control.

Brood rooms, brood-grow pens and flight pens can be built easily within a converted barn. However, it may be more economical to extend the fenced portion of brood-grow pens and flight pens from the sides of the barn if space and terrain permit.

This outdoor option will also produce better quality flight quail. If flight quail are maintained in outdoor flight pens and misted or sprinkled 3 to 5 times per week in good weather, they will be weather conditioned, have better feather quality and exhibit superior field performance over quail maintained indoors.

In all cases, livestock must be fenced from an isolation flight quail farm to prevent broken gas lines, freed quail and damage to quail pen fencing, feed line equipment and brooders. Cattle, horses, goats, sheep and other animals are attracted to feed and will gain access to it if effective barrier fencing is not built and maintained.
Every producer of quality isolation-reared flight quail must be concerned with flock health and preventive medicine. An outbreak of ulcerative enteritis, blackhead, *Capillaria*, botulism or any of a number of other diseases and parasites or a nutritional or management health problem can destroy the best of plans.

Preventive medicine for flight quail operations includes:
- Buying quality, disease-free chicks from National Poultry Improvement Plan breeder flocks and hatcheries
- Thorough sanitation and management practices
- Quality diagnostic work
- Proper and timely medication
- Effective pest control
- Adequate nutrition

Health problems are caused by parasites, infectious organisms; environmental, managerial and nutritional stresses; and combinations of these factors. When the causes are inter-twined, diagnosis, treatment and prevention become complicated.

The producer should keep current, detailed accounts of each production unit. Of particular interest are disease symptoms, treatment response, mortality and performance.

Keep yearly records pertaining to performance and health, including the dates and ages at diagnosis, diagnostic comments, treatment recommendations and responses and mortality. These records enable producers and diagnosticians to predict health problems and initiate effective preventive measures.

Most intestinal diseases and internal parasites can be minimized in production facilities by following effective rodent and fly control practices and keeping fresh pans of footwear disinfectant at the entrance of the brood barn.
A controlled entrance to an isolation production farm. Keep out unwanted visitors and maintain a footwear disinfection program at the entrance.

and transfer lane. To ensure effectiveness, the disinfectant must be used by everyone and renewed as directed on the product label.

Do not permit a backyard flock or pet or exotic fowl on a flight quail farm. Workers must not have fowl at home. Limit visitors, and do not allow them inside production enclosures. All visitors should disinfect their footwear and wear disposable boots on the farm.

It is essential that a new flight-quail producer develop a working relationship with an experienced, competent flightbird disease diagnostician. Together, the producer and diagnostician can develop and maintain a farm health program designed to prevent or control disease and parasite problems.

The program should be reviewed every year and every time a health problem arises. The diagnostician is an essential factor in a quail farm’s success. The goal of the producer and diagnostician should be a mortality of less than 10 percent.

Texas producers can use the services of poultry and gamebird diagnosticians at area laboratories of the Texas Veterinary Medical Diagnostic Laboratory. (See Suggested References and Sources of Assistance.) Similar services are available in other states.

To detect management and health problems in quail, producers must carefully observe each quail unit every day. They must also become adept at spotting sick and dead quail and recognizing abnormalities. Seek diagnostic assistance and current treatment recommendations promptly when an unfamiliar health symptom appears or when the quail do not respond to treatment.

On the following pages are brief summaries of the more common infectious diseases, toxins and parasites. For detailed material on these and other health problems, refer to Grower’s Reference on Gamebird Health. (See Suggested References and Sources of Assistance.)

Dense vegetation in flight and holding pens is conducive to botulism and heavy mortality. The caretaker must be able to spot and remove dead quail easily.
# Common infectious diseases, toxins and parasites of quail

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<td><strong>Botulism</strong> — Caused by the consumption of decaying organic material containing a neurotoxin produced by <em>C. botulinum</em>.</td>
<td>Toxin is ingested when quail eat dead birds, maggots, spoiled feed or wilted vegetation. Legs and wings become paralyzed, then the neck. Death typically follows within 12 to 24 hours.</td>
<td>No practical treatment.</td>
<td>Botulism is an indication of poor farm management or supervision. Promptly remove mortality daily. Prevent spoiled or wet feeds. Eliminate the dangerous practice of maintaining dense or low-lying vegetation in flight pens. Properly supervise workers on spilled feed and dead bird removal. Acidifying pen soil is also beneficial.</td>
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**Coccidiosis** — A common intestinal disease that usually affects quail at 3 to 5 weeks old — earlier if brooded on used litter. |

Unsanitary conditions, wet litter, contaminated footwear, flies and rodents have been implicated. Quail are unthrifty and have soiled vent feathers, a watery or blood tinged diarrhea and loose blood in the intestines. Mortality can be high if not treated promptly. A variety of anticoccidial drugs are available. Amprolium in the water usually works quickly and quite effectively. After an outbreak and treatment, most quail develop an immunity to the disease. Add a coccidicostat to the starter feed. Maintain good litter management and sanitation practices. Control flies and rodents. |

**Histomoniasis (blackhead)** — Can be a chronic problem in quail. |

Droppings from free-flying birds are a factor. Disease is transmitted in eggs of the cecal worm. Earthworms and possibly other soil invertebrates consume the droppings from infected birds and become carriers. Quail are sickly and emaciated. They usually have yellow droppings and a swollen cecum containing cheesy material. Prescription drugs are available. A diagnostician must be involved in the prevention and treatment of this disease. A worming program and strict sanitation will help. Soil acidification may help reduce the incidence of earthworms. |
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<td><strong>Internal parasites</strong> – The most common internal parasites on flight quail farms are ascarid and <em>Capillaria</em> worms.</td>
<td><em>Capillaria</em>: quail are emaciated and tend to huddle in isolated areas of the flight pen before dying. The crop is typically thickened and contains considerable mucus. <em>Capillaria</em> infesting the crop wall are threadlike and virtually invisible to the naked eye. Ascarid: unthriftness, depressed growth and increased susceptibility to infectious diseases.</td>
<td><em>Capillaria</em> treatment and control should be carried out under the direction of a qualified pathologist. The ascarid can usually be readily controlled with a worming program and a rigid program of farm sanitation and fly and rodent control.</td>
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<tr>
<td>The earthworm is the common intermediate host for the most common species of <em>Capillaria</em>. Ascarid eggs may contaminate litter or pens. They can be spread by mechanical means – via footwear, equipment, rodents and insects.</td>
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<td><strong>Mycotoxicosis</strong> – Arises from eating toxic material in the feed. It has a cumulative effect on animals and affects disease resistance, growth and performance.</td>
<td>Variable, but can include bruising, unthriftness, depressed growth, increased mortality and mouth and foot lesions. Remove contaminated feed. Provide vitamins in the water. Use a mill that routinely tests all incoming grain for mycotoxins. Clean and then disinfect the feed bins with bleach.</td>
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<td>Quail eat feed contaminated by molds that are often found on corn and other grains. Many feed mills – particularly small, local mills – fail to test grain and other ingredients for mycotoxins.</td>
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<td><strong>Mycoplasma gallisepticum</strong> (<em>Mg</em>) – A respiratory disease common to many species of fowl.</td>
<td>Respiratory problems, watery eyes, nasal discharge and an unthrifty appearance. Mortality depends on stress, and complications and can vary from light to heavy.</td>
<td>Buy Mg-free chicks, strictly control visitors and employees and maintain rigid farm and equipment sanitation and cleanup. Some National Poultry Improvement Plan quail breeder flocks and hatcheries are infected with Mg. Buy eggs and chicks from National Poultry Improvement Plan flocks or hatcheries that hold a “U.S.M. Gallisepticum Clean” certification.</td>
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<td><strong>Quail bronchitis</strong> – A highly infectious viral disease primarily affecting young quail.</td>
<td>Spreads rapidly among age groups.</td>
<td>Sudden onset of sneezing and coughing and severe dehydration. Mortality can be high.</td>
<td>Although there is no basic treatment, some quail have responded to certain antibiotics. Keep infected quail comfortable, well fed and watered. Prevent additional stress. In hot weather, increased ventilation may help.</td>
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**Quail pox** – A viral disease that is most prevalent in the fall and early winter of wet years. | Spread by mosquitoes. | In the “dry form,” appears as small “wart like” nodules on unfeathered areas. The more serious “wet form” affects the mouth and throat and can cause respiratory stress and high mortality. | Can be controlled by vaccination. Producers usually do not vaccinate unless pox is common to the area. Then it may be necessary to vaccinate all quail units every year. | In isolation production programs, quail can be caught and vaccinated at 4 or 8 weeks old during movement from the brood room or brood-grown pen. Eliminate or treat mosquito breeding sites. |

**Ulcerative enteritis** – A highly contagious bacterial infection that has forced many southeastern quail producers to install wire floors in the flight pens. Juveniles from 4 to 12 weeks old are most commonly affected. | Spread by contact with droppings of infected birds by rodents and flies and with contaminated soil, footwear and equipment. | Quail become emaciated and sickly and develop distinctive white or yellow-white lesions in the intestine. Mortality is high. | Certain antibiotics have shown some effectiveness in treating ulcerative enteritis. | Avoid stress. The disease is thought to be triggered by histomoniasis (blackhead). Treatment for histomoniasis may reduce the incidence of ulcerative enteritis. Bacitracin in the feed can help prevent ulcerative enteritis. Other: strict sanitation and cleanup, fly and rodent control, and acidifying soil in pens. See the farm diagnostician for prescribed treatment measures and help in preventing this disease. |
Producing isolation-reared flight quail commercially requires the same sound practices of any successful small business. It requires intense physical and mental work, hands-on management and close supervision of employees. Familiarity and too much trust can result in lax effort and a business disaster. Absentee or "arms-length" management will guarantee failure.

Prospective producers usually have a high level of enthusiasm but limited business knowledge and skills and very limited knowledge about isolation flight-quail production. The requirements for a commercial-size isolation flight-quail farm are much different and more complex than for small or hobby operations.

For the best chances of success, prospective producers should temper their enthusiasm with a realistic business approach. Financial needs, including required personal income, operating capital and mortgage obligations, are often underestimated.

Realistically examine the market potential and your market development assessment strategies. Get help from a competent certified public accountant and banker during the planning process. Like other businesses, the success of a quail farm depends on keeping adequate and accurate production and financial records.

A modern automated inline bobwhite cage breeder system for volume production of eggs and healthy, high-quality bobwhite chicks.
The interests of your spouse and other family members are important. Older individuals should consider: How marketable is the enterprise? Who can operate the business if the owner dies, is incapacitated or eventually wants to retire?

Get help in planning, predevelopment and construction from knowledgeable flight-bird-rearing professionals at a state land grant university, reputable commercial flight bird producers and hatcheries and commercial poultry housing and equipment experts. Certain industry publications (see Suggested References and Sources of Assistance) can also provide some helpful information.

If producers do not conduct thorough research, they may buy or build inefficient and outmoded facilities or equipment or adopt inefficient practices recommended by an enthusiastic hobbyist or a small, marginally successful “pro.”

Some problems to avoid:

- Do not overbuild, which can be expensive and unnecessary.
- Turnkey construction by a contractor can also be excessively expensive. Request bids. Look for bargain volume buys in quality material. Consider acting as your own contractor.
- Many prospective producers initially want to develop breeders and a hatchery in addition to the flight bird operation. However, it is always more practical and economical for beginners to buy day-old chicks from a reputable National Poultry Improvement Plan hatchery.
- Most commercial producers find that egg and chick production requirements conflict with the flight bird enterprise and decide to leave that to professional hatcheries. Only a few large, established producers eventually establish a hatchery and purchase eggs or integrate breeders into their business.
- Similarly, most producers who try to operate both a flight-quail farm and a hunting preserve have found that resulting conflicts and requirements make the effort difficult and inflexible.
- Do not – under any condition – bring any kind of fowl, chicks or eggs from hobby or small operations onto a farm premise. Try to discourage wild birds from entering the farm. Parasites and diseases are commonly spread by a variety of normal-appearing carrier birds.

Once on a farm, all diseases and parasites are expensive to eliminate. Some are difficult or impossible to eradicate. If other species of flight birds are produced, keep them separate from quail. Be sure that they originate from an NPIP hatchery.

A primary consideration in each phase of planning, development and
operation should be the ease and efficiency of implementing isolation brooding and rearing practices. Locate and build the facilities to optimize the effects of isolation practices and to increase the operational efficiencies for labor, bird transfer, feeding, miscellaneous equipment and utilities.

Many producers do not give adequate consideration to site location, area and topography, future farm expansion and waste disposal. It is extremely important to select proper housing and pen location, design and construction, and equipment so that construction and maintenance costs and labor requirements can be minimized and bird quality and performance maximized.

Farm site selection is critical. The site must have enough well-drained acreage (20 acres minimum) for projected expansion, and for buffer protection from neighbors and future encroachment by others. A well-drained, sandy soil is preferred over blackland or other high-pH soil types for flight pens. The land should be above a 100-year flood plain and drain well. It must have access to electricity and a dependable potable water supply and be on an all-weather road.

Before any purchase, check for civil, legal or governmental restrictions. Do not build facilities within 300 feet of a home. No commercial or backyard fowl should be located within a quarter mile.

Applicable farm facilities must be easily accessible to bulk feed, LP gas carriers and bird-hauling equipment, but located to minimize farm access and accompanying mechanical transfer of diseases and parasites. Trees and brush that can shade or be left in isolation production flight pens can be a plus.

Successful flight quail producers often expand from an initial 10,000 to 20,000 capacity to production of 40,000, 60,000 or 100,000 or more quail per year. Plan the initial farm design and construction so that the facilities can be expanded at minimum cost and in a manner to maximize operational efficiencies. This includes linear extension of the foundation and barn, rows of brood rooms, brood-grow and flight pens, transfer lane and accompanying utility and feeder lines. Install utility equipment and lines that can handle triple the initial farm capacity requirements.

Quail space requirements are six to eight chicks per square foot in brood rooms through 4 weeks, three birds per square foot through 8 weeks in the brood-grow pens and a maximum of one quail per square foot in flight pens.

For operational and management efficiency, the individual brood rooms, brood-grow pens and flight pens should be sized to hold the same number of quail. This quail production unit simplifies planning and eliminates mixing of age and different brood and flight groups, etc., which can lead to health, quality and cannibalism problems.

Producers of top-quality isolation-reared quail suggest that a unit size should be between 1,000 and 2,500 quail. Problems multiply when the farm unit size exceeds 2,500.

The disposal of mortality and other waste is critical and must be handled in accordance with federal and state regulations.
To remove darkling beetles from the premises, haul manure and litter immediately from the farm area as the brood rooms are cleaned. Manure can be spread on land if water pollution regulations and landowner requirements are met.

There are several disposal options for the remaining waste: public landfills, licensed trash haulers, incineration and composting. Most states, including Texas, prohibit the burial of mortality and its placement in disposal pits or use as feed to food animals. All states prohibit the dumping of dead poultry. A few producers dispose of dead birds by feeding them to alligators.

Incinerators are expensive to buy and operate and must meet strict environmental regulations on smoke and odor.

Commercial poultry producers increasingly use composters to dispose of mortality. Properly composted mortality can be spread like manure. Information on composter construction and operation is available from the local USDA Natural Resources Conservation office. Composters to handle quail mortality can be built on a much smaller scale but operated in a similar manner.
Marketing Quality Flight Quail

New isolation flight-quail producers must make a strong effort initially to market their product and stress the improved performance of isolation-produced flight quail. The first year, initial sales may not come until late in the season when quail become scarce or buyers become disenchanted with quail from other producers.

Most new producers increase production over a 2- to 4-year period to meet expanding and projected market demand. Quail unit placements of chicks must be coordinated with realistic market projections for the farm's flight quail.

It is seldom practical to raise large numbers of flight quail on a speculative basis. Underpricing competitors can create hard feelings and cause future marketing problems. Set the price of the quail appropriately with that of your competitors. As the season progresses, increase the price to cover the increased risk and additional feed cost incurred with late-season quail.

In all advertising, emphasize that the flight quail are produced under a strict isolation program that improves performance in the field. Standard marketing efforts include:

- Placing permanent advertising on the Internet and in select trade publications. In the first year, periodic seasonal advertising in the sports sections of regional newspapers may have merit.
- Compiling a mailing list of potential customers and developing pamphlets, cards, etc., for mailings and handouts. State wildlife departments have a list of licensed hunting operations, which can usually be obtained for a nominal fee.
- Joining and actively participating in appropriate industry organizations, conventions and field days, etc.
- Making personal visits and calls to potential customers. Personally invite potential customers to visit the isolation flight quail production facility if it is attractive. When visitors arrive, be certain to stress biosecurity and use footbath disinfectant and disposable plastic footbaths.
- When the isolation flight quail are ready and tested, carrying a few quail on visits to allow potential customers to observe the isolation flight bird performance in the field. The producer in turn has an opportunity to observe the potential customer's practices, learn some of his or her concerns, problems and needs and initiate producer-customer friendships.

It is usually safer to do business with five or more significant customers than to depend on one or two. Charge for delivery, particularly on long hauls. Sell
only quality quail. Always send a thank-you note immediately after a sale.

Satisfied customers are always the best and cheapest route to new business. As business progresses, ask for customer comments and permission to quote them in advertising. If the customer isn't willing to boast about the product and service received, there is a chance of losing that customer to a competitor.

Never deliver poor-quality birds to customers, regardless of the urgency of their needs. It is better to pass up a sale than to damage a reputation. Poor-quality quail include poor fliers, and unthrifty, poorly feathered, bobtailed or small, immature quail. Such quail can usually be discounted to a broker who will move the unidentified quail to bargain hunters.

Customers eventually spread the word on quality quail performance in conversations with their competitor colleagues. They will also immediately talk about producers of poor-quality flight quail.

At delivery, inform the customer about the condition and quality of the quail. Ask the customer to inspect the quail for quality and health. When appropriate, provide suggestions on care and handling.

Make certain that the customer always receives the number of quail ordered and paid for. Offer to deliver at cost the feed the birds are consuming. If a repeat sale does not occur within a reasonable time, call to find out why.

Require full payment at delivery unless the customer is known to be trustworthy. Requiring partial payment before placing chicks is a very effective way of cutting losses when dealing with unproven customers. This practice can also reduce the requirements for operating capital.

Be hesitant to place a large number of speculative chicks based on the request or suggestion of an unproven or suspect customer. There are deadbeats, crooks and slow payers in every industry. Friendly competitors will usually identify those folks when properly asked.

At season's end, visit or call each customer. Discuss the season and the performance of the quail. Ask for orders for the coming season and a down payment to secure chick placement. Make follow-up contacts at appropriate times.

Yearly and multi-year records on potential customers and proven customers can be of real value. Information should include:

- Names and data on family members, employees, favorite dogs and important hunting guests, etc.
- Number of quail ordered in the past, specific order and delivery dates and promptness in paying.
- Special hunts, field trials, promotions, etc., scheduled or held.
- The conditions of the holding pens, length of holding periods, observed bird treatment and any other relevant practices.
- Complaints (or compliments) regarding producer or competitor quail.
- Problems mentioned or discussed relating to the business.

Remember: Retaining an existing customer is much easier and cheaper than recruiting a new one.
Construction Suggestions

Construction costs and barn and shed construction and fencing can vary significantly among isolation flight-quail farms. The choice of building materials depends on cost, availability, structural strength, life expectancy, ease in handling, previous experience and personal preference.

However, certain basics are involved in any construction effort:
- The isolation production program and farm design must remain incorporated.
- Each time a significant change is considered, producers should review their business planning and development recommendations and decisions.
- The site and pens must drain well, and the structures should be built on a raised pad.

Quail space

Bird space is critical for production of isolation-reared quail. Use the quail production unit (number of quail per group) for an isolation flight-quail farm to coordinate the size and number of brood rooms and brood-grow and flight pens.

Quail require a minimum amount of space in each area:
- In the brood room, six to eight chicks per square foot
- In the brood-grow pen, three chicks per square foot
- In the flight pen, one quail per square foot

A 2,000-quail production unit requires 300 square feet of brood room, at least 600 square feet of brood-grow pen including 300 square feet plus of shed and 2,000-plus square feet of flight pen and shelter.

Portable shelters can be used in the flight pen to supplement the permanent shed. Quail performance may improve if the flight pen space is increased to 1.3 to 1.5 square feet per bird.

Foundation and floor

Use reinforced concrete for structure foundations. Brood room and work aisle floors should be concrete. To minimize darkling beetle problems, the undershed portion of brood-grow pens should be concrete. It should also be elevated slightly above the yard area to ease drainage.

To prevent seepage and flooding, build the flight pen feeding and shelter shed on an elevated soil pad.
Framing and walls

The framing can be wood or metal. The brood room wall height should be 8 to 9 feet. The outer wall siding is usually metal. Inside walls are plywood or particleboard.

Roof

Typical barn structures have a sheet-metal gable roof with a 1:4 or 1:3 pitch and enough overhang to provide shade and protect against heavy rains. Most brood rooms have ceilings. Install adjustable exhaust vents along the peak of the barn roof.

Sheds

Sheds for brood-grow and flight pens are usually a continuous structure covering a section of each pen. The brood-grow pen shed should slope sufficiently to move water from the barn and shed usually to a gutter to keep runoff out of pens.

To accommodate workers, the gutter or edge of the shed should be a minimum of 6.5 feet high. The flight pen shed should slope to move water to the backside, away from the pens.

The portable shelters for flight pens can be built of lumber, plywood and 1/2" by 1 inch welded wire or other materials. A transfer lane shed is optional.

Insulation

Roof or ceiling insulation is necessary in brood rooms and desirable in brood-grow and flight sheds. Insulation in the outer walls of barn and brood
rooms improves heating efficiency. Wall insulation within 3 feet of the floor must be protected from the quail. An R-value of 6-8 is considered sufficient for Texas conditions.

Lanes, aisles and gates

The barn work aisle can be 6 to 8 feet wide. A 6-foot transfer lane is adequate to permit movement of quail and equipment such as a tiller or a small garden tractor with a trailer. The surface of the transfer lane can be soil, concrete, asphalt or crushed rock.

Gates should be placed at each end of the lane for convenience. Brood-grow and flight pen gates should open into the transfer lane and be the same width as the lane to permit effective movement of quail.

Pens

To maintain quail isolation, a barrier curtain must cover the perimeter fencing of brood-grow and flight pens. Curtains should also be installed on brood-grow and flight pen fencing and gates facing the transfer lane.

Quail can be more easily managed, moved and caught if the brood-grow and flight pens are no wider than 20 feet. Some producers prefer 12- or 15-foot widths. Pens wider than 12 feet require center pole supports for top netting. For quail performance and farm efficiency, the flight pens should be at least 100 feet, preferably longer.

Place feeders and waterers at opposite ends of brood-grow and flight pens to encourage exercise and distribution of quail. Waterers should be near the transfer lane. Feeders and the auger line should be in the shed shelter at the opposite end.
Brood-grow and flight pen fences should be at least 8 feet tall to stimulate flight efforts and permit work in the pens. Research on 300 flights of native bobwhites found that the average maximum height reached was only 2.4 yards, or slightly over 7 feet. However, producer debate strongly suggests that flight performance will benefit from higher fences and cover netting.

Fencing
Post selection varies. Used oilfield tubing or pipe is reasonably priced and makes great fence posts. Protect the top netting by covering the post ends with pieces of inner tube or tire. It may be necessary to brace the posts or set alternate and corner posts in concrete to prevent the fencing from leaning or collapsing from weight stress and tightness of top netting.

Build perimeter fencing to last. Use 1- by 2-inch plastic-coated welded wire for the base fencing and bury an L-shaped portion 1 foot deep to detour burrowing animals.

Uncoated wire deteriorates rapidly. Plastic-coated 6- or 7-foot, heavy-gauge, 1-inch wire is ideal for the perimeter fence. Interior fences can be built of lighter, less expensive material and attached at ground level to a stretched and anchored wire, cable or buried welded wire.

Use quality heavy-duty 1-inch netting to cover pens.
To help detour snakes, use single-galvanized sheet metal or fiberglass sheets with the ends connected and placed at the base of the fence. Most predators and livestock will be turned from the fence by properly placed strands of electrically charged fencing.

To prevent injuries to flying quail, the rear walls of flight pen sheds should be solid or a barrier curtain, burlap or colored plastic strips attached to rear fencing.

Plumbing
Size the main lines for future expansion. Install a valve for each waterer connection. Filters must be a part of main lines. Washing machine hoses are ideal for hooking up nipple waterer systems.

Medication- and vitamin-dispenser connections must be incorporated in the plumbing scheme. To prevent the dispensers and waterers from clogging, install filters in the lines leading to and from the dispensers.

Install a sprinkler or misting system in each flight pen to use in conditioning quail.

Be certain that the farm water-storage tank can hold enough water for at least 3 days of use in case of an emergency.

Lighting
Although screw-in florescent lights are more economical (longer life and less power) than incandescent, both are effective. Light is needed at times in all structures, including the flight pen feed and shelter shed. Wire cage protectors should cover each light fixture to minimize breakage by flying quail.
Other

Establish shallow drainage ditches in pens where necessary to move rainfall and minimize erosion. Maintain a sand supply to fill low areas in pens and build up soil under sheds.

Leave as much natural cover (trees and brush) as feasible for flight pens. Trim or remove it according to operational needs.
Production Equipment

Production equipment for an isolation flight-quail operation includes:
- Brooders for brood rooms and brood-grow pens
- Exhaust fans and air intakes in brood rooms
- Feeding equipment and nipple waterers in brood rooms and brood-grow and flight pens

When choosing equipment, take into consideration the isolation production requirements; operator preference, knowledge and skills; available funds; initial operating size; expansion plans; recommendations; and labor availability.

For more information, contact equipment sales companies and service personnel, successful commercial flight quail producers, knowledgeable hatchery managers and some university personnel.

Brooders

The fuel of choice is LP or natural gas because it is usually cheaper and more dependable in severe weather than electricity.

Two types of brooding systems are available:
- Warm-room brooding heats an entire room to a fairly uniform temperature and is effective in well-insulated brood rooms.
- Cool-room brooding uses cool-room-type brooders that heat the lower portion of a room. Cool-room brooders include conventional hoover, catalytic, pancake and infrared units.

Most commercial producers use the cool-room system. It is easier to regulate temperature with this system and the chicks can easily find their given comfort zone.

Attractant lighting is needed at heating units. Units under brood-grow pen sheds must be shielded to protect pilot lights from wind. To prevent crowding and smothering in cold or rainy weather, there must be enough brood space under the brood-grow sheds.

Ventilation

Effective ventilation ensures adequate air exchange and removes ammonia and moisture from brood rooms. To provide adequate airflow in the brood room, install a negative pressure ventilation system consisting of a small variable speed exhaust fan mounted midway in the outside wall and narrow adjustable air intake slots along the upper portion of the aisle wall opposite the fan.
Fan and temperature controls can be installed at a reasonable cost. Due diligence must be used with any automated or mechanical system. The chicks must be watched closely to make sure they are comfortable, regardless of control settings.

During extremely hot weather, the chicks may need additional ventilation, even cooling. This can be accomplished by increasing the fan speed and opening intake slots. Some farm situations may require that a negative pressure evaporative cooling system be installed in the outside work aisle wall and the cooled air from the work aisle be drawn into the brood rooms.

Feeding

In brood rooms, isolation-produced quail are generally fed from standard plastic feed lids and cylinder and pan-type feeders. Some small producers hand-feed by funneling feed through aisle wall-mounted PVC pipe angled to feeders.

Most producers find it more convenient to install an auger equipped with drop tubes to distribute feed to feeders. In most auger systems, drop tubes in empty rooms and pens can be sealed.

Four or five feeders should be provided per 1,000 chicks. In addition, place six standard-size feed lids per 1,000 chicks around the brooding unit and leave them for 10 to 14 days. Heap finely ground starter feed on each lid and fill the feeders. Empty the chick boxes on or near the lids and leave the brood room. The lead chicks will immediately find the feed and stimulate others to begin eating. Within 24 hours, the other chicks will also have found the feeders. Refill the feed lids in darkness and refill the feeders as needed.

Fill the feeders in brood-grow pens by hand at night or as needed if they are equipped with an auger and drop tubes.

The feed for the quail in the flight pens is supplied via auger and drop tubes to feeders.

The number of quail per feeder pan (12 to 15 inches in diameter) recommended by producers varies from 200 to 280 birds in brood room and brood-grow and flight pens. Quail do well within this range if the feeders are filled often.

Like larger animals, quail can create a depression around the flight pen feeders that are placed on soil. To counter this problem, feeders are sometimes placed on concrete or low wire platforms.

Watering

Nipple drinkers have proven ideal for all three phases of the isolation production system. They are much better than any other watering system because:
- Nipples are a sanitary way of providing a constant supply of clean water. Diseases are rarely transmitted via nipple drinker systems.
- Labor requirements are minimal compared to any other watering system.
- Nipples work well with quail of all ages and can be easily adjusted. They typically are the only source of water in brood rooms and brood-grow and flight pens.

The recommended number of quail per nipple varies widely among successful producers. Quail numbers range from 25 to 40 chicks per nipple in the brood room and 40 to 80 in brood-grow and flight pens. Performance appears to be similar within these ranges.

The nipple height is critical and must be adjusted as the quail grow. Nipple waterers can be suspended on a pulley system to raise and lower the waterers even from outside the brood room. Drinkers should be maintained with the bottom at eye level, a height that permits a quail to reach up slightly and trigger a nipple valve allowing water to run down the quail’s throat.

Day-old bobwhite chicks are immediately attracted to nipples. Make certain that the smaller chicks can reach the nipples. An entire flock will be using them within 2 hours of release from boxes. In the brood room, all chicks should be within 6 feet of a nipple line.

Nipple systems operate on very low pressure and are equipped with pressure equalizers installed in incoming water lines. Check the lines for air locks, water flow and the occasional leaky nipple, which can be easily replaced.

If the water contains sand, silt or other sediment, install and service line filters. Mineral deposits can be removed from most nipples by soaking them for a short time between flocks in acidic acid or a weak muratic acid solution. Follow the manufacturer’s directions.

A wire platform and a rock-filled pit beneath nipple waterers are sometimes used in brood-grow and flight pens to handle spillage and to prevent puddling.

Sulfur and iron can be removed from farm water by chlorine injection at the wellhead. Chlorine reacts with sulfur or iron, and the precipitate collects in the holding or pressure tank. The tank can be drained periodically to remove the accumulated residue.

Attach simple, elevated gravity-flow medication containers to the nipple system when water-soluble vitamins or medication are needed.

Most producers place drinkers and feeders at opposite ends of the flight pens to exercise and distribute the quail.
Nutritional problems can be devastating. Feed quality is critical to the profitable production of isolation-produced flight quail. Quail of all ages have metabolic requirements that leave little margin for error.

All quail rations must have essential amino acids, methionine and lysine added. Inadequate methionine is a major cause of feathering problems. To ensure vitamin potency, the vitamin mixes must be fresh.

Producers seldom find it practical or economical to manufacture their own feeds. It is vital that producers use reputable mills. Marginally formulated rations, mycotoxin and gossypol contamination and vitamin deficiencies often occur in flight-bird feeds manufactured by small mills.

Nutritional problems seldom occur in feeds manufactured by large, quality-conscious mills. These mills are accustomed to the manufacturing requirements for monogastric animals. They commonly test incoming ingredients for mycotoxins and purge equipment when necessary to minimize gossypol problems. They also manufacture sufficient volume to assure use of fresh vitamin mixes.

Quality feeds cost a little more but are always more economical over time. If a small or predominantly cattle feed mill is used, the quail producer should review quality factors regularly with the mill manager. The presence of cattle cubes or cottonseed hulls in the feed indicates a problem with quality. Too much trust can result in a massive nutritional problem and a devastating financial loss.

Routinely take a sample from each feed shipment and store it. Although producer-pulled samples have no legal validity in court, they may be of value in discussions with the manufacturer.

When a problem with feed quality is suspected, immediately call the state feed control office and ask a representative to visit the farm to pull an official sample from a bulk bin or unopened bag. The phone number for the Texas Feed and Fertilizer Control Service is (979) 845-1121. A representative will usually visit within 24 hours. The feed manufacturer may then be notified.

If an in-line feeding system is used, minor changes must usually be made in the feeding program to compensate for age differences.

For the first 6 to 8 weeks, bobwhite chicks require a properly formulated and fortified flight bird starter feed containing 28 to 30 percent protein. When an in-line system is used, quail are generally on this feed until they
enter the flight pens and receive a 22 to 24 percent gamebird grower.

After the 12th week, well-feathered quail can be fed a lower protein flight
bird maintenance ration. However, it’s usually more practical to keep them
on the grower ration because of the variable ages of quail units on a flight
pen feed line.

Chicks are often provided a low level of supplemental water-soluble
poultry vitamins the first 7 days.

For the first week, the feed particles must be finely ground (cornmeal
consistency). Larger particles often create late-stage mortality, with chicks
starving at 4 to 6 days old. When most particles are too large to swallow, the
chicks can usually find enough fines to stay alive for several additional days
before dying. Starving chicks may be found standing on feed particles that
are too large to eat.

Experienced producers prevent this problem by routinely milling the feed
to the proper consistency using a small, inexpensive hammer mill equipped
with a small screen for the first week.

Caution: Never place flight quail of any age on a supplemental or full-
grain diet. Grains are high in energy but low in protein, vitamins, minerals
and essential amino acids.

A high-grain diet can rapidly create a deficiency in protein, vitamins,
minerals or essential amino acids. It can slow feather growth, reduce feather
quality and increase susceptibility to cannibalism and disease. Excess grain
also fattens birds rapidly. Fat birds do not fly fast or far.

Proper feed storage is critical. Use feed within 2 weeks of manufacture in
hot weather and always within 30 days.

Large producers purchase bulk feed and enjoy discounts of $15-plus per
ton. Keep bulk storage bins in good shape and inspect them yearly (more
often as they age) for plugged vents and leaks. Pay particular attention to
bin covers, and patch them if necessary. Clean out, wash and dry the storage
bins. Cleaned bins can be disinfected with a strong bleach solution to allevi-
ate mycotoxin problems.

Sacked feed is used by smaller producers and in situations when a limited
amount of feed is needed. Store sacked feeds on pallets in a clean, dry struc-
ture and protect them from rodents, insects, pests and weather. Identify and
rotate the feed to prevent aging or using the wrong feed.

Note: Augers or other mechanical
feed distribution systems must be
operated weekly throughout the
year to prevent rodent damage. Be
sure to empty the feed bins when
quail production ceases. Seal the bin
openings to keep out rats.
Early Mortality Problems

Mortality in bobwhite chicks can be high during the first week of life. Although producers often blame the hatchery for high early mortality, field experience shows that the major causes of excessive mortality are certain deficiencies in farm management.

It is critical that producers observe and monitor the chicks closely. Too often this responsibility is left to inexperienced or poorly motivated workers. A responsible person with sufficient experience and knowledge to spot problems must monitor chicks several times daily.

When observing the chicks, producers must adhere to isolation brooding practices if early imprinting is to be avoided and quality flight quail produced. Use a one-way window panel in the door or wall of each brood room for easy observation without entering the room.

**Mismanagement of very young chicks includes:**

- Exposing boxed chicks to adverse temperatures before placement
- Delays in picking up and placing chicks
- Placing chicks on cold litter or concrete floors
- Failing to maintain proper brooder room temperature
- Inadequate or excessive room ventilation
- Crowding
- Improper feed particle size
- Low vitamin efficacy
- Poorly adjusted waterers
- Exposure to toxic materials
- Lax sanitation practices
- Ineffective pest control
- Low light intensity in the first 24 hours.

The most common problems are related to temperature. Adverse temperatures (too hot or cold) can devastate quail chicks. When accompanied by another of the above stresses, the effects of temperature can be intensified but may be less apparent as the basic problem.

Before the chicks arrive, operate the brooders for 24 hours (48 hours in cold weather) to ensure a proper brooding environment, including warm litter and floor. Chicks have a very small body mass per unit of surface area.
and cannot conserve heat or effectively maintain their body temperatures. The litter and floor must be warm when the chicks arrive to minimize mortality, slow growth, stunting and susceptibility to later health problems.

Always measure the brooding temperature at chick level. Warm air rises. Research measurements in cold weather have shown that temperatures in ceiling-insulated brood rooms can vary as much as 12 degrees between the floor and 8 feet above.

Carefully coordinate ventilation and heating efforts to prevent chilling or overheating, to provide adequate oxygen, to remove ammonia and moisture and to prevent a buildup of carbon dioxide and noxious gases from gas brooders.

Chicks will seek their temperature comfort zone around brooders by moving farther from or closer to the heat source. If chicks huddle, pile or move to the outer wall, there is a problem with the temperature. In extremely hot weather, even young chicks can overheat. Air movement may need to be increased to alleviate the problem.

Make certain that smaller chicks can reach the waterer nipples.

As mentioned earlier, starter crumbles from most or all feed manufacturers tend to be larger at times than the smaller chicks can easily swallow. The small chicks will find enough small particles to maintain life the first several days, then run out of consumable size particles and die from malnutrition on days 4 to 8.

Gamebird starter crumble feed for bobwhite chicks must be finely ground (cornmeal consistency) at the farm and fed the first 7 days to make sure that the small chicks can consume enough feed to meet their energy needs. To improve survival rates, supplement the feeders with six or more feed lids placed around the edge of the brooder and filled with finely ground feed.

It is important that an isolation flight-quail farm have a small mill equipped with a fine screen.

Be consistent and safe. Do not depend on a worker to make a judgment on feed particle size. A high percentage of early deaths in smaller chicks indicates that the nipple waterers may be too high for these chicks to reach or that the feed particles are too large to swallow. A qualified observer must observe the chicks closely each day for signs of problems.

Unthrifty, droopy or sickly chicks or increasing mortality after the fourth day are signals of an ongoing or developing health problem often brought on by producer mismanagement.
Producers of isolation-reared flight quail must never ship poor-quality quail. Unthrifty, sickly, immature, crippled, stunted, poorly fleshed, poorly feathered and bobtailed quail must be culled at cooping.

Near catch time, feed and water the quail. Successful producers usually provide a low level of poultry vitamins and electrolytes and often a broad-spectrum antibiotic in the water the last 3 to 4 days before shipment. This is particularly important for hails of 5-plus hours or when the customer has a history of health problems in the holding pen.

Use clean hauling equipment. Wash the coops and trailers and sun-dry them after each delivery. Make sure the tarps and other equipment are in good condition. Filthy and poorly maintained equipment reflects on quail quality and can make a lasting poor impression on some discriminating customers.

Use quail-size coops, and never crowd the quail. Provide 10 to 15 square inches of coop floor space per quail, depending on the temperature conditions. Place the coops end to end and space the rows 6 to 8 inches apart to maintain adequate ventilation. Screen the top stack of coops from direct sunlight and protect the quail from cold and heavy rain.

Each time birds are caught from a flock, the quail are stressed and subject to feather and other physical damage. Handle them gently during catching and cooping. Separate a sizeable group and gently drive them to an area of the flight pen away from the main body of quail.

There are three common methods of catching quail:

- Netting and hand catching is usually carried out at night. Use a web net to surround and restrain the quail for cooping. Blue or dim lights make the process easier for both quail and workers.
- In daylight, quail can be caught by driving a group along a fence into a narrowing quarter funnel of netting leading into an alignment of catch cages. To prevent crowding and smothering, equip the cages with overlapping strip-rubber-covered side or top openings and drop
panels. Remove the quail through the openings, check them for defects, band them if necessary and place them in the shipping coops.

- A third catching method involves herding the quail into the transfer lane and moving them to the end of the lane and up a short, inclined ramp into a catch house equipped with catch cages. The quail are removed through rubber stripped openings and processed to shipping coops.

With producer experience and proper supervision, the detrimental effects from any of these catch systems are generally minimal on captured quail and the remaining flock.

Immediately move the loaded coops to the customer. Again, the quail must receive adequate ventilation and be protected from adverse weather during shipment.
Even though a knowledgeable producer delivers isolation-reared flight quail with a performance rivaling that of native quail, the customer can ruin the quail after delivery by poor handling and mismanagement. Both the producer and the customer must cooperate to deliver the ultimate experience to the discriminating hunter.

Flight quail are athletes and must be treated as such if satisfactory performance is to be attained. University football teams are fed and rested for at least 24 hours before playing a game. Flight quail are no different. The amount of time spent hauling and off feed and water are of critical importance and must be kept to a minimum.

Quail must be on feed and water just before loading. Immediately upon arrival, they must be unloaded and given water and feed. The holding pens or other containment structures should offer the same feed and be equipped with the same waterers as were used in the flight pens. Many producers deliver feed with the quail, supplying it at cost.

Provide three nipples or 30 inches of open water trough and one 50- to 50-pound cylinder and pan feeder per 100 quail. Make certain that the quail do not run out of fresh feed.

Employee ignorance or indifference can be costly. Trust and familiarity can result in lax effort. Carefully instruct and supervise employees on the management requirements for newly delivered quail. Negligence in feeding and watering quail can cause illness and poor performance within a few hours. Quail held on grain soon become overly fat and deficient in essential micronutrients, which reduces flight performance and invites health and feathering problems.

Most flight-reared quail of shooting age weigh about 200 grams. After 24 to 26 hours of fasting, these mature quail become sickly and inactive. They will need 5 days on quality feed to return to normal.

Quail have a high metabolic rate and a critical energy reserve. In cold weather, mature quail can die within 3 days without food. In a holding pen disaster that occurred on a hunting preserve in cold weather, quail weight and breast muscle declined drastically after a 2-day period without food. These quail could not function in the field for a considerable period.
Unprotected exposure to environmental extremes and rough handling or crowding can be disastrous. Shipped quail become stressed and are likely to perform poorly if they do not get enough rest or if they are penned with strange quail at delivery. Quail that have been left in crates for a lengthy period or hauled in stressful weather may require 3 to 7 days of rest to recover before they can perform well.

Holding site structures and pens must be built to provide flight quail comfort and security from predators and livestock. Incorporate the basic ideas in the Construction Suggestions chapter.

Holding pens must drain well. The pens should be out of sight of hunters and be provided with at least 1 square foot of space per quail. There should be enough shelter area to protect all the quail from adverse weather.

Isolation-produced flight quail should be isolated from dogs and humans. Shield them with a barrier curtain. Rows of sparse, upright vegetation, trees or brush piles in holding pens will reduce stress and stimulate the quail to hold in cover when released. If the quail are held for a lengthy period, mist or sprinkle them every other day in good weather to maintain feather condition.

Healthy, vigorous quail often become diseased when held for more than a few days in contaminated preserve holding pens. If a particular disease is a problem, provide effective medication to protect the new quail.

To combat hauling stress, some veterinary practitioners recommend that quail be given a broad-spectrum antibiotic for a few days before and after delivery, provided that the withdrawal period is not compromised. Consider providing water-soluble poultry vitamins 3 to 4 days before and after delivery.

If the quail are held and rested for a short time, place them in a darkened structure with feed and water and at least 1 square foot of space per bird. Low light intensity reduces stress, making the quail easier to manage and often stimulating them to hold in cover.

Take care when catching quail to minimize feather damage and stress. Nets and rough handling can break and loosen feathers and physically damage the quail. When quail for several hunts are being held together in a holding pen, quietly separate a group sufficient for a hunt from the rest of the flock. Then move them to the catch area to prevent wear and tear on the entire flock during catching. (See Chapter 13, Capture and Delivery.)

The performance of quality isolation-produced flight quail can be affected by many field factors, including vegetative cover type, number of quail per release, method of release, time of day, time lapse after release, pollen concentration, weather conditions and hunter and dog problems.

Publications by Fred Guthery and Ed Kozicky offer considerable expertise in these areas. (See Suggested References and Sources of Assistance). Their texts should be a part of every quail industry person's library. Those interested in restocking bobwhite quail on a premise will gain by referring to these texts.
Cannibalism and Feather Picking

Cannibalism and feather picking can be a problem in flight birds and domestic fowl. Breeding and improved management practices have significantly reduced the problem in commercial poultry. It is not certain whether strain differences exist in quail and other flight birds. However, it may be the reason if cannibalism or feather picking occurs with any regularity in different flocks of quail from a particular strain or source.

Feather picking occurs most often in crowded flocks where exercise is limited. One cause may be nutritional deficiencies. Cannibalism and feather picking can go hand in hand and probably have many identical causes.

Once cannibalism or feather picking starts, control can be difficult in commercial size flocks. It is critical that preventive measures be taken in the brood room and brood-grow and flight pens.

To prevent cannibalism and picking, the causes must be known.

Causes include:
- Bird crowding
- Hunger
- Inadequate feeder or watering space
- Improperly adjusted feeders and waterers
- Boredom
- Dusty litter or environment
- High temperature and humidity
- Lack of exercise
- Ammonia
- Stale air
- Bright lights
- Feather mites
- Bleeding from mechanical injury or aggressive quail
- Malnutrition
- Possibly, pelleted feed
- Possibly genetics

Toe picking in young chicks relates to hunger. Inadequate feeder space causes the aggressive chicks to crowd the small and timid siblings from the feed. The feeders may also be too high or far from brooders. Hungry chicks then pick at their toes and the toes of neighbors. Prevent toe picking by placing plastic lids of feed around brooders for the first 10 to 14 days.

Nose picking occasionally occurs at 12 to 14 days old, usually in small, closely confined flocks. Chicks grab the nasal septum and rip the top beak loose. Mortality is high.

If this problem occurs, reduce the light intensity and increase the space. If immediate control is not attained, slightly block snub the beak of each chick.
Important preventive measures include:

- Don't crowd the quail. Provide enough individual bird, feeder and waterer space for each age group.
- Keep the waterers and feeders properly adjusted. Designate and check the responsible employee for compliance.
- Place six plastic feeder lids per 1,000 chicks around brooders, and dump the chicks on or near the lids. Fill the lids and feeders with finely ground starter feed.
- Keep the light intensity low in brood rooms after 3 to 4 days old or change to blue light.
- Do not use peat moss or other dusty litter materials, and install sufficient brood room ventilation equipment to provide adequate air exchange to remove ammonia, carbon dioxide and house moisture and to keep the air fresh.
- When building flight pens, leave some shade trees and upright brushy vegetation (mesquite, juniper, etc.) if feasible. Top and trim the brushy vegetation to make it compatible with management practices.
- Place stacks of evergreen brush such as juniper in bare flight and holding pens and along fences. Turn it every few days. If problems occur in the brood room or brood-grow pens, place the evergreen brush upright along the brood room walls and brood-grow pen fences. Blocks of leafy alfalfa hay scattered in rooms or pens can often help stop cannibalism.
- Allow some vegetative growth in otherwise bare flight pens to improve quail performance, minimize erosion and help prevent cannibalism. Strips of vegetation should be narrow and easily seen through. Treat excess vegetation with Roundup® at least 2 weeks before quail are placed.

If upright plants such as milo or corn are planted, place the seed 12 to 14 inches apart in 48-inch rows to provide strong, bulky stalks. This will help keep the plants from falling over and permit rapid detection and removal of all dead birds. The caretaker must be able to walk each flight pen quickly and see and remove every dead quail.

Remember: Dense vegetation and a botulism outbreak can cause mortality and economic losses that make cannibalism and feather picking insignificant.

Be sure the flight and holding pens have enough shelter space to prevent crowding and to protect all of the quail from adverse weather.

As a last resort, lightly block snub the beaks of chicks if cannibalism or feather picking repeatedly occurs early in a source of chicks or in certain brood rooms or brood-grow pens and if other practices have failed to control the problem. If block snubbing is properly performed on the first day, most quail will have fairly normal beaks by 15 weeks old.
Pest Control

Pesticide regulations change periodically. Current label statements are the law and supersede any other recommendations. Use only those pesticides recommended for use around poultry. Follow the directions carefully.

The pesticide applicator should undergo private applicator training, which is provided by the Department of Agriculture or the Cooperative Extension Service in each state. For information about applicator training in Texas, contact the Texas Cooperative Extension Agricultural and Environmental Safety office at (979) 845-3849 or the Texas Department of Agriculture License Section at (800) 835-5382.

Free-flying birds

Wild birds – particularly feral pigeons, English sparrows and starlings – are carriers of avian diseases and parasites and are a constant threat to the health of flight quail.

Government regulations prohibit the killing of most other bird species. Gunshots will keep most pest birds away for a time. Although poisoning may be allowed under certain conditions, it is generally prohibited. Live trapping of avian pests may remove some.

These preventive measures are most effective in minimizing free-flying birds:

- Feed is the major attractant. Eliminate all spilled and waste feed from a farm. Be alert and clean up spillage immediately anytime it occurs.
- Check for and eliminate all nesting attempts throughout the spring and early summer. Spray the nesting area with permethrin to eliminate mites.
- Find and break up roosts year round. Be particularly alert for roosting concentrations in the colder months.
- Find and plug entrance sites into pens and work areas.
- When all else fails, ask county pest control personnel for suggestions or hire an experienced exterminator.

As a disease precaution, do not allow waterfowl or other wild birds to be processed on the farm.

Rodents

Rats and mice can be a costly nuisance on isolation flight-quail farms. They spread diseases, waste and consume large amounts of feed; and damage and destroy insulation, electrical wiring and equipment. Rats also prey on
chicks and young quail. Residual rodent populations can, within a few months, overrun a farm.

When droppings, tracks and rodents are seen occasionally, inspection will usually reveal mice and rat burrows along foundations and fence lines and under feeders, feeder platforms, portable shelters, feed tank foundations and piles of lumber and debris. Mice and rats often burrow in the soil of brood-grow and flight pens and in shelter areas. Rats also burrow in nearby weeds and high grass and along ditches and depressions. Both species invade ceilings and double walls and nest in insulation.

Commercially available baits will kill rodents if the bait is consumed. Experience has consistently shown, however, that consumption and resulting kill is usually modest. When feed is available, bait acceptance is consistently poor.

Experiences with commercial pest control applicators have also often been unsatisfactory. Bait stations are expensive and usually ineffective. Rodents enter stations and urinate and defecate on the bait, soiling it for others. Electronic and sonic devices are also ineffective.

Instead, producers can control rodents at reasonable effort and cost using the following eradication program:

- In late spring, apply Roundup® to vegetation from the foundation to the drip line around structures and from the perimeter fence out 2 feet and around the entire perimeter fencing. Rodents seldom burrow in open, vegetation-free areas.
- Keep the vegetation mowed closely within 100 feet of the quail production facility, including the space behind flight pens. Short vegetation discourages rodents, exposes fire ant mounds and minimizes mosquito and fly resting areas.
- Remove all trash, lumber and debris from the farm area.
- Locate and mark the burrow sites.
- Mount a small gasoline engine on a dolly and connect 12 to 15 feet of 1/2-inch copper tubing or steel pipe to the exhaust. (See photo above right.) Hook a 20-foot section of hose to the tubing and adjust the carburetor or add a small amount of oil to the fuel to produce a heavy smoke exhaust.
- Start treatment as soon as the quail are moved from a site and before the feed is removed. Insert the end of the exhaust hose into the burrows and fill them with exhaust smoke. Nestlings and young rodents will die in the burrows along with most adults. Rodents that exit and stumble will eventually die from inhaling components of the exhaust gas. Multiple connected burrows are easily treated. Cover the burrow area with a tarp and insert the hose in random burrows and for a time under the tarp.
- Migrants and any survivors will not soon enter effectively treated burrows. If this treatment is properly conducted, rodents should not be a problem for a year or more.
Precautions

- Keep all humans, pets and farm animals out of the treatment area during and immediately after the treatment.
- Do not use the procedure in an enclosed area or where ventilation is compromised.
- Handle the exhaust hose while standing upright and upwind of the exhaust fumes.
- Have an observer nearby in case a problem occurs.

Flies

Fly populations on flight-quail farms increase in mild and hot weather. The housefly, little house fly, black garbage fly and blow fly can spread intestinal diseases and internal parasites and create problems for neighbors. The greatest concern by far is the housefly.

Effective fly control must involve appropriate sanitation and management practices to eliminate breeding sites. Practices include:

- Keeping manure and litter dry and preventing water leaks.
- Removing litter from the farm and spreading it thinly to dry.
- Removing and properly disposing of wet or spilled feed and dead birds daily.
- Keeping vegetation on the farm closely mowed and cleared from drainage ditches.

Another fly-control measure is to apply a permethrin residual spray to fly resting areas such as ceilings, walls and light cords every 5 to 6 weeks.

Place a commercial sugar bait containing a fly sexual attractant in shady areas where houseflies congregate. The bait can be placed on top of a barrel, wetted and covered with a wet burlap bag. The dissolving bait will saturate
the burlap and attract flies. For maximum effect, shake off the dead flies and wet the burlap each day.

Fogging at night with an approved contact insecticide can help control flies, mosquitoes and other insect pests.

Other insect pests

Mosquitoes spread pox and other diseases and can be a problem in wet years. The most effective way to control mosquitoes is to eliminate or treat small pools of standing water in the area. Vaccinate the quail for pox if necessary.

Buffalo and turkey gnats can appear in warm weather of late winter or in the spring after a wet year. Although periodic problems have occurred on breeder farms, the insects appear to be a minimal threat to flight quail.

Various mites, lice and fleas can affect quail. Mites occur occasionally on quail breeder farms. These insects are seldom if ever a problem for flight quail and should certainly not be a problem on well-managed isolation flight quail farms that are free of wild birds.

Blister beetles are often attracted to lights. On occasion they may invade quail pens and will kill the quail that consume them. They are seldom a problem on unfit farms.

The darkling beetle is a known carrier of many diseases affecting poultry and gamebirds and can be a nuisance on flight-quail farms. The adult beetles and larvae are found throughout housing but predominantly in the litter and soil. To treat for darkling beetles, remove the litter and haul it from the farm when the infested brood rooms are vacated. Treat the floor with Sevin® before adding new litter.

Fire ants

Fire ants on flight-quail farms kill chicks, consume feed, sting workers, nest in electrical boxes and make a general nuisance of themselves. They are not known to spread diseases or parasites.

Ants are best controlled with any of several broadcast type baits approved for use on poultry farms. Do not spread ant bait in or near production facilities.

Individual mounds in or near production facilities can be easily controlled with a 2-gallon hand sprayer and any pesticide approved for common use around poultry. Inspect foundations, housing, pens and lanes for ants, and treat the mounds at least a week before quail movement.

Fire ants are reduced to only a minor problem if broadcast baits are spread on a farm at the intervals specified on the product label and if individual mounds near or in production sites are treated regularly.

For more detailed information on pest control for flight-quail farms, contact the local county Cooperative Extension office. Ask for a copy of Texas Cooperative Extension publication B-1088, Poultry Pest Management. It is also available at http://tcebookstore.org.
Because quail are near the bottom of the food chain, predators such as domestic and feral dogs and cats, all local wild mammal carnivores (including hogs), snakes and birds of prey can be a nuisance and a costly problem on flight-quail farms.

The essential element in protecting isolation-reared flight quail is proper pen construction. Three or four strands of hot wire properly spaced on perimeter fencing will turn most mammals, including livestock.

Farm maintenance and sanitation are also important. Dispose of dead birds and waste feed properly. Keep escaped quail to a minimum.

Snakes can be controlled by eliminating den sites, controlling surrounding vegetation growth, snake-proofing buildings and placing a solid barrier (sheet metal or fiberglass) along perimeter fences.

Producers must know and follow the state and federal regulations governing predator control. To control mammals, they must also have a working knowledge of individual predator traits and habits and trapping procedures. Local trappers may be interested in removing animals that invade a farm.

Or, the flight quail producer may want to invest in trapping literature and equipment.

Owls and hawks will harass quail in brood-grow and flight pens, causing hysteria and panicky flight. They will occasionally catch individuals that hit the cover netting. It is against federal law to kill birds of prey. State or federal wildlife officials will usually cooperate with harassed producers and permit live trapping of problem birds.

Do not kill a protected bird. More than one gamebird producer has appeared in a federal district court charged with such a violation.

For more information on wildlife control, see the Texas Cooperative Extension Web site at http://tcebookstore.org.
Producers tend to handle pesticides, herbicides, sanitizers and drugs in a haphazard and dangerous manner. Most chemicals in these classifications can be harmful or poisonous, particularly to children and animals. Do not permit unskilled labor to make chemical decisions. Bobwhites are extremely susceptible to chemicals. Use only the chemicals that are labeled for use around poultry.

Always follow these practices when using, storing or disposing of labeled chemicals:

- Identify the problem and determine the chemical of choice. When in doubt, contact a trained person – a local Extension agent, Extension specialist, veterinarian, farm store manager, etc., for assistance.
- Read all label precautions carefully before opening a container. Although most chemicals are sold under a trade name, the label will also identify the ingredients.
- Follow all mixing and use directions carefully and clean up spills.
- Store chemicals in their original containers only.
- Store chemicals out of reach of children, pets and livestock and in a secure site.
- Before opening the container, know the antidote listed on the label.
- When disposing of empty containers, follow the specific labeling directions.
- Clean up (personal hygiene and applicator equipment) after using a chemical.
- Closely supervise and monitor others involved.
- Think safety. Be alert and look for problems.

Remember: Bobwhites are very susceptible to chemicals. Use only those chemicals (and doses) specifically labeled for use around poultry. When in doubt, expose a small number of quail to the chemical and observe them for 12 to 24 hours.
Cleaning and Sanitation

Quality flight quail must be brooded, reared and maintained in a sanitary environment. If they are not, chronic or acute disease and internal parasite problems will result.

Typically, first year farms with new ground and facilities have few infectious health problems if the recommended isolation brooding and management procedures are understood and followed closely. Invariably over time, diseases and parasites will be introduced, even on the best-managed farms. By the third year, most farms will experience some degree of periodic or chronic low-level flock health problems.

Cleanliness and sanitation are significant factors in minimizing organisms and optimizing flock health. Ideally, brood rooms should be cleaned and sanitized after every flock. This is essential if the previous flock experienced a contagious health problem. At a minimum, the litter should be removed and replaced with fresh litter material. Treat for darkling beetles if they are detected. (See the Pest Control chapter.)

To reduce potential disease and internal parasite problems, thoroughly clean and sanitize all housing at the end of each season. Remember: No disinfectant will do a satisfactory job if organic matter and filth are present. It is essential that litter and other organic matter be cleaned thoroughly before a sanitizing agent is applied. Cleaning will remove the adhering contaminating material and make it possible to kill most remaining pathogenic organisms with an approved disinfectant. This effort should reduce the organisms to noninfectious levels.

Follow this procedure to minimize disease and predator problems:

1. To prevent recontamination, eradicate rodents, any birds and insect pests immediately after quail are removed. (See the Pest Control chapter).
2. Remove all nonattached equipment. Wash and clean the equipment thoroughly to remove all organic material then rinse by spraying with a mixture of water and a chlorine disinfectant.
3. Use a medium-pressure nozzle to settle house dust in the brood rooms and brood-grow pens, to moisten dusty manure and litter and to wash down brood-grow curtains and attached equipment. Remove all litter and adhering manure including that along walls, in corners, and around posts. Clean up any spilled litter. Then wash down the inside of buildings (ceilings, walls and concrete floors) with a high-pressure nozzle.
4. Do not pile or spread litter within 100 yards of production facilities, ponds or streams or on overflow land. If possible, haul the litter off the farm and spread it thinly to minimize fly development, to control beetles.
and larvae and to stimulate incorporation into the soil.

5. After the buildings are clean, apply a coal tar disinfectant that is labeled for use in poultry houses. The spray should cover walls, ceiling and floor.

6. Close sanitized facilities to prevent entry and contamination by birds and other animals and allow them to dry until the odor of disinfectant disappears or becomes faint.

Some flight bird producers have been confused about the effectiveness of different disinfectants.

Many commercial disinfectants have detergents in the solution. Do not add soap or extra detergent to those solutions unless it is recommended on the label.

The most effective disinfectants for sanitary footbaths, housing and equipment are coal tar distillates (cresylic acids, cresols, and xylenol products). These compounds are highly resistant to the inhibitory effects of organic debris (blood, feathers, manure, etc.) and are satisfactory disinfectants for floors (dirt and cement), walls and ceilings if the facility has been thoroughly cleaned then washed down with a high-pressure sprayer before the disinfectant is applied. Coal tar distillates have a characteristic odor, a strong residual action on clean surfaces and a wide range of action on bacteria, fungi and viruses.

Because quaternary ammonium compounds, or "quats," chlorines and iodophors are quickly inactivated by residual organic matter, they do not disinfect housing effectively. Other disinfectants that are not suitable for disinfecting flight bird facilities include strong alkalies, methyl bromide and formaldehyde.

Follow the recommended precautions when handling and applying chemicals. Again, use only those recommended for use around poultry.

Between seasons, many successful flight quail producers treat the pen soils with sulfur or a commercial soil-acidifying product to help protect against intestinal disease organisms and internal parasites. Earthworms and other invertebrates that serve as intermediate hosts tend to avoid highly acidic soils.

Use a lawn fertilizer spreader to spread the sulfur at a rate of 10 pounds per 100 square feet. Lightly wet the spread sulfur, then till it into the top 3 to 4 inches of soil.

Apply a commercial soil-acidifying product according to label directions.

Caution: Sulfur is flammable and must be stored safely. It also irritates the eyes and skin. Do not apply it within 2 weeks of moving the quail into pens. Wear eye shields and protective clothing during application. Rinse all equipment after use. Use only the disinfectants that are labeled specifically for use around poultry. Follow the mixing instructions and concentration levels closely.
Profitable Reminders

- Become acquainted with and involve an experienced state disease diagnostician in the farm planning process.
- Most hatcheries do not speculate on chicks. While farm development plans are in progress, contact a reputable National Poultry Improvement Plan (NPIP) bobwhite quail hatchery and make early arrangements to buy chicks. Otherwise, breeders may not be placed and the chicks will not be available when needed.
- A misstep can ruin the isolation production effort. Make certain that the employees understand and rigidly follow the isolation production practices in brood rooms and brood-grow pens.
- Do not use questionable feed mills or buy feed strictly on price. Remember: You usually get what you pay for, and everyone has to make a buck to remain in business.
- Misting or sprinkling flight-pen quail frequently will improve feather quality and flight performance in the field.
- Maintain a barrier curtain on perimeter fences exposed to human or dog traffic.
- Botulism will eventually cost the producer who becomes lax in removing daily mortality from brood-grow and flight pens.
- Ulcerative enteritis can be controlled – even prevented – on the farms of intelligent and hard-working producers. Implement a strict sanitation and pest-control program and make certain that all concerned understand and follow the program. If the disease appears, contact a diagnostician and take corrective measures immediately.
- A producer cannot starve profit from quail or wish feathers and tails on a flock. Although good-quality feed with adequate levels of essential amino acids costs money, it is essential for feather growth and bird quality.
- Become experienced in posting (necropsy) sick and dead quail in order to recognize disease abnormalities and better converse with the disease diagnostician.
- Be certain that the feed for chicks is finely ground the first week.
- Never deliver poor-quality quail to a customer.
- Always supervise farm employees closely, particularly those with decision-making responsibilities.
- Check each quail production unit every day for health, environmental and equipment problems. Check the chicks at least twice a day for the first 7 days.
- Keep cattle and other domestic animals fenced from the production facilities at all times.
- Obtain a flight bird farm license from the state parks and wildlife department before the farm begins operating.
- To minimize coccidiosis outbreaks, remove the litter and vacuum the brood room floor after each brooding and before placing litter and a new unit of chicks.
- Never bring any barnyard or backyard chickens, turkeys, guineas, peafowl, waterfowl or pet birds on or near a flight quail premise. Other species of flight-bird chicks must come directly from a NPIP hatchery.
- Do not mix units of quail.
- Always carry a can of spray disinfectant or maintain a footbath when working a unit of sick quail. When leaving the room or pen, scrape off the manure and then spray the footwear thoroughly or step in the footbath.
- Pick up and properly dispose of dead and sickly quail every day.
- Try to educate your customers and their employees on correct management and nutrition practices for holding quality isolation-produced flight quail.
- Never short a customer on the number of quail paid for. Customers can count and they will talk.
- Rigidly control rodents, wild bird populations, flies and other pests. To prevent rodent damage, operate augers or other mechanical feed distribution systems weekly throughout the year.
- Keep accurate financial, production and health records and learn from your mistakes and experience.

Always remember: Retaining an existing customer is much easier and cheaper than recruiting a new one.
Suggested References and Sources of Assistance

Publications

*Game Bird Propagation*, Wildlife Harvest Publications, P. O. Box 96, Goose Lake, Iowa 52750.

*Grower’s Reference on Gamebird Health*, Dwight Schwartz, Wildlife Harvest Publications, P. O. Box 96, Goose Lake, Iowa 52750

*On Bobwhite*, Fred Guthery, Texas A&M University Press, College Station, Texas 77543.

*Hunting Preserves for Sport and Profit*, Ed Kozicky, Caesar Kleberg Wildlife Research Institute, Texas A&M University at Kingsville. Kingsville, Texas 78363.

*Wildlife Harvest*, Wildlife Harvest Publications, P. O. Box 96, Goose Lake, Iowa 52750.

Texas Cooperative Extension
These and other wildlife-control publications are available at [http://teebookstore.org](http://teebookstore.org) or by contacting your county Extension office:
- L-1916, *Control of Rats and Mice*
- L-1906, *Controlling Armadillo Damage*
- L-1923, *Controlling Badger Damage*
- L-1917, *Controlling Coyotes with Snare*
- L-1925, *Controlling Feral Hog Damage*
- L-1907, *Controlling Opossum Damage*
- L-1904, *Controlling Pocket Gopher Damage*
- L-1902, *Controlling Raccoon Damage*
- L-1901, *Controlling Skunk Damage*
- B-6076, *Managing Red Imported Fire Ants in Agriculture*
- B-1088, *Poultry Pest Management*

Other related publications from Texas Cooperative Extension include
- L-5217, *Dead Poultry Disposal*
- L-5182, *Poultry Facility Biosecurity*
Suggested References and Sources of Assistance continued

Industry organizations
Texas Flightbird Association
5322 Hwy. 16N
Bandera, Texas 78003
Phone: (830) 796-4820
http://texasflightbirdassn.org

North American Gamebird Association
1214 Brooks Ave.
North Carolina State University
Raleigh, North Carolina 27607
Phone: (919) 515-5403
http://www.naga.org

Government and educational (Texas)
Department of Poultry Science
Texas A&M University
College Station, TX 77840
Phone: (979) 845-4318

Texas Veterinary Medical Diagnostic Laboratory
College Station: (979) 845-3414
Center: (936) 598-4451
Gonzales: (830) 672-2834
Amarillo: (888) 646-5624
http://tvmd.web.tamu.edu

Texas Feed and Fertilizer Control Service
Texas A&M University
College Station, TX 77840
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