

Evaluation of Quail Feeders

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We evaluated four quail feeder designs put out on a South Texas ranch and five feeder designs in pen studies. Of the quail feeders studied, five were commercially manufactured, three were homemade and one was an experimental design. Each feeder had different design problems. The feeders were either too accessible to nontarget animals, had problems with feed caking or clogging or had a short usable life. Some commercial feeders had a high amortized annual cost. The best feeder in the field study was a homemade hanging plastic 55-gallon barrel. In the pen studies, two commercial feeders and a different homemade feeder proved useful. Managers should decide which feeder type to use based on their specific concerns.

The effects of supplemental feeding of quail have been variable. Often improved habitat structure is a limiting factor that feeding will not correct. If done properly, feeding may be effective during drought. Economic benefits from feeding quail are questionable. An additional quail in the bag can cost from \$24 to \$60 in successful feeding programs.

Introduction

Quail managers use feeding programs to (1) sustain quail through periods of food shortages, (2) increase and maintain quail numbers, (3) aid in restocking programs, and (4) congregate quail for easier hunting (Frye 1954, Collins 1956, Lehmann 1984, Guthery 1986, Doerr 1988). Supplemental feeding of quail has been studied in several areas using many different quail feeders. As extensive as these field studies have been, few have compared different quail feeder designs.

Lehmann (1984) and Guthery (1986) suggested that a good quail feeder should require no fencing to exclude cattle, have a large feed capacity, minimize feed losses from nontarget animals and have adjustable openings to control the amount and type of feed used. In addition, feeders should have long usable lives.

A major problem with quail feeders is heavy use by nontarget species. Field studies show that quail consume only 1 to 25 percent of the feed offered (Frye 1954, Collins 1956, Campbell 1957, Haugen 1957, Guthery 1986, Kane 1988). Moisture reaching the grain inside feeders is also a problem (Hawkins 1937, Frye 1954, Haugen 1957, Kane 1988). This often results in clogging

and spoiling of feed. Moist feed can lead to growth of toxic fungi. Feeders that cause birds to stand in the food while they eat may hasten the spread of disease and parasites (Lehmann 1984, Guthery 1986, Brittingham and Temple 1986).

With these points in mind, we compared different quail feeder designs. This paper is a result of a completed field study and continuing pen studies. Our studies include feeder designs manufactured commercially and others developed for personal use.

Methods

Quail feeders were studied on the McFaddin Ranch, 18 miles south of Victoria, Texas. Twelve quail feeders (three each of four types) were put out on a 400-acre management unit. The four types used were the Allen-Young feeder (Allen-Young Manufacturing, Crystal City, Texas), the Pasadena feeder (Quail Feeder, Pasadena, Texas), a hanging plastic barrel feeder and a 55-gallon drum feeder.

We filled the feeders with grain sorghum (milo) and checked them every 2 to 3 weeks. We measured the amount of feed in the feeders and calculated the average flow per day for each month. We also made 30 observations at each feeder and used physical evidence (feathers, feces and tracks) to determine seasonal use by quail and nontarget species. Quail density was determined during fall, winter and spring. From the density estimates we calculated maximum quail use if they ate nothing else but supplemental feed. We then estimated the minimum amount of waste from all the feeders.

We are conducting pen studies at the Texas A&I University Wildlife Research Facility in Kingsville, Texas. We designed the pen studies to evaluate bobwhite and nontarget species use of five different quail feeder designs. The five types being studied are the Verde feeder (Verde Manufacturing, Miami, Florida), the Lehman H feeder (Lehman H Feeder and Plow, Corpus Christi, Texas), the Quail Master feeder (Quail Master Feeders, Carrizo Springs, Texas), an experimental design and a hanging 5-gallon bucket feeder. We selected the three manufactured feeders because they did not need livestock enclosures. We used the hanging bucket feeder because of its simple design and low cost.

In these pen studies we placed the five feeder types in an enclosure with 25 northern bobwhites (*Colinus virginianus*), 25 bronzed cowbirds (*Molothrus aeneus*), 4 white-tailed deer (*Odocoileus virginianus*), 4 javelinas (*Tayassu tajacu*) or 2 raccoons (*Procyon lotor*). After allowing the animals time to learn how to use the feeders, we measured feed loss from each feeder and observed each animal species using them.

Field Study Findings

Feed flow rates showed that the 55-gallon drum feeders received higher use than the other feeders (0.71 pounds per day versus 0.44 for the Allen-Young, 0.31 for the hanging barrel and 0.24 for the Pasadena feeder). Flow rates for the 55-gallon drum feeder could have been higher because they were often empty when checked. Lower feed flow in the Pasadena feeder resulted from frequent clogging.

Physical evidence around the feeders showed heavy use by nontarget animals. Nongame birds, mostly cowbirds (*Molothrus* sp.), meadowlarks (*Sturnella* sp.) and mourning doves (*Zenaida macroura*), accounted for 66 percent of the nontarget species sign at the Pasadena feeder. Nongame birds and cattle accounted for 52 percent of the nontarget species sign at the 55-gallon drum, 65.6 percent at the Allen-Young and 55.3 percent at the hanging barrel feeder.

Our estimates of minimum waste on the management area (amount fed that quail could not have eaten) showed that from January through April nontarget species made heavy use of the feeders. Nontarget species consumed a minimum of 6.6 to 17.6 pounds of milo overall per day. Observational data indicated that bobwhites did not use any of the feeders. It is likely nontarget species accounted for most of the use in all months.

Unavailability of feed is a potential problem with quail feeders. The hanging barrel and 55-gallon drum feeders have a feed capacity of 288 pounds of milo. The Allen-Young feeder will hold 46 pounds, and the Pasadena feeder holds 67 pounds. How often feeders are empty or clogged indicates how often feed is unavailable to quail. Moderately high feed flow rates and a low feed capacity in the Allen-Young feeders resulted in their being empty on 11 percent of our visits. The other three feeder types were empty less often when checked (6 percent of the visits to the Allen-Young feeder, 4 percent to the 55-gallon drum and 4 percent to the Pasadena).

Three feeder designs were susceptible to clogging. We found feed clogged in the Pasadena feeders on 7 percent of our visits. The Allen-Young and 55-gallon drum feeders were clogged on 4 percent and 3 percent of our visits, respectively. The hanging barrel feeders did not clog during our study, but they did have minor problems with feed caking.

Only the Allen-Young feeder has adjustable openings to control the amount and type of feed used. The 55-gallon drum and the Pasadena feeders can handle any kind of feed. The hanging barrel can be permanently modified to use any feed.

Initial cost of the feeder designs ranged from \$150 for the commercially produced Allen-Young feeder to about \$30 for the homemade hanging barrel. Annual cost of the feeders (based on expected life) ranged from \$35 per year for the Pasadena feeder to about \$4 per year for the hanging barrel feeder (Table 1).

Table 1. Initial and amortized annual cost of nine quail feeders.

Feeder	Initial Cost (\$)	Life (Yrs)	Cost/Year (\$)
Pasadena	70	2	35
Allen-Young	150	5	30
Quail Master	150	6	25
Verde	125	8	16
Lehman H	140	13	11
Experimental	75	15	5
55-gal. drum	50	10	5
Hanging barrel	30	7	4
Hanging bucket	10	5	2

Pen Study Results

Feed consumption showed that bobwhites used the Quail Master feeder more than the experimental, Lehman H and hanging bucket feeders. Quail use of the Verde quail feeder was similar to all other feeders. Our observations of bobwhites using the feeders showed no difference in time they spent at each feeder.

Deer, javelina and cowbirds showed differences in feeder types used. Raccoon use of each feeder design was similar except that they used the hanging bucket less. Both deer and javelinas used the experimental feeder more than the others. Deer ate about eight times as much and javelina ate almost nine times as much milo from the experimental feeder as from the second most used feeder. Our observations showed the same use pattern for deer and javelina. Cowbird use of the feeders showed a different pattern. They used the Quail Master and Lehman H feeders five times more than the hanging bucket and experimental feeders. Cowbird use of the Verde feeder was similar to that of all other feeders; however, they spent less time using the Verde feeder. During our observations, small songbirds often visited the Verde and Quail Master feeders.

Feed caking and clogging was also a problem in the pen studies. We found milo caked inside the Quail Master, experimental, hanging bucket and Verde feeders within 2 weeks during wet periods. Caking was a

major problem in the Quail Master feeder and resulted in clogging on a few occasions. Feed caking in the other three feeders did not cause clogging; however, problems might have been more severe if feed was left in the feeders for longer than 2 weeks.

We also measured the density of feces on the feed trays of the commercial feeders and on the ground below the bucket. Fecal accumulations on the feed tray of the Quail Master feeder tended to be highest, followed by the Verde, hanging bucket and Lehman H feeders. Because the experimental feeder had a screen platform for birds to stand on, there was little fecal accumulation on it; however, we occasionally found feces in the feed troughs. To reduce the possibility of disease problems, these commercial feeders need to be washed, disinfected and moved regularly. The hanging bucket feeder only needs to be moved.

There are large differences in feed capacity of feeders used in the pen studies. The Verde feeder will hold about 200 pounds of milo, whereas the Lehman H holds 92 pounds, the experimental 64 pounds and the hanging bucket and Quail Master feeders only about 35 pounds. With equal use, the hanging bucket and Quail Master feeders would need refilling about six times more often than the Verde feeder.

The cost of the feeders also varied (Table 1). Purchase price of the Quail Master feeder was \$150. It only cost about \$10 to make the hanging bucket feeder. When costs were amortized over the life of the feeders (before any part needs replacing), the Quail Master was most costly at \$25 per year and the hanging bucket was least costly at about \$2 per year.

Conclusions

Each of the feeders used in the field study had different design problems. The 55-gallon drum feeder was relatively weather proof but easily accessible to nontarget species. The Allen-Young feeder required no enclosure but had problems with feed clogging during wet weather and was costly. The Pasadena feeder had three major problems. First, ants had easy access to the feeder and clogged the feed tube by building mounds. Second, rain caused clogging and rotting of the grain. Third, the lid rusted out within 1 year on one of the three feeders, making them most costly to operate. The hanging barrel was the best feeder studied and the least costly. It did, however, have minor problems with feed caking. Hanging the feeder reduced feed problems with ants but required a large limb or manmade structure to support its heavy weight.

Of the feeder types used in the pen studies, the Quail Master had the highest quail use. This feeder also had the highest cowbird use, lowest feed capacity, highest annual cost and most problems with feed caking and feces accumulation. Songbirds visited the Quail Master and Verde feeders more than others. Bobwhite use of the verde

feeder was high and deer, javelina and cowbird use was low. This feeder has a large feed capacity and only minor feed caking problems. The experimental feeder was too accessible to nontarget species to be effective without fencing. The Lehman H feeder had high cowbird use but low deer and javelina use. We had no feed caking problems with this feeder. Even though the hanging bucket feeder had moderate quail and deer use, its low cost and simple design are desirable.

Decisions on which feeder type to use should be based on each manager's specific concerns. If feed clogging and spoiling is a problem because of a wet climate, the Lehman H may be best. On the other hand, if exclusion of large animals and a large feed capacity is desirable, the Verde feeder may be the best choice. When feeder cost is the concern, the hanging barrel and bucket feeders are as useful as any other.

Effectiveness of Feeding Programs

Effects of feeding quail have been variable. In Florida, Frye (1954) found that when natural food supplies were low, bobwhite numbers increased with supplemental feeding. In Alabama, Haugen (1957) reported that feeding did not increase bobwhite numbers and failed to re-establish coveys in areas with inadequate food supplies and cover. In our field study, bobwhite density did not increase with supplemental feeding. Dense grass cover and a lack of brushy cover on the site likely prevented the feeding program from being beneficial.

In South Texas, Doerr (1988) found that feeding increased winter survival of quail on deep sand sites but failed to improve survival on red sandy loam or clay sites. He suggested inappropriate habitat structure and sufficient food supplies as reasons for the ineffectiveness of feeding on clay and red sandy loam sites. Feeding did not improve reproductive success of bobwhites on any study site. He found that feeding can increase the probability of locating quail but cautioned that feeding cannot overcome poor habitat structure or high hunting pressure.

Feeding may be most effective during drought. With the proper habitat, an appropriate feeding program can carry quail through a drought. Guthery (1984) recommended the following feeding program for ranches with good habitat structure, proper grazing and moderate hunting:

1. If April to July rains total less than 5 inches, feed a high energy supplement November through January;
2. If September and November rains are less than 5 inches, feed a high protein supplement during February and March;
3. Feed energy supplements all year with prolonged, severe drought and place feeders near water.

The message is simple. Feeding will help only if food availability is limiting quail numbers and the habitat structure is suitable.

Economics of Feeding Programs

Economic benefits from feeding quail are questionable. The increased winter survival that Doerr (1988) found as a result of feeding could only provide an economic return through increased harvest during the year of feeding. Because fair lease prices are determined using fall densities, an increased winter survival would not raise the value of a lease the next year. In our field study, given the limitations in habitat structure, feeding was not economical.

A review of nine intensive experimental feeding programs by Caesar Kleberg Wildlife Research Institute researchers shows the average net gain from feeding is about 0.2 quail per acre. On six sites there was no net gain in fall density. Net gain on the remaining three sites was relatively high. At an average net gain of 0.2 quail per acre, the cost per covey (12 birds) gained was between \$120 and \$300. Cost per quail in the bag (at a 40 percent harvest rate) ranged from \$24 to \$60.

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