QUAIL SUPPLEMENTAL FEEDING: PROS AND CONS

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Abstract: Supplemental feeding is used to enhance quail populations on hunting leases. Feeding may be used to improve quail survival, body condition, reproduction, and/or the ability to harvest birds. However, such feeding programs are expensive, with much of the feed going to non-target animals. Feeding may not increase quail survival, body condition, or reproduction and birds concentrated at feeders may be more susceptible to predation and disease. Food should be limiting quail population before a feeding program is implemented. Variability in efficacy of supplemental feeding and the costs associated with a feeding program need to be considered by managers and compared to potential risks and gains of other management tools before such a program is implemented.

The reasons why people supplementary feed quail include attempting to: (1) improve quail survival; (2) increase quail body condition (i.e. larger quail to hunt); (3) improve reproduction; and, (4) to attract quail to specific areas for hunting. Conversely, others do not supplementary feed quail because: (1) it's costly; (2) non-target animals eat most of the feed; (3) quail numbers and body condition are not increased; (4) feeders attract predators and reduce quail numbers; and, (5) feeders concentrate quail which can lead to disease problems. In this paper, I look at each of these factors, summarize my understanding of each, and conclude with my recommendations on supplemental feeding of quail as a management tool.

Theory Behind Feeding Programs

A well-conceived quail management program needs to be based on sound ecological principles. An area managed for quail needs to meet several assumptions before supplemental feeding can be an effective tool (Doerr 1988). Doerr's (1988) first assumption concerning habitat was that native food supply must limit quail numbers before a supplemental feeding program would be effective. He noted that food could be limited in quantity, quality, temporal or spatial distribution, or a combination of these factors. His second assumption was that no other habitat parameter restricted the current population level from increasing when the food supply was improved. A third assumption was that quail would use the supplied feed. The provided feed must fulfill all or part of the quail nutritional requirements that are limiting and should be available at the appropriate time and place and for the necessary length of time. A fourth assumption was that quail would be healthier with an improved food supply. These quail should have greater body fat reserves and should be more capable of withstanding stresses of inclement weather and predation. Therefore, improved health (or condition) would cause a related increase in survival of existing animals or increased reproductive success.

If supplemental feeding is to be an effective tool, increases in quail density on fed sites should be related to increased reproductive success or survival. Quail from fed sites should have greater amounts of body fat and high amounts of supplemental feed usage should be documented. If supplemental feeding did not increase quail population densities then either food supply was not limiting or some other habitat factor was limiting the population.

Guthery (1986:59) suggested that an appropriately executed feeding program could enhance breeding success of northern bobwhite (*Colinus virginianus*). This type of program would include supplying a whole-ration supplement throughout breeding and brooding. However, most supplemental feeding programs provide feed only during the fall, winter, and the beginning of the breeding season, however, several ranges in south Texas now feed year around. In addition, most programs feed with whole milo that does not meet minimum protein or phosphorous requirements of northern bobwhite (Nestler et al. 1944). Protein has been suggested as an important supplemental nutrient for improving bobwhite productivity (Guthery 1986:53). Wood et al. (1986) found that south Texas bobwhites were able to meet minimum reproductive protein requirements but not minimum phosphorous requirements by using native foods. Their study suggested that protein may not be limiting but phosphorous may have been limiting. Therefore, the use of a whole-milo supplement fed in the winter and early spring may not meet the necessary assumptions of supplying the appropriate

nutrient at the appropriate time to improve reproduction.

What Has Our Research Told Us

In a 2-year study to determine the effects of supplemental feeding on population attributes and body condition of northern bobwhite in south Texas, Doerr (1988) established 4 paired study sites representing a cross-section of soils, vegetation, and hunting pressure. Whole milo was provided from late fall through March during the study. Feeding increased winter survival of quail on deep sand sites by 225-245%. Feeding did not improve survival on red sandy loam or clay sites. The red sandy loam and clay sites had greater indices of native food production compared to the deep sand sites, suggesting native food was not limited on the red sandy loam and clay sites. Feeding did not improve reproductive success of quail on any of the study sites. Percent body fat of quail from fed sites tended to be greater then for birds on non-fed sites. A high percentage of birds collected had milo present in crops and there was a tendency to find quail close to feeders more often than at points where feeders were not present, suggesting that increased survival was related to availability of supplemental feed.

Doerr (1988) noted that the variation in cost of feeding at his study sites were the result of feeder cost. Doerr and Silvy (1987) recommended using feeders that restricted feed from flowing on the ground. This reduced feed loss and the chance of quail ingesting feed contaminated by water, fungus, or fecal matter that should promote disease. Limiting feed loss to non-target animals such as other birds, rodents, livestock, and big game can help keep feeding costs down. Fences or other mechanical barriers that keep larger animals from feeders are important. Hanging feeders will reduce feed loss from ants and rodents (Guthery 1986). Harvester ants can remove up to 0.25 lbs/hour of whole milo from feeders (Doerr and Silvy 1987). Doerr (1988) noted that annual operating costs including maintenance, feed, and transportation was $4.61-$5.35/acre (in 1988 dollars). Cost of feeding on the deep sand sites, based on additional birds surviving through spring, ranged from $5.70- $6.58/bird. As the other sites did not produce additional birds, the cost for additional bird surviving could not be figured, therefore, the cost of feeding was a financial loss. Lease rates in 1988 were less then $4.00/acre, therefore, it would have been more cost effective to lease additional lands for hunting then to feed.

Doerr (1988) also noted that feeding did improve the opportunity for hunters to locate quail. This did not hold when quail densities were extremely low. He also found that feeding did not increase predator activity. Nor was there a greater probability of seeing predators at feeders compared to locations without feeders.

Reasons Why Feeding May Not Increase Quail Reproduction

So why didn't supplemental feeding improve reproductive success of quail on any of the study sites? Rainfall and moisture availability are among the most influential forces on terrestrial ecosystems (Clarke 1954:109), avian reproduction (Marshall 1959), and quail abundance (Bridges 1999). The "boom or bust" relationship between quail abundance and weather conditions was considered by Payne and Bryant (1994:270) to represent a "classic example" of wildlife response to drought. Guthery (1986:17) proposed that surface water availability might be a limiting factor in more arid regions such as southern Texas and might be especially important to laying females (Koerth and Guthery 1990). However, subsequent analyses failed to provide conclusive evidence of this relationship (Guthery and Koerth 1992). Guthery et al. (1988) concluded that aridity of climate influenced the effective reproductive season for bobwhite.

The mechanisms by which drought and other climatic conditions influence quail numbers have been the subject of much conjecture. Rainfall might affect quail abundance by chilling exposed chicks and destroying nests (Stoddard 1931:201), improving range condition in overgrazed pastures (Cantu and Everett 1982), influencing vitamin A availability (Lehmann 1953, Hungerford 1964), influencing phosphorus availability (Cain et al. 1982), concentrating phytoestrogens (Leopold et al. 1976, Cain et al. 1987), impacting vegetation (Campbell 1973), impacting insect availability (Roseberry and Klimstra 1984:112), and influencing corticosterone levels through water stress (Cain and Lien 1985, Giuliano et al. 1995).

Young quail chicks feed almost exclusively on insects (Roseberry and Klimstra 1984). Supplemental feeding does not produce more insects for chicks, therefore, one would not expect supplemental feeding to increase reproductive success if chick food was limiting within an area. Therefore, no matter how much supplemental feeding increases adult quail survival and body condition, if chick food is

limiting factor, supplemental feeding will not increase quail numbers for the fall hunt. To Doerr's (1988) list of assumptions, a fifth assumption is needed; that supplemental feeding will benefit all segments (young as well as adult quail) of the population.

Management Recommendations

In summary, no single tool will produce consistent results with quail populations because of the many environmental factors that affect survival and reproduction. Knowing what key environmental factors are limiting a quail population is the best tool for management of the population. Understanding management objectives and the habitat are essential to gain benefits from a feeding operation. Studies have shown the effects of supplemental feed on quail population were variable. Variability in efficacy of supplemental feeding and the costs associated with a feeding program need to be considered by managers and compared to potential risks and gains of other management tools before such a program is implemented.

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