Research Note

Effects of Supplemental Feeding on Physiological Condition of Northern Bobwhite in South Texas

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The effects of supplemental feeding on populations of northern bobwhites (hereafter, bobwhite) have been the subject of many previous studies (Frye 1954; Keeler 1959; Robel et al. 1974; Doerr and Silvy 1987; DeMaso et al. 1998, 2002; Townsend et al. 1999). Burger and Linduska (1967), Ellis et al. (1969), and Guthery (1997) noted that supplemental feeding and food plots have not produced a positive population response for bobwhites. However, Lehmann (1984:16, 276) suggested that bobwhites benefited from feeding in south Texas, USA, and Guthery (1986:48–59) suggested that supplemental feeding could benefit bobwhite reproduction and survival if habitat structure was of sufficient quality and the feeding program was handled correctly. Guthery (2002) now tempers his 1987 position about supplemental feeding and other means of habitat quality enhancement, by supporting maximizing habitat quantity over habitat quality. Townsend et al. (1999) suggested that bobwhites can gain nutritional benefits from supplemental feeders during times of severe winter stress. Doerr and Silvy (2002) reported that supplemental feeding with whole milo increased survival of birds on deep-sand-range sites, but it did not increase bobwhite densities the following fall. Feeding did not affect bobwhite density or survival on clay soils of the Gulf Coast or on red-sand loams of south Texas. Doerr and Silvy (2002) also found that whole milo supplied from winter through early spring did not increase reproductive success on any of their study areas.

Improved food supply has been hypothesized to result in better body condition or reduced danger to stress or predation, thus increasing survival (Doerr 1988). Improved food supply may alter time of reproduction, increase realized reproductive effort, or improve nurturing efforts. Stress in bobwhites is reflected by weight loss (Robel 1972; Robel et al. 1974, 1979), reduced fat reserves (Robel 1969, 1972; Robel et al. 1974, 1979), and increased mortality (Robel 1965, Robel and Fretwell 1970, Robel et al. 1979). Kendeigh (1969, 1970) proposed that demands by birds to maintain core body temperatures caused a greater depletion on fat reserves. Leif and Smith (1993) noted that bobwhites feeding on low-energy foods accumulated less body fat than those feeding on high-energy foods. Robel et al. (1974) reported that bobwhites having access to food plots during late winter in Kansas accumulated more body fat compared to birds not having access to food plots.

We monitored bobwhite body condition in response to fall feeding of a high-energy supplement (milo) in south Texas. Specifically, we studied the effects of supplemental feeding on the physiological condition of bobwhites in fed and nonfed sites in south Texas. We hypothesized that wild birds fed supplemental whole milo would have greater body fat content than birds not fed supplemental milo.

Study Areas

We established 2 paired study areas (each with a 260-ha fed and a nonfed site) in south Texas, USA, 35 km south of Hebbronville and centrally located in Jim Hogg County. We selected the 2 study areas based on geographic proximity and similarity of current and past grazing management, range condition classes (U.S. Department of Agriculture 1976), bobwhite harvest rates, precipitation patterns, and vegetation types. Initial bobwhite densities, vegetation, soil types, grazing pressure, and hunting activity were similar on the 2 study areas and the surrounding areas (Doerr 1988). These 2 areas received about 50 cm of rainfall annually, which was near normal (59 cm).

The first study area (Study Area I) was located on the H. C. Weil's Palangana Ranch in Jim Hogg County, and a 0.3-km buffer of similar habitat separated the fed and nonfed sites. Soils were dominated by deep sands in the Nueces and Saritas soil series, although inclusions of sandy loam of the Delmita series comprised $<20\%$ of each study site. Grazing management consisted of a cow-calf operation with year-long continuous grazing at 8 ha/animal unit (AU). This was changed to a 2-herd, 3-pasture system at 10 ha/AU during the study. Bobwhite densities in fall 1985 were 1.5 (SE = 0.4) birds/ha on the control site and 1.6 (SE = 0.6) birds/ha on the fed site (Doerr 1988).

Mesquite (*Prosopis glandulosa*) mottes with Brazil (*Condalia obtusifolia*), lime-prickly ash (*Zanthoxylum fagara*), lantana (*Lantana horrida*), and granjeno (*Celtis pallida*) were common woody species and comprised 10% of the vegetation cover of the study sites. Important herbaceous species associated with the mesquite mottes included ground cherry (*Physalis viscosa*), dichanthelium (*Dichanthelium* spp.), bristlegrass (*Setaria* spp.), and panicgrasses (*Panicum* spp.). Open areas (90% of cover) were dominated by perennial horsemint (*Monarda* spp.), milkpea (*Galactia* spp.), three-awn (*Aristida* spp.), thinseed paspalum (*Paspalum setaceum*),

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