Foraging Behavior of Northern Bobwhites in Relation to Resource Availability

Ryan Miller
Bill Palmer
Shane Wellendorf
Wes Burger Jr.
Rationale

• Supplemental feeding is a common management practice

• Bobwhites readily use supplemental feed

• Increased survival observed

• Hunting Success/Baiting

![Graph showing Hen Survival Rate over years with FED and Not FED conditions.](image)
Supplemental Feeding Statistics

- 1.8 miles/100 acres of habitat
- Covers about 12% of habitat area
- Averaged 2.2 bu./acre/year; range (0.91 – 3.6 bu/acre/year).
- 5.7 bu of grain per mile
- Every 2 weeks
OBJECTIVES

1. Modeled loss rate of sorghum at 2 feeding rates
   • 2.0 bu/ac/year (high feed rate)
   • 0.5 bu/ac/year (low feed rate)

2. Determine if seed availability was related too:
   • Bobwhite diet during late winter
     • Hypothesis-quail would exhibit a giving up density
   • Bobwhite covey movements during late winter
     • Hypothesis- daily distance traveled was inversely related to seed availability
   • Space use in relation to the feeding patch
     • Hypothesis-coveys would be closer to the feed patch, than random, especially at higher seed densities
Methods

• Tall Timbers, 1 Feb through 15 Mar, 2009-2010
• “Feed Patch” was a 14-m wide buffer along the dedicated feed trail.
• Covered approximately 11% of each treatment area
• Treatments were randomly applied in 2009, rotated in 2010.
• Radio-tagged bobwhites to determine movements and space use.
• Harvested bobwhites to assess diet from crop contents
• Whole body Proximate Analysis (MSU Nutritional Laboratory)
Distribution of Sorghum in Feed Patch
Sorghum Seed Availability

Randomly placed plots (n = 60) were every 15 days associated with spreading feed.
All debris and seeds were removed from a 0.5 m² sampling square.
Known starting density of seeds was placed in the sample square and plant debris replaced.
20 randomly selected plots were vacuumed at 5, 10 and 15 days post-spreading.
Counted Sorghum seeds remaining to model seed loss rate.
Sorghum availability 15-day Feeding Cycle

High Feed Rate

Low Feed Rate

$y = 49.862 - 2.566x$

$r^2 = 0.998$

$y = 10.955 - 0.845x$

$r^2 = 0.998$
Crop Contents

- Crop contents of 285 bobwhites during study
- No Feed, Low and High Feed Treatments
- Sorted, dried and identified
Seasonal Telemetry

- Located > 3 times per week, 1 November to 15 March
- Locations were based on homing techniques, locations placed on detailed maps
- Locations were used to determine daily and seasonal utilization distributions in ADEHABITAT package in R
Intensive Telemetry on Focal Coveys

- Four days per week in Low and High Feed Treatments only
- Monitored radio-tagged “coveys” every 30 min roost to roost using 2 observers per day (one am/one pm), per covey.
- Triangulated from ~40m using GPS
- GPS map did not have Feed Patch on it to avoid biasing locations
- Locations determined using LOAS 4.0 Software (ESS LLC)
- Censored locations with error eclipse > 0.01 ha
- Averaged 21 locations per day, 17-24
RESULTS: DIET

NO SORGHUM

LOW FEED RATE

HIGH FEED RATE

2009

2010
Percent of Sorghum in Crops in Relation to Seed Availability

![Graph showing the percent of sorghum in crops in relation to seed availability.](image-url)
## Body Condition

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Year</th>
<th>N</th>
<th>Lipid%</th>
<th>SE</th>
<th>Total body mass</th>
<th>SE</th>
<th>Total body lipids(g)</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Feed</td>
<td>2009</td>
<td>16</td>
<td>6.6</td>
<td>0.4</td>
<td>160.9</td>
<td>2.3</td>
<td>10.6</td>
<td>0.7</td>
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<td></td>
<td>2010</td>
<td>50</td>
<td>5.8</td>
<td>0.2</td>
<td>165.1</td>
<td>1.8</td>
<td>9.7</td>
<td>0.3</td>
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<tr>
<td>Low Feed Rate</td>
<td>2009</td>
<td>30</td>
<td>5.9</td>
<td>0.1</td>
<td>164.1</td>
<td>1.5</td>
<td>9.8</td>
<td>0.2</td>
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<tr>
<td></td>
<td>2010</td>
<td>71</td>
<td>6.1</td>
<td>0.2</td>
<td>167.7</td>
<td>1.3</td>
<td>10.3</td>
<td>0.3</td>
</tr>
<tr>
<td>High Feed Rate*</td>
<td>2009</td>
<td>30</td>
<td>6.9*</td>
<td>0.2</td>
<td>167.1</td>
<td>1.9</td>
<td>11.6</td>
<td>0.5</td>
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<tr>
<td></td>
<td>2010</td>
<td>85</td>
<td>7.2*</td>
<td>0.2</td>
<td>165.4</td>
<td>1.2</td>
<td>11.9</td>
<td>0.3</td>
</tr>
</tbody>
</table>

*F2,276 = 12.86, P<0.001
Space and Distance Moved

- No difference in Seasonal Home Ranges for among 3 treatments or among years (18.3 – 21.2 ha; $P=0.55$)
- Daily home ranges were 15% lower for the High Feed treatment (0.71 – 0.72 ha) than the Low (0.83 – 0.85 ha) ($P < 0.06$)
- Centered bivariate locational distributions indicated greater dispersion of locations in the Low versus High Feed Trt ($P < 0.001$)
- No difference in mean step length (24.5 – 27.2 m) among treatments
- No difference in total distance (495 – 528 m) among treatments
Covey Use of the Feed Patch
Use of the Feed Patch by Bobwhites and Diet

102 covey/days monitored; average 21 locations

15.2% of Locations in Feed Patch for Low and High Feed Treatments
Mean Distance to Feed Patch

Average Distance 42.0m (SE= 1.0) for Random Locations
Average Distance 41.3m (SE =3.2) for Actual Locations
Conclusions

• Bobwhites generally followed OFT selecting sorghum seeds over native seeds.
• Bobwhites demonstrated a foraging threshold, abandoning the feed patch at low seed densities (<10 seeds/0.5m$^2$ or ~1.6Kcal/0.5m$^2$)
• Increases in survival from supplemental feeding do not appear to be caused by reduced movements or range size
• Bobwhites were not closer than random to the feed patch unless seed availability approached the foraging threshold
• Spreading supplemental feed, rather than point feeders, limits potential for baiting and increased harvest rates
• Supplemental feeding at the High Feed Rate provides consistent food resources for bobwhites in winter maintaining consistent lipid levels among years
Thanks too:

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