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An Evaluation of Some Marking Techniques Used on Bobwhite Quail

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AN EVALUATION OF SOME MARKING TECHNIQUES USED ON BOBWHITE QUAIL

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Abstract:

Summarized are data obtained from field testing various marking techniques used to distinguish individual, unrestrained bobwhite quail. Four methods and combinations of each included various types of back tags, colored leg bands, dyes, and radio transmitters. Discussed are methods, advantages, and limitations as based upon field observations of 195 back-tagged quail, 86 quail with colored leg bands, 55 dyed quail, and 91 radio-marked quail.

The ability to mark individual animals so that they can be recognized at a later date under field conditions is essential to many studies. Back tags have been employed successfully in numerous investigations including those by Blank and Ash (3) in studying partridges and by Labisky and Mann (10) in studying pheasants. Colored leg bands have been used extensively in researching ruffed grouse (7), turkeys (11), and prairie chickens (8). Dyes have been used to mark game birds with varying success (2,5,6,9,12). Radio-transmitters have been employed for numerous studies of game-birds, but with limited success on the bobwhite quail (1) because of their small size. This paper summarizes data obtained from field testing of the above techniques on individual, unrestrained bobwhite quail (Colinus virginianus).

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Methods and Findings

Back Tagging

Tags were constructed of Fibre-thin and Amor-tite (vinyl material bonded to nylon mesh). Tag size varied from 2.75" x 1" to 5.25" x 0.75". Ten different colors were used (white, yellow, light blue, dark blue, orange, red, black, bright green, armor green, and pink). To maximize the number of individually marked birds, various numbers and letters were painted (vinyl weathercoat paint) on the tags.

A total of 195 quail were back-tagged. Tags were attached by means of a calf-skin harness or Fibre-thin strips which were passed from the front of the tag under the wings and stapled to the front of the tag. It is essential that the harness is not too tight and that the strap is passed under the scapular feathers instead of over them.

Both materials employed were considered adequate for use, but Fibre-thin tags curled upward after a short time in the field. The curling was caused by the paint used to put symbols on the tag and was alleviated by painting the symbol on both sides of the tag. All sizes of tags used worked well; but the narrower tags seemed to interfere less with flight than the wider ones.

Certain difficulties in recognition were noticed between tags of similar colors, particularly in poor lighting, or when the observation must be brief because of intervening vegetation or rapid movement. Inability to distinguish between the colors red and orange occurred most commonly, both on the ground and in flight. We do not recommend use of both colors in the same covey. The 2 shades of blue were also difficult to differentiate. There was no difficulty in distinguishing between the 2 greens. However, we do not recommend using armor green because the drab color is difficult to see on a flying bird. Dark colors (black, dark blue, and red) were not visible or were indistinguishable beyond 50 yards. The most visible colors were white, yellow, and pink, respectively.

The use of 2-color tags increased the number of quail individually identified, both in flight and on the ground. Division of the 2 colors on the tag should be arranged longitudinally and should include both sides of the tag. Motion of the tag in flight makes it quite difficult to determine colors if the tag is painted on 1 side only; horizontal division of the color results in the impression of a single color tag. Contrasting primary colors should be used.

Any numeral, letter, or other symbol chosen as a marker should be placed in the center of the lower half of the tag. The scapulars often cover the upper half of the marker, which obscures the identification symbol. We identified all symbols tested on tags up to 50 yards using 7 x 50 binoculars. Occasionally, identification of 2 number tags at this distance was difficult. When quail are feeding, the tag rests in a horizontal plane and the smaller number necessary on such tags is more difficult to read. When observations were made at distances of 80-85 yards, 2-number tags were seldom identified while the larger single number was discernible. Increasing the observational distance to 100 yards resulted in loss of definite recognition of all symbols; under poor lighting conditions even the color of the tag cannot be recorded.

Colored Leg Bands

Colored plastic leg bands (National Band and Tag Co., Newport, Ky.) were placed on 86 quail. Two bands were placed on 1 leg to increase the visibility of the marking.

This method for identifying individual quail was used with little success. However, on several occasions where dyed birds were seen at such an angle that the back tag was not visible, the identification of the bird was obtained by use of the leg bands and dye colors. In our opinion, 1 or 2 such observations justify the use of colored

bands, considering the small amount of expense and the time involved in placing the bands on the quail's leg.

Color Dyeing

Fifty-five quail were color dyed in an attempt to increase the number of individually recognizable birds. Rhodamine BXP, Rhodamine 60, Auramine, Brilliant Green, Victoria Blue B, Brilliant Scarlet 3R, Crocien Orange Y, and picric acid were used. There was some evidence that mixing of dyes might produce desirable colors; this was not investigated fully.

Auramine, Rhodamine BXP, and Brilliant Green were recognizable dyes in the field. Picric acid yielded an acceptable color at application, but it faded to a greenish yellow. All other dyes faded rapidly under field conditions.

The birds were dyed by either dipping them in the solution, swabbing them with cotton, or spraying them with a perfume atomizer or a "Windex" spray bottle. Swabbing with cotton proved to be the only method acceptable. An excellent job of dyeing was obtained by dipping the quail into solution; however, the feathers tend to become saturated and the resulting temperature loss as the alcohol and water evaporated caused stress to quail. The use of a perfume atomizer and a "Windex" spray bottle did not give a sufficient dyeing of the feathers.

No noticeable change of behavior due to dyeing was noted; dyed quail were accepted by covey mates and mated dyed quail were observed many times.

Dyeing quail for identification was successful as they were recognized easily on the ground and in flight. It is limited, however, by the small number of acceptable dyes available. This problem can be solved in part by using secondary markers. It must be recognized that any dye will be recognizable only until the time of molt. During this study dyed quail were not observed after mid-July; loss of dyed feathers during molt probably was responsible for this.

Radio Transmitters

Ninety-one quail were radio marked during the past 7 years. This entailed the use of 3 different types of transmitters: Type A with a loop antenna (26.550 to 26.640 megacycles); Type B with a whip antenna (148.000 to 148.330 megacycles) and a battery packaged as described by Brander (4); and Type C which was the same as Type B, except that the battery was packaged with the transmitter. A single mercury cell (Mallory RM-625) was used as the power source for all transmitters. Estimates of theoretical transmitter life varied from 30 to 50 days depending on the power drain of the particular transmitter. All transmitters weighed between 9 and 11 g.

Method of attachment varied with the type of transmitter employed. Type A used the same type of harness as used with the backtags; the

harness simply passed from the front of the transmitter, around the wings, and was attached to the front of the transmitter. Type B used the same harness as described by Brander (4). This entailed running the harness with battery leads to the battery on the breast, and then passing the harness straps under the wings and attaching them to the back of the transmitter. On Type C, the harness straps led from the front of the transmitter thence around the neck to the front of the breast. Here they were crossed over and passed under the wings and attached to the back of the transmitter.

Transmitters were believed to have had a minimal effect on quail if the harness was adjusted properly. All birds with properly adjusted harnesses flew readily when released and flushed normally at later dates. Instrumented birds appeared to pair normally and nesting instrumented birds were noted in several instances. However, birds had to adjust to all 3 types of transmitters. During adjustment mortality was high (13%); 54% of all mortality occurred within the first 5 days after instrumentation.

A comparison of the 3 types of transmitters is presented in Table 1. Type C transmitter produced the best results. This transmitter yielded best life expectancy and least premature termination of signal. It was carried readily by quail, including several cases by quail of only 60 days of age; 1 quail carried an operable transmitter for 121 days. The Type A transmitter appeared cumbersome, and on 2 occasions quail were found dead after the loop antenna became entangled in vegetation. The leads to the battery of the Type B transmitter broke after a short time in the field. Also, this type of transmitter was never recovered from birds believed killed by predators; apparently the predators broke the leads.

Summary

Each of the 4 methods of marking has limitations as well as advantages. The use of any 1 of these methods depends solely on the type of study and the types of data the researcher wishes to obtain. Important to consider is how readily the marker is distinguishable in the field. While back tagging and color dyeing give acceptable results, the radio transmitter is unquestionably the easiest way to locate and distinguish individual animals. Also of concern is the duration of the marker. Back tags and color leg bands may last the life of a quail, while color dyeing will last only until the time of molt. Data for radio-marked quail rarely are obtained for a period more than 2 months. A third point to consider is the type of data the researcher wishes to gather. The radio transmitter yields continuous data, while the other methods yield only interrupted data. A fourth constraint is the number of birds the investigator desires to mark. Obviously, radio-marking is somewhat limited due to the expense involved.

Table 1. Comparison of radio-transmitters field tested on bobwhite quail.

Type	No. used	Suboptimum transmitters			Transmitters recovered while still operating			Transmitters operating expected life			Overall average life
		No.	%	Average life in days	No.	%	Average life in days	No.	%	Average life in days	
A	14	6	42.9	5.0 (1-11)	7	50.0	8.4 (1-17)	1	7.1	39.0	9.1 Days
B	10	7	70.0	6.8 (1-23)	1	10.0	19.0	2	20.0	39.0 (36-42)	14.5 Days
C	85	23	27.0	10.3 (1-27)	29	34.1	8.3 (1-29)	33	38.8	36.8 (30-56)	20.0 Days

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INTERRELATIONSHIPS BETWEEN VARIOUS QUAIL POPULATION MEASUREMENTS

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Introduction

Early investigators of the bobwhite used covey counts to measure population numbers. We do not know when quail were first censused by this method, but we do know that Leopold and Errington put much emphasis on these counts. Covey numbers and their sizes are of great importance