

FOODS OF BOB-WHITE IN WISCONSIN

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STUDIES of the food habits of the Bob-white (*Colinus virginianus*) with which I have been associated in north-central United States have been carried on during the winter months chiefly by means of field observations (supplemented by stomach and fecal examinations) at times when snow was on the ground, and the results of this phase of the work have been summarized (P. L. Errington and F. N. Hamerstrom, Jr., Research Bull. Iowa Agric. Exp. Sta., no. 201, 301-443, 1936). Food habits of the species for the warmer months are fairly well indicated by data now in hand from a series of fifty-eight stomachs (including six of chicks) collected in Dane, Sauk, and Columbia Counties, Wisconsin, between April 4 and November 28, 1930 and 1931. These stomachs were examined by Mr. Leon H. Kelso, Division of Food Habits Research, U. S. Biological Survey.

The detailed Biological Survey analyses reveal a very great variety of food items, of which most are recorded only as traces or in other small amounts. It is, of course, likely that some of these may have physiological significance far out of proportion to their dietary representation. Conversely, many others were doubtless picked up at random by the feeding birds, since apparently one may justifiably expect Bob-whites sooner or later to sample or to eat incidentally almost any objects of swallowable sizes occurring in their habitats. Upon occasion, however, quail may show considerable discrimination as to what they eat (C. O. Handley in H. L. Stoddard's 'The Bob-white Quail,' chapter 6, 1931, and A. S. Hawkins, Amer. Midland Nat., 18: 417-425, 1937). Organization of the data according to changes shown in feeding trends and seasonal availability of foods seems in this instance preferable to grouping according to uniform time intervals. Outside of the winter months, there appear to be five seasonal categories to which the data rather naturally belong: (1) post-winter, when few insects are active and, except for some green growths, the principal quail foods are seeds from the previous year; (2) a period of increased insect abundance prior to the appearance of the season's fruits and seeds; (3) mid-summer, with abundant insect life, small fruits, and small grains; (4) late summer and early fall, marked by abundance of certain insect types and the maturing of favorite vegetable foods; (5) late fall to early winter, before the coming of lasting snows.

The food habits of twelve birds collected in 1930 and 1931, from April 4 to May 10, did not differ greatly from those observed on the part of well-fed covey members in March or even in mid-winter. Principal foods were achenes of lesser ragweed (*Ambrosia artemisiaefolia*), achenes of several

species of smartweed (notably *Polygonum punctatum*), and kernels of corn (*Zea mays*), averaging respectively 34%, 18% and 17% of the foods in the stomachs. Grains of wheat (*Triticum sativum*) made up 82% of the food in a single stomach, thus averaging 7% for the twelve. Acorn mast (*Quercus* sp.) and seeds of pigeon grass (*Chaetochloa glauca*) and three-seeded mercury (*Acalypha virginica*) were represented in amounts averaging between 1% and 4%. Early-April stomachs of the series contained grass leaves (Gramineae), but after April 18, leaves of clover (*Trifolium* sp.) and dandelion (*Taraxacum officinale*) were eaten in quantities sufficient to bring the average of each for the twelve stomachs up to about 4%. Wild grape (*Vitis vulpina*), dogwood (*Cornus* spp.), sumac (*Rhus* spp.) and other fruits were represented irregularly, as were insects, the latter being mainly small beetles (Coleoptera) and ants (Formicidae) occurring after the middle of April and averaging 4% of the food contents of the stomachs.

Food contents of eleven stomachs collected from May 22 to June 24, 1931, were still predominantly of vegetable matter, but animal remains averaged 29% by bulk. Corn made up 19% of the average food material; seeds and pods of mouse-ear chickweed (*Cerastium arvense*), 9%; beans of black locust (*Robinia pseudoacacia*), 5%; and seeds of crowfoot (*Ranunculus abortivus*), 4%. Other foods averaging between 2% and 7% by reason of heavy representations in single stomachs were seeds of violet (*Viola* sp.), elm (*Ulmus americanus*), and dandelion. Wild grapes were eaten frequently, and other fruits included those of sumac, ground cherry (*Physalis* sp.) and dogwood. Clover leaves were eaten in quantity by one bird. Among the insect foods, leaf beetles (Chrysomelidae), particularly *Zygogramma suturalis*, and the larvae of sawflies (Tenthredinidae) were most heavily represented (about 5% for each of the two families); other insects eaten were mainly Pentatomidae and other bugs (Hemiptera), such weevils (Curculionidae) as *Hypera punctata* and *Tanymecus confertus*, some damsel-flies (Zygoptera) and blow-flies (*Calliphora* sp.), crickets (*Gryllus assimilis*), and miscellaneous dung beetles (Scarabaeidae), ground beetles (Carabidae), and Formicidae.

The diet of thirteen adult Bob-whites taken from July 5 to July 29, 1930 and 1931, was strongly vegetable; animal matter dropped to an average of 14% and was liberally represented in only two stomachs. Achenes of smartweeds (principally *Polygonum convolvulus*) averaged 15%; corn kernels, 14%; and grains of wheat and oats (*Avena sativa*) 13% and 11%, respectively. Individual stomachs contained substantial quantities of elm seeds, catalpa-seed fragments (*Catalpa bignoniodes*), capsules of shepherd's purse (*Capsella bursa-pastoris*), achenes of sedge (*Carex* sp.) and seeds of wood sorrel (*Oxalis stricta*) and panic grass (*Panicum scribnerianum*). There was some representation of beans of black locust and other Leguminosae.

Seeds of bramble (*Rubus* sp.) averaged 16% of the food contents. Fruits eaten in lesser quantities included wild cherries (*Prunus* spp.), dogwood, ground cherry, and sumac. Insects taken were largely grasshopper nymphs (*Melanoplus femur-rubrum*) and stink bugs (Pentatomidae), especially *Euschistus* spp.

On the other hand, stomach contents of six young collected between July 18 and August 5, 1930 and 1931, at ages from about one day to about three weeks, averaged 83% animal matter. This consisted largely of miscellaneous insect material, with nymphs of grasshoppers (Acrididae) and false chinchbugs (*Nysius* sp., Lygaeidae) predominating. Spiders (Arachnida) were well represented, as also were Curculionidae, Chrysomelidae, and Formicidae. Perhaps half of the vegetable matter was of *Rubus* seeds; other plant foods eaten to some extent were seeds of sweet clover, black locust, *Oxalis* spp., and *Polygonum ramosissimum*. So far as they go, the limited data bear out Handley's (op. cit., p. 160) statement: "During the first two weeks of existence, young Bob-whites . . . consume a much greater proportion of animal food than do their parents" and also: ". . . when chicks attain the age of between two and three weeks the character of their food is practically the same as that of the adults" (p. 161).

Stomachs of six specimens collected from August 1 to October 5, 1930 and 1931, illustrate particularly seasonal change in diet with the ripening of foxtail seed, this item (mainly pigeon grass) making up an average of 43% of the food. Corn averaged 17%; achenes of lesser ragweed, 7%; and achenes of *Polygonum*, 5%. Other plant foods represented importantly in individual stomachs were: beans (*Phaseolus vulgaris*), acorn mast, sumac fruits, and seeds of bramble and purslane (*Portulaca oleracea*). Animal food averaged 15%, chiefly the contents of two stomachs, of which one contained meadow grasshoppers (*Conocephalus* sp.) and the other a pentatomid, *Peribalus limbolarius*.

Transition from early-fall to winter diet is well under way by November, during which, in 1930, stomach contents of ten specimens were secured. Corn averaged 46% of the food eaten; achenes of lesser ragweed, 15%; acorn mast, 6%; achenes of Polygonaceae, 11%, mostly of cultivated buckwheat (*Fagopyrum fagopyrum*) from stomachs of five quail collected from a single covey. Wheat grains, achenes of sedge (*Cyperus* sp.), and seeds of jewelweed (*Impatiens* sp.) were found in quantity in individual stomachs. Sumac fruits averaged 6%, and those of dogwood and wild grape were represented. Animal matter made up an average of only 2% of the food by bulk and much of this was of Scarabaeidae, including *Aphodius distinctus*.

The proportion of gravel in the stomach contents remained high from April to July, but fell from an average of 14% to an average of 5% from August to November. Gravel averaged only 1% of the stomach contents

of the six chicks, and the greater part of this was found in the stomach of the largest; traces, however, were detected in the stomachs of three of the others. Handley (op. cit., p. 159) says that "grit is taken along with the first food."

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