

A METHOD TO DETERMINE THE WEIGHT OF FOOD  
DIGESTED DAILY BY BIRDS.

BY WILLIAM BREWSTER TABER, JR.

WHEN devising a method of taking physiological measurements of wild birds care must be taken to alter the environment as little as possible, for a change may upset the functioning of the various organs to such an extent that the measurements taken would be valueless. If, in order to measure the weight of food daily digested, wild birds were confined for considerable periods, the environment would be so radically different from the natural it is probable that it would materially effect the amount of food eaten. Restriction of activity would decrease the appetite, while fear and uneasiness caused by the unaccustomed surroundings would also have their effects. To avoid these undesirable factors the following procedure was devised.

The method consists in trapping birds of diurnal feeding habits in the late afternoon, weighing them, keeping them over night (the period of rest) and weighing them again in the morning. From the data thus obtained the daily (24 hour) rate of loss of weight may be calculated. As this loss must be balanced by the total amount of food (dry matter and water) digested, the daily loss of weight must be equivalent to the daily food consumption. Birds of nocturnal feeding habits are caught early in the morning and kept throughout the day, similar measurements being taken at the beginning and ending of their captivity. With this procedure the bird examined is placed in unnatural conditions and subjected to measurement *only after* its usual period of activity and feeding under normal unrestrained conditions; and if it is confined in a dark quiet place, disturbance of the usual digestive processes is reduced to a minimum.

This method is based upon two assumptions, first, that the bird examined is not appreciably changing in weight from day to day; second, that the hourly loss in weight during the period of rest fairly represents the rate at which body wastes are excreted during the entire 24 hours. There is no doubt that in the case of healthy

birds the first assumption introduces no error. The second assumption, however, is not strictly true. The excrement from the alimentary canal is probably somewhat greater during the period of activity than during the period of rest because the digestive and excretory functions are stimulated by exercise. The loss of carbon and moisture by way of the breath is considerably greater during the period of activity because exercise causes an immediate increase in body temperature which is controlled by the conduction of heat through the walls of the lungs and air sacs to the breath, and frequently a marked increase of body temperature is accompanied by a marked increase in the rate of respiration. Loss of weight due to wear of feathers and the sloughing of dead skin, etc., is insignificant. Loss of weight due to feeding activities of external parasites such as lice, parasitic flies, etc., is with healthy birds also insignificant. Therefore it seems, taking all of these factors into consideration, that the rate of losing weight during the period of rest is somewhat less than the rate for the entire 24 hours. This should be borne in mind while interpreting the following figures.

FOOD CONSUMPTION IN PERCENT OF ORIGINAL WEIGHT.

Species	Number Examined	Maximum	Minimum	Average
Mourning Dove	22	24.1	7.8	16.1
Screech Owl	1	—	—	19.1
Northern Flicker	1	—	—	14.6
Blue Jay	1	—	—	16.2
Bronzed Grackle	1	—	—	11.6
English Sparrow	1	—	—	11.9
Vesper Sparrow	1	—	—	19.4
Grasshopper Sparrow	1	—	—	23.4
White-crowned Sparrow	1	—	—	13.1
White-throated Sparrow	5	20.9	9.4	15.8
Slate-colored Junco	5	16.6	9.8	13.5
Towhee	1	—	—	15.1
Tennessee Warbler	1	—	—	16.4
Brown Thrasher	3	12.0	10.3	11.2
Hermit Thrush	1	—	—	14.7
		Average of 46 birds		15.4

From these figures it is evident that the daily food consumption of wild birds averages approximately 15 or 16 percent of their weight. This is true regardless of the size of the species. The little Tennessee Warbler digested only 1.73 grams of food per day while a Mourning Dove consumed 19.4 grams, but in both cases this amounted to a little over 16% of their weights.

There is a large variation among individuals of a species. For instance 22 Mourning Doves varied between the limits of 7.8% and 24.1% of their weights.

It seems probable that there is a seasonal variation, because the daily food consumption of 13 Mourning Doves trapped from April 2 to August 1 averaged 11.7% of their weights, while the daily food consumption of 9 trapped from September 6 to October 6 averaged 20.4%. Such a large difference even with such a small number of birds is significant.

It is admitted that the data offered are incomplete, but it is hoped that various investigators will use this method for making determinations upon a great number of individuals of a wide range of species. Developments which might arise are, the precise determination of the general average based upon a large number of birds, the possible discovery of species varying considerably in food consumption from the general average, the determination of the limits of variation of individuals of a species from day to day and from each other, the determination of the magnitude of seasonal variation if any, and the possible linking of seasonal variation with profound physiological changes such as the moulting of feathers.

*Kansas, Illinois.*