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NUTRITIONAL ANALYSES OF FOODS EATEN BY PINTAIL AND TEAL IN SOUTH LOUISIANA [1]

By JOHN L. BARDWELL,[2] LESLIE L. GLASGOW,[3] and ERNEST A. EPPS, JR.[4]

INTRODUCTION

In the interest of waterfowl management, it is important to know the nutritive value of the foods consumed by waterfowl, especially those foods which are available for the building up of nutritive reserves to carry the birds through the winter period and the following spring. Only after various seeds have been evaluated is it possible to know which plants to encourage for the production of high quality foods. Although feeding tests are necessary to determine the actual nutritive value of wild foodstuffs, data on their proximate composition serves as a guide in suggesting their probable nutrient contributions to ducks.

If the body cavities of the birds from which food is recovered contain appreciable quantities of fat, it is reasonable to assume that the foods are meeting at least the minimum nutritional needs. Therefore, by chemically analyzing foods obtained from a large number of crops from fat ducks, it is possible to determine the nutritional levels that support wild waterfowl.

Little is known concerning the nutritional requirements of wild ducks; however, limited studies have indicated that the dietary requirements are met by diets which promote excellent growth in domestic ducks.

The purposes of this study were: (1) to identify foods removed from the crops of teal (*Anas discors, Anas carolinensis*) and pintail (*Anas acuta*), (2) to determine by proximate analyses the nutrient content of foods removed from the crops, (3) to compare the nutritional levels recommended for semi-domestic and domestic ducks with the analyses of the crop contents of wild ducks.

DESCRIPTION OF COLLECTION AREAS

Two hundred teal and 65 pintail crops were collected in four communities located in three parishes in South Louisiana. All of the samples were obtained from prairie marshes in southwestern Louisiana with the exception of one which was collected from delta marshes near the mouth of the Mississippi River.

The delta marshes are predominantly fresh and are associated with the active delta of the Mississippi River; therefore, the soils are chiefly alluvial deposits from the river. The primary plants are cattail (*Typha* spp.), reedgrass (*Phragmites communis*), common three-square (*Scirpus americanus*), giant

1 A contribution of Louisiana State University and the Louisiana Wildlife and Fisheries Commission.
2 Former Graduate Student, School of Forestry and Wildlife Management, Louisiana State University.
3 Associate Professor of Game Management, School of Forestry and Wildlife Management.
4 Head, Feed and Fertilizer Laboratory.

cutgrass (*Zizaniopsis miliacea*), delta duckpotato (*Sagittaria platyphylla*), alligator weed (*Altenantheria philixeroides*), coontail (*Ceratophyllum demersum*), sago pondweed (*Potamogeton pectinatus*) and water hyacinth (*Eichornia crassipes*).

The collection sites near Creole, Pecan Island and Gueydan are located on prairie marshes. This area is divided into three major marsh types composed of fresh, brackish and salt marshes.

The fresh marshes located north of the ridges are predominantly covered by grasses such as bull paspalum (*Paspalum bosciamum*), fall panicum (*Panicum dichotomiflorum*), millets (*Echinochloa* spp.), sprangletop (*Leptochloa fascicularis*) and sacciolepis (*Sacciolepis striata*). There are also many acres of *Sagittaria* and *Eleocharis* spp.

Brackish areas are generally found south of the ridges. Saltmeadow cordgrass (*Spartina patens*), saltmarsh bulrush (*Scirpus robustus*), Olney's three-square (*S. olneyi*) and saltgrass (*Distichlis spicata*) are commonly found there.

Salt marshes prevail near the Gulf primarily because of high salt water tides. This area is dominated by a saltgrass-saltmeadow cordgrass association.

STUDY PROCEDURE

Field Procedure

The duck crops, examined for this study, were collected during the 1960-61 waterfowl hunting season from November 4 to 15 and from December 16 to January 18. Crops were obtained from biologists or from local residents who dress ducks during the hunting season as part-time employment.

In accordance with written instruction, the crops were removed intact and placed in envelopes. Collection envelopes were labeled as to species, sex, date and location of kill, collector and condition of duck carcass as "good", "fair", or "poor" depending on fat deposition. Upon completion of labeling the envelope, the duck crops were frozen.

Laboratory Procedure

Since it was necessary to have a minimum weight of 3 grams for chemical analysis and in order to reduce the number of chemical analyses, 5 crops were combined to form a sample. Crops that were combined were matched by species, collection area and, as nearly as possible, by date of kill.

After thawing, the contents of 5 crops were examined collectively. Animal matter was removed from the sample, placed in labeled bottles and refrozen. Later processing of this material included submerging the animal material in a 1 percent borax solution to prevent excessive loss of nitrogen (Richardson, Watts, Wilkinson and Dixon, 1960). It was then placed in a forced-air oven and dried at 152° F. for 48 hours. When removed from the oven, the animal material was separated into classes, weighed and analyzed.

Because of the small quantity, all animal matter was combined for each species of duck to make up two aggregate samples for chemical analyses.

In processing the vegetable material, the crop contents were dried, identified, measured and weighed by species. These contents were again mixed as a sample unit and chemically analyzed.

Chemical analyses were completed by chemists of the Feed and Fertilizer Laboratory at Louisiana State University as recommended in the eighth edition of *Official Methods of Analyses—Association of Agricultural Chemists, 1955.*

RESULTS AND DISCUSSION

The food eaten during the first period of the hunting season was compared with that eaten during the second hunting period (Table I). Statistical "t" tests were employed for the two periods to determine if there was a significant difference at the 5 and 1 percent levels of probability. These tests disclosed no significant difference in protein, fat, fiber, ash or calcium. However, differences in nitrogen-free extract (NFE) and phosphorus were significant at the 5 and 1 percent levels of probability, respectively.

No comparison was made of foods consumed by pintails during the two periods because an insufficient number of samples was obtained during the first hunting period (Table II).

TABLE I

PROXIMATE ANALYSES OF FOOD REMOVED FROM 40 TEAL SAMPLES (200 CROPS)
(Percentages Calculated on Moisture-Free Basis)

Location and Sample Number	*Protein*	*Fat*	*Carbohydrates Fiber*	*NFE*	*Ash*	*Calcium*	*Phosphorus*
			First Period of Season (November 4-15)				
Pecan Island							
1	16.3	3.1	16.5	59.0	5.0	0.21	0.318
2	17.3	3.7	27.4	45.5	6.1	0.27	0.300
3	17.5	1.2	15.7	60.5	5.0	0.37	0.308
Creole							
1	23.7	2.2	26.5	37.7	9.9	0.50	0.246
Pass-a-Loutre							
1	24.4	3.9	28.0	37.0	6.7	0.28	0.290
AVERAGE	19.8	2.8	22.8	47.9	6.5	0.33	0.292
			Second Period of Season (December 16-January 8)				
Pecan Island							
1	17.3	4.5	14.0	59.1	5.0	0.20	0.549
2	17.7	3.0	12.4	63.5	3.4	0.12	0.482
3	18.2	4.5	16.3	56.1	4.9	0.28	0.603
4	19.4	3.8	15.3	56.1	5.5	0.40	0.523
5	17.1	6.0	14.5	56.5	5.7	0.14	0.571
6	19.0	2.1	14.8	59.4	4.6	0.19	0.619
7	18.6	4.4	15.3	56.7	4.9	0.27	0.597
8	17.2	4.4	15.4	57.7	5.1	0.15	0.581
9	21.3	2.5	44.6	25.3	6.2	0.50	0.650
10	17.8	6.7	19.0	51.6	4.8	0.31	0.619
11	20.0	3.7	13.5	58.1	4.6	0.16	0.563
12	18.2	5.2	13.4	59.9	3.3	0.15	0.576
13	17.2	3.7	17.1	57.0	4.9	0.21	0.564
14	19.4	4.3	16.9	53.2	6.2	0.54	0.594
15	19.0	2.4	17.7	56.4	4.4	0.15	0.533
16	19.2	1.1	22.7	52.8	4.1	0.28	0.634
17	20.5	3.6	20.3	50.4	5.1	0.25	0.431
18	14.1	3.2	31.1	42.9	8.6	0.36	0.503
19	19.1	3.1	15.6	57.3	4.8	0.13	0.513
*20	...	...	...	...	...	...	...
21	21.1	2.5	16.6	54.0	5.8	0.28	0.577
22	19.3	2.8	22.1	49.3	6.2	0.14	0.557
23	21.1	3.4	16.3	53.1	6.1	0.56	0.457
24	18.2	4.8	16.2	54.3	6.0	0.38	0.621
*25	...	...	...	...	...	...	...
26	17.7	3.1	15.2	58.8	5.1	0.33	0.548
27	18.3	3.0	17.9	56.3	4.4	0.20	0.602
28	18.0	7.5	20.5	49.5	4.5	0.20	0.525
29	20.0	2.4	14.8	57.4	5.5	0.19	0.566
*30	...	...	...	...	...	...	...
31	18.4	3.3	16.5	57.1	4.5	0.15	0.244
32	17.3	3.4	16.7	57.7	4.8	0.20	0.276
33	18.5	3.6	16.2	56.4	5.3	0.17	0.274
34	16.3	3.6	20.3	54.7	5.0	0.21	0.284
35	18.7	3.1	17.1	56.1	4.4	0.15	0.244
Creole							
1	10.7	2.7	15.1	64.7	6.8	0.13	0.172
2	14.7	3.0	17.6	59.1	5.6	0.15	0.232
3	17.4	3.5	19.4	54.5	5.1	0.12	0.270
Gueydan							
*1	...	...	...	...	...	...	...
AVERAGE	18.2	3.6	17.8	54.9	5.2	0.24	0.490
TOTAL AVERAGE	18.4	3.6	18.6	54.1	5.3	0.25	0.465
			First and Second Periods Combined				
Animal Matter	25.7	3.3	6.5	19.4	45.1	4.65	0.257

* Sample too small for complete analyses.

TABLE II

PROXIMATE ANALYSES OF FOOD REMOVED FROM 13 PINTAIL SAMPLES (65 CROPS)
(Percentages Calculated on Moisture-Free Basis)

Location and Sample Number	*Protein*	*Fat*	*Carbohydrates Fiber*	*NFE*	*Ash*	*Calcium*	*Phosphorus*
			First Period of Season (November 4-15)				
Creole							
1	14.4	1.9	17.9	49.9	5.7	0.35	0.418
			Second Period of Season (December 16-January 8)				
Creole							
1	12.6	2.9	13.9	55.1	17.2	0.37	0.407
2	10.4	3.4	16.2	48.2	19.8	0.54	0.486
3	9.7	1.6	10.8	41.7	10.3	0.30	0.382
Pecan Island							
1	18.1	1.4	16.8	58.9	4.8	0.38	0.387
2	23.4	2.3	16.9	59.2	6.6	0.38	0.454
3	20.4	3.1	16.4	57.2	7.5	0.32	0.494
4	18.8	1.9	15.4	53.4	6.9	0.34	0.424
5	18.9	2.5	15.4	52.9	6.4	0.60	0.527
6	21.4	2.6	11.5	51.2	5.1	0.38	0.492
Gueydan							
1	10.5	2.4	12.5	46.6	11.4	0.33	0.368
*2	...	3.7	10.9	...	10.9	0.38	0.498
3	11.0	3.3	13.5	51.8	15.2	0.30	0.326
AVERAGE	15.8	2.5	14.5	52.2	9.8	0.38	0.435
			First and Second Periods Combined				
*Animal Matter	...	..	...	...	32.7	8.12	0.305

* Sample too small for complete analyses.

Again "t" tests were used to test differences in the nutritional value of crop contents between teal and pintail. Differences in protein, fat and fiber were found to be significant at 5 percent; whereas, calcium was significant at 1 percent. These differences will be discussed later in detail. Nitrogen-free extract, ash and phosphorus were not found to be significantly different at the 5 percent level.

Since the pintails had not consumed enough animal matter for a complete chemical analysis, the animal material for teal was also disregarded when a comparison was made between teal and pintail foods. Therefore, these comparisons are based solely on nutrients obtained from vegetative matter.

In a companion study, a chemical analysis had been made of most of the seeds from waterfowl producing plants. Data from this study were used freely in this report.

Protein

Protein is of primary importance to all animals. It is needed for the building and maintenance of all animal tissue. Since excess protein may be converted and stored as fat, a secondary function is a source of energy. Ducklings making rapid growth require a higher protein level than adult ducks. Also adult laying ducks require more protein than those in a quiescent condition.

Proteins are not of equal quality. Some are much more efficiently utilized than others. Quality may be more important than quantity. Some can be synthesized by the body while others cannot. Wild ducks may increase their food intake to meet their protein requirements.

A comparison of protein levels from foods taken by teal during the two periods of the hunting season was not found to be significantly different at the 5 percent level. The first period was highest with an average of 19.8 percent and a standard error of the mean $\pm$ 1.7, while the mean for the second period was 18.2 with a standard error of the mean of $\pm$ 0.3.

Protein content of teal and pintail samples averaged 18.4 $\pm$ 0.6 and 15.8 $\pm$ 1.4, respectively. "t" tests revealed that a significant difference at the 5 percent level was present between the two species. This difference is probably due to protein differences in the seeds that were taken. For example, in the Pecan Island area, it was noted that fall panicum contributed 78 percent of the

total volume and weight of the food eaten by teal. Fall panicum, Walter's millet and bag scale grass formed nearly half of the volume at Creole. If the analyses of seeds eaten are equivalent to the analyses of seeds taken from plants in the study area (Table III), their protein contents are 15.2, 16.3 and 21.9 percent, respectively. The average of these values is 17.8, which approaches the mean for teal. Only one of these seeds, Walter's millet, occurred in the sample from Pass-a-Loutre. However, this sample contributed less than 1 percent of the total teal food.

Pintail crop contents from Pecan Island had a fairly high protein level—over 15 percent. Bagscale grass and fall panicum which have high protein levels (Table III) made up over 50 percent of the crop contents at this location. Pintail crops collected at Creole and Gueydon contained large quantities of brownseed paspalum, barnyard millet and rice. These seeds possess low protein values of 7.4, 9.7, and 9.1 percent, respectively.

TABLE III

PROXIMATE ANALYSES OF SEEDS TAKEN FROM PLANTS OCCURRING IN THE STUDY AREAS

(Percentages Calculated on Moisture-Free Basis)

Plants	*Protein*	*Fat*	*Carbohydrates* *Fiber*	*NFE*	*Ash*	*Calcium*	*Phosphorus*
Gramineae							
Digitaria sanguinalis	14.0	2.4	14.1	63.0	6.5	0.10	0.356
Brachiaria extensa	10.7	6.4	21.1	55.5	6.2	1.44	0.381
Paspalum plicatulum	7.4	2.3	18.9	65.1	6.1	0.11	0.273
**Panicum dichotomiflorum*	15.2	4.1	19.9	51.7	9.4	0.13	0.340
Sacciolepis striata	21.9	3.5	7.2	25.7	4.9	0.04	0.461
Echinochloa crusgalli	9.7	1.4	22.2	40.5	26.2	0.06	0.325
Echinochloa walteri	16.3	3.6	14.2	61.4	4.4	0.05	0.413
Setaria magna	14.2	1.5	17.1	64.2	3.9	0.06	0.271
†*Oryza sativa*	9.1	2.0	1.1	74.5	1.1	0.04	0.250
Cyperaceae							
Cyperus iria	8.9	3.9	14.5	65.0	7.6	0.13	0.357
Cyperus sp.	8.9	2.8	19.9	61.1	7.2	0.16	0.426
Eleocharis quadrangulata	4.8	2.3	50.6	36.6	5.5	0.16	0.130
Eleocharis sp.	6.8	2.1	38.9	40.2	11.9	0.07	0.177
Fimbristylis miliaceae	13.3	0.8	36.9	25.7	23.2	0.09	0.671
Fimbristylis sp.	14.4	0.7	25.1	51.6	7.9	0.17	0.361
Scirpus californicus	6.5	3.9	33.7	53.1	2.5	0.16	0.201
Scirpus robustus	8.3	3.2	16.2	65.8	6.4	0.06	0.224
Cladium jamaicensis	8.1	4.7	37.3	48.3	3.8	0.21	0.178
Polygonaceae							
Polygonum sp.	9.5	2.2	18.3	66.5	3.5	0.09	0.310
Amaranthaceae							
Amaranthus sp.	14.4	0.7	25.1	51.6	7.9	0.17	0.361
Rutaceae							
Sagittaria sp.	22.8	15.3	23.0	21.4	17.3	0.37	0.845
Compositae							
Iva ciliata	7.7	4.2	35.1	48.8	4.2	0.03	0.640

* Taken from King and McClure (1944).
† Taken from Morrison (1957).
Other analyses by the School of Forestry and Wildlife Management and the Feed and Fertilizer Laboratory, Louisiana State University.

Fat

Fats provide animals with heat and energy. Although ducks obtain heat and energy from protein and carbohydrates, an equivalent amount of fat produces about 2¼ times as much. Most wild seeds consumed by waterfowl are low in fat.

When the fat content of samples for teals were compared for the two periods, the statistical analyses showed no significant difference at the 5 percent level. The first period averaged 2.8 ± 0.5, while the last period had a mean of 3.6 ± 0.2.

There was a significant difference in fat at the 5 percent level between teal and pintail samples. Teals averaged 3.6 ± 0.2 and pintails showed an average of 2.5 ± 0.8. As with protein, this difference may be due mainly to seed composition of the crop contents. Since the same seeds are involved here as with the protein, no need for further explanation is deemed necessary.

Fiber in feeds is composed chiefly of plant cell walls and other woody material. Chickens can digest only small amounts of fiber. They do need about 3 to 5 percent to keep their bowels working. Ducks may be able to digest more fiber than chickens.

No significant difference was shown for fiber at the 5 percent level between hunting periods for teal samples. The first period had a mean of 22.8 ± 2.8, while the second period averaged 17.8 ± 1.5.

A significant difference at 5 percent did occur between teal and pintail samples. The former averaged 18.6 ± 0.9 and the latter had a mean of 14.5 ± 0.7. However, individual analyses of the main contributing seeds for pintail samples had a higher average fiber content than that found for crop contents. This is difficult to explain. It could possibly be due to the rice and sacciolepis which had values of 1.1 and 7.2 percent, in that order. These two seeds combined make up approximately 12 percent of the pintail foods. This, plus influencing factors such as storage, moisture, temperature, stage of maturity, soil fertility and digestion may have affected the analyses and established this lower percentage for pintail.

NFE (Carbohydrates)

Carbohydrates (NFE) are a principal source of energy for many animals and therefore also provide much heat. Excess carbohydrates may be stored as fat for later use.

There was a significant difference for teal samples in nitrogen-free extract at 5 percent between hunting periods. The first period had an average of 47.9 ± 5.1, whereas the last period averaged 54.9 ± 1.1. When these contents are compared with the analyses of seeds shown in Table III, the difference noted is probably due to the plant species that comprised the samples. Table I reveals that the Creole and Pass-a-Loutre areas were below average for the first period. This may be attributed to the fact that fimbristylis and bagscale grass composed 40 percent of the volume for these 2 areas during the first period. These seeds each have values of 25.7 percent NFE.

No statistical significance was found between teal and pintail samples for NFE. Teal had a mean of 54.1 ± 1.2 and pintail averaged 52.2 ±1.5.

Ash

Ash contains many minerals. Minerals are found in all tissues and are essential to the proper functioning of nearly all systems and processes within the body. Ducks require several minerals in addition to calcium and phosphorus.

When the "t" test was employed between periods for teal samples, the difference in percentage of ash was found to be significant. The first period had a mean of 6.5 ± 0.9 and the second period averaged 5.2 ± 0.2. Table I reveals that the single sample collected near Creole in the first period had an exceptionally high ash content of 9.9 percent.

It was noted that fimbristylis composed 15 percent of the total volume for this sample. A review of the analysis of this seed reveals that it had a high ash value of 23.2 percent. This, combined with the previously mentioned factors may be responsible for the high ash value of this sample.

The difference in ash between teal and pintail samples was not significant. The pintail crop contents averaged 9.8 ± 1.4 while the teal crop contents averaged 5.3 ± 0.2.

Calcium

Calcium is necessary for egg production and bone growth.

No significant difference was found between the first and second periods for teal samples. The means were 0.33 ± 0.05 and 0.24 ± 0.02, respectively.

A significant difference at the 1 percent level was found between samples for teal and pintail. Teal had a mean of 0.25 ±0.02 and pintail averaged 0.38 ± 0.02. Table II reveals that in the second period, the second sample from Creole and the fifth sample from Pecan Island had unusually high values compared with the rest of the samples. The result of the calcium sample from Creole is difficult

to explain. However, the entire sample was comprised of seeds of four plant species: brownseed paspalum, Walter's millet, barnyard millet and signal grass. Table III reveals that these seeds have respective calcium values of 0.11, 0.05, 0.06 and 1.44 percent. The only seed capable of producing such a high value was signal grass, but it composed only 1 percent of the volume for that sample. Again, the cause may lie with the influencing factors already mentioned.

Of the seeds that made up the sample from Pecan Island, none that were analyzed yielded a value as high as 0.54, which was the calcium value for the second pintail sample from Creole. However, sprangletop made up 31 percent of the total volume and 17 percent of the weight. Perhaps an analysis of this seed would reveal why the results were so hgh.

Phosphorus

Phosphorus is an essential element for proper bone growth.

"t" tests between periods for teal samples showed a significant difference at 1 percent. The first period averaged 0.292 ± 0.014 and the last period averaged 0.490 ± 0.024. This difference is pointed out in Table I. It is noted that in comparing crop contents from the first hunting period at Pecan Island with the second, their respective phosphorus averages were 0.308 and 0.515. It is believed that had more samples been obtained from Pecan Island in the first period, it would have resulted in an average higher than 0.308. This is concluded inasmuch as samples number 31, 32, 33, 34, and 35 from Pecan Island in the second period also had low values of 0.244, 0.276, 0.274, 0.284 and 0.244, respectively. This difference was not due to species composition since the major contributing seed was fall panicum and the rest of the samples in this area and period were also composed mainly of fall panicum. However, their values were much higher and this raised the average of the analyses.

There was no significant difference between teal and pintail samples. Teal had a mean of 0.465 ± 0.023 and pintail averaged 0.435 ± 0.018.

A COMPARISON OF THE NUTRITIONAL VALUE OF FOODS REMOVED FROM TEAL AND PINTAIL CROPS WITH NUTRITIONAL LEVELS RECOMMENDED FOR SEMI-WILD AND DOMESTIC DUCKS

Studies were undertaken by Holm and Scott (1954) to determine whether or not the nutritional requirements for wild ducks held in captivity are the same as that for domestic ducks. Their results revealed that diets which produced satisfactory growth, egg production, and hatchability in three species of semi-wild ducks under game farm conditions, were similar to diets that promote excellent results in domestic ducks.

Since we are concerned with adult wintering ducks in Louisiana, the diet developed by Scott and Holm (1961) for semi-wild breeder ducks (Table IV) is compared with the diet of wild ducks based on the average composition of the contents of teal and pintail crops. For comparison the breeder diet was chosen over starter and grower diets because of the stage of development in wild ducks wintering in Louisiana.

This comparison divulged that for teal, only protein and fiber met the nutritional levels recommended for semi-wild ducks. Pintail crop contents were found to be deficient in all nutrients except fiber. Junca (1962) also found this to be true in a similar study of mallard crop contents. It should be noted in Table IV, that for pintail, the protein, fat, and fiber did not contain animal

TABLE IV

A COMPARISON OF NUTRIENT LEVELS IN THE CROP CONTENTS OF TEALS, PINTAILS AND MALLARDS WITH A RECOMMENDED WILD BREEDER DUCK DIET

Nutrient	*Breeder Diet (Scott & Holm)*	*Teal (This Study)*	*Pintail (This Study)*	*Mallard (Junca, 1962)*
Protein	19.0	19.0	*15.8	14.8
Fat	†6.0	3.6	* 2.5	2.9
Fiber	3.8	18.3	*14.5	14.7
Calcium	2.7	0.36	0.94	1.19
Phosphorus	0.79	0.460	0.426	0.498

* Does not include animal matter.
† Animal fat added.

matter. The quantity of animal food found in the crops was too small for a chemical analysis. Had the sample been large enough to analyze for these nutrients, it is believed that protein and fat values would have been slightly higher provided pintail animal matter was equivalent to that contained in teal crops (Table I).

Even though most of these nutrients are below the values for the recommended breeder duck diet, there is no evidence that the ducks on Louisiana wintering grounds will not reproduce successfully. Differences in metabolic rates of wild and domestic ducks may be such that wild ducks are capable of getting along better than domestic ducks on much lower energy and higher fiber feeds (Scott, M. L., 1961, letter of September 25th pertaining to nutrition). Wild ducks lay only 12-14 eggs compared to the 110 expected from domestic ducks; they are usually fully grown when they reach the wintering ground and they are probably less nervous than penned wild ducks. Diets of wild ducks may improve during the spring when more animal food and green plants are available.

Of the 265 crops examined, 235 (88.7%) of the ducks were classed as being in good condition, 16 (6.0%) as fair, 2 (0.8%) as poor and 12 (4.5%) as undetermined. According to these condition ratings, it would appear that the nutritional levels determined from crop contents are sufficiently high to meet at least the minimum nutritional needs of wild ducks on the wintering ground.

SUMMARY

Crop contents of 200 teals and 65 pintails collected in south Louisiana during the first and second periods of the 1960-61 hunting season were identified, measured and chemically analyzed.

Statistical "t" tests between the first and second hunting periods, November 4-15 and December 16-January 8, for teal samples (5 crops per sample) revealed no significant difference at the 5 percent level of probability for protein, fat, fiber or calcium. However, nitrogen-free extract and phosphorus for the second period were significantly greater at the 5 and 1 percent levels, respectively. This difference in the former nutrient was believed due to seed composition while insufficient samples probably affected the latter.

"t" tests also showed that between teal and pintail samples, protein, fat and fiber were significantly greater for teal at 5 percent whereas, calcium was significantly greater for pintail at 1 percent. This was again believed to be due primarily to seed composition plus factors such as storage, moisture, temperature, stage of maturity, soil fertility and digestion which may have influenced the nutritional analyses of these crop contents. Nitrogen-free extract, ash and phosphorus were not significantly different at the 5 percent level.

The average teal and pintail crop contents were compared with a diet recommended for semi-domestic breeder ducks. This revealed a deficiency for teal in all nutrients except protein and fiber. Pintails were deficient in all nutrients except fiber. However, an examination of the fat content of the bodies of these 265 ducks disclosed that 235 (88.7%) were classed as being in good condition, 16 (6.0%) in fair condition, 2 (0.8%) in poor condition and 12 (4.5%) in an undetermined condition. Therefore, it is probable that wild teal and pintail do not need the dietary requirements recommended for semi-domestic ducks.

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ESTIMATING CONSUMPTION OF FOOD BY WINTERING WATERFOWL POPULATIONS

By JOHN L. SINCOCK
Biologist, Bureau of Sport Fisheries and Wildlife
U. S. Fish and Wildlife Service
Patuxent Wildlife Research Center
Laurel, Maryland

Wildlife food habits studies generally conclude that a series of foods make up certain percentage volumes and frequencies of the total consumption by the population of a species or group of species. These studies do not define the demand by the population on the food supply. With a few simple assumptions, and some additional knowledge of the food supply and the population, food habits studies can culminate in a more tangible expression of the amount of each food item consumed by the population, thereby permitting comparison of demand and supply.

This paper describes a method that was used to estimate the total food demand of the wintering waterfowl populations of Back Bay, Virginia, and Currituck Sound, North Carolina, from 1958 to 1962, to permit comparison with estimated standing crops of submerged aquatic plants. Potential errors that are avoided by this method of presenting food habits data by groups of waterfowl species are discussed.

The methods described in this paper were developed for application to data obtained from the cooperative study of Back Bay, Virginia, and Currituck Sound, North Carolina, by the Bureau of Sport Fisheries and Wildlife, the Virginia Commission of Game and Inland Fisheries, and the North Carolina Wildlife Resources Commission. The cooperation of all personnel assisting in collection of the data, used herein as examples of the methods described, is gratefully acknowledged. Donald W. Mayo, Virginia Commission of Game and Inland Fisheries, assisted the author in sorting and preliminary identification of items in the waterfowl gizzards.

To estimate the amounts of each food consumed by a waterfowl population, it is necessary to know the average amount of food consumed by each individual of each waterfowl species per day, the size of the population of each waterfowl species, its tenure in the area of concern, and the relative percentage of each food eaten by each major species in the population.

It was found that as a "rough rule of thumb" the average food consumption per bird per day could be estimated, in dry weight, as 10 percent of the wet body weight of each species. The average weights used for each waterfowl species were the average of the drake and hen weights presented by Kortright (1954), which presumably include both young of the year and older birds. Individual daily consumption might possibly have been calculated by other methods, such as estimating the percentage of the daily consumption reflected by the gizzard content. A correlation of $r = 0.964$ was obtained in comparing average body weight of 21 species of waterfowl with the average content of food in the gizzards of 765 individuals. However, a simplified, and perhaps superior, estimate of daily food consumption for each bird was obtained by using the 10 percent estimate of wet body weight as the amount in dry weight required. This method also permits estimates of total food demand by a population when only the size of the population is known.

The 10 percent estimate was an approximation based on unpublished data and the few reports in the literature of the daily consumption of food by different species of waterfowl.