

SUMMER FOODS OF CATTLE EGRETS IN NORTH CENTRAL FLORIDA

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SINCE it first appeared on the U. S. mainland in May 1948 near Lake Okeechobee, Florida (Sprunt, 1953), the Cattle Egret (*Bubulcus ibis*) has spread over the continent and now nests in all states except Alaska, the Dakotas, Idaho, Indiana, Iowa, Montana, Nebraska, Nevada, Washington, and Wyoming. In Canada the egret occurs in Ontario where it also has nested (Buerkle and Mansell, 1963), as far west as Alberta (Lister, 1965) and as far east as Newfoundland (Tuck, 1968). In a scant 30 years the species has probably become the most plentiful egret in North America. In Florida it appears to be more numerous than all the native species of herons combined.

The rapid extension of its nesting range in the New World and the occupation of indigenous roosting and nesting colonies has caused concern among wildlife managers and some ornithologists. Storer (1953) called for immediate studies of the Cattle Egret, including work on the food preferences to evaluate possible competition with native birds. The purpose of the present study was to determine the kinds and quantities of foods of the species during summer.

PREVIOUS RESEARCH

Previous food habit studies of the Cattle Egret showed the species to be primarily insectivorous. Haverschmidt (1957) noted that one specimen collected in Surinam was filled with grasshoppers and two others collected in August contained grasshoppers (*Caulopsis sponsa*), dragonflies (*Orthemis* sp.), beetles (Hydrophilidae), and clegs (Tabanidae). Seaman (1955) reported that a single specimen taken on St. Croix, Virgin Islands contained 92 percent orthopterids by volume. Martin et al. (1967) identified the foods from 26 Cattle Egrets taken near Havana, Cuba in March 1967 and found 531 (41.4%) larval and adult lepidopterids, 523 (40.8%) coleopterids, and 135 (10.5%) orthopterids. Other foods were flies, spiders, frogs, lizards, a mouse, and an earthworm. Biaggi (*in* Palmer, 1962) identified principally grasshoppers (Acrididae, Tettigonidae), crickets (*Gryllus* sp.), and flies (Tachnidae, Syrphidae) from 20 Puerto Rican specimens. Snoddy (1969) examined 20 egrets killed between 15 August and 16 October 1967 in southeastern Georgia. He found, by percent occurrence, 59 percent horse flies, 28 percent grasshoppers and crickets, 5 percent tree frogs, 4 percent spiders, 2 percent dragonflies, 0.8 percent caterpillars, 0.5 percent horn flies, 0.5

percent stable flies, 0.1 percent ticks, and 0.1 percent undetermined organisms. Burns and Chapin (1969) identified 56 percent Gryllidae and 21 percent other orthopterous groups (mostly short-horned grasshoppers) in 74 egrets collected in Louisiana.

Two food habit studies were done in Florida. Heubeck (1967) examined 165 stomachs collected at different seasons throughout the state. Orthopterids made up over 64 percent of the food in summer and more than 50 percent of the winter food. Jenni (1969) found an average of 34.1 food items in 50 nestling Cattle Egret regurgitated pellets: 0.1 snakes, 2.0 amphibians, and 32.0 invertebrates. Short-horned grasshoppers, leopard frogs (*Rana pipiens*), crickets, and cricket frogs (*Acris gryllus*) comprised 78.8 percent of the total diet volume.

Old World studies show similar results. Chapin (1932) found nine egrets in the Belgian Congo filled with grasshoppers, but other unidentified insects were numerous; he also found a cricket, some maggotlike larvae, and a number of large carrion flies. Ikeda (1956) examined 21 Cattle Egrets (*B. i. cormandus*) collected in Japan between May and September from the edges of rivers and rice fields. Although he found insects comprised 73.6 percent of the diet, orthopterids constituted only 1.9 percent of the total. Spiders made up 26.0 percent and larvae of an aquatic beetle 32.8 percent of the diet. This is not surprising considering the habitats where the specimens were collected. Kadry (1942) identified the foods from 510 egrets collected from every province of Egypt except Qena and Assuan in November and December 1935 and July, August, and September 1936. They comprised 53.7 percent orthopterids, 19.8 percent lepidopterids, 11.5 percent coleopterids, and other organisms in minor amounts. Kirkpatrick (1925) reported the stomach contents from 131 Cattle Egrets collected near Cairo and 8 taken near Simbellaween (in the Nile River delta near the Mediterranean coast) mostly from August 1923 through July 1924 excluding January. Combining the food habit data into a table that represented the theoretical diet of one egret per year, the author theorized that orthopterids would comprise 37.7 percent of the diet and dipterids 35.2 percent. Middlemiss (1955) found 2 grasshoppers, 3 dragonflies, 6 waterbugs, 10 beetles, 1 bee, 22 blowflies (Tachnidae), 12 other flies, 2 snails, *Tomicha ventricosa*, and 2 unidentifiable frogs in a single regurgitate from a 10–12 day old Cattle Egret nestling in a South African colony. Seigfried (1966) examined the regurgitates from 15 nestling South African Cattle Egrets and determined that grasshoppers accounted for 84.6 percent of the primarily insect diet. In a comprehensive study conducted in southwestern South Africa, Seigfried (1971) reported the contents from 348 egrets, collected year around, were mainly grasshoppers, caterpillars, and earthworms.

TABLE 1
FOODS FOUND IN 410 CATTLE EGRETS

Food items	Occurrence	(%)	Volume (cc)	(%)
INSECTS				
Orthoptera	397	96.8	8,462.0	80.5
Acrididae, short-horned grasshoppers	394	96.1	4,663.0	44.4
Gryllidae, crickets	390	95.2	2,755.0	26.2
Tettigoniidae, long-horned grasshoppers	373	91.0	1,001.0	9.5
Tetrigidae, pygmy grasshoppers	99	24.1	22.0	Trace ¹
Blattidae, cockroaches	40	9.8	16.0	"
Mantidae, mantids	13	3.2	3.0	"
Phasmidae, walkingsticks	6	1.5	2.0	"
Diptera	246	60.0	207.0	2.0
Asilidae, robber flies	171	41.7	120.0	1.1
Tabanidae, horse and deer flies	109	26.6	42.0	Trace
Metopiidae, blow and flesh flies	20	4.9	4.0	"
Muscidae, muscid flies	6	1.5	2.0	"
Tachnidae, tachinid flies	3	0.7	1.0	"
Bombyliidae, bee flies	2	0.4	2.0	"
Stratiomyidae, soldier flies	1	0.2	Trace	"
Tipulidae, crane flies	1	0.2	"	"
Larvae, asilids and tabinids	31	7.6	36.0	"
Coleoptera	158	38.5	179.9	1.7
Scarabaeidae, scarab beetles, 22 adults, 88 larvae			159.0	1.5
Carabidae, ground beetles, 112 adults, 13 larvae			14.0	Trace
Dytiscidae, predaceous diving beetles, 6 larvae			4.0	"
Cicindelidae, tiger beetles, 3 adults			1.2	"
Silphidae, carrion beetles, 2 adults, 1 pupa			1.0	"
Cebriionidae, cebraionid beetles, 3 adults			0.5	"
Elateridae, click beetles, 3 adults, 4 larvae			0.2	"
Buprestidae, metallic woodboring beetles, 2 adults			Trace ²	"
Staphylinidae, rove beetles, 1 adult			"	"
Tenebrionidae, darkling beetles, 1 larvae			"	"
Lepidoptera	168	40.9	154.5	1.5
Noctuidae, noctuid moths, 57 adults, 1 pupa, 816 larvae			111.0	1.1
Sphingidae, sphinx moths, 10 adults, 6 larvae			30.1	Trace
Hesperiidae, skippers, 35 adults, 29 larvae			11.0	"
Pyrilidae, pyralid moths, 15 larvae			1.0	Trace
Cossidae, carpenter moths, 3 larvae			0.6	"
Geometridae, geometer moths, 2 adults, 2 larvae			0.5	"
Nymphalidae, brush footed butterflies, 2 adults			0.4	"
Pieridae, sulphur butterflies, 2 larvae			Trace	"
Odonata	133	32.4	106.0	1.0
Libellulidae, common skimmers, 117 adults, 14 nymphs			100.0	1.0
Coenagrionidae, narrow-winged damselflies, 23 adults			6.0	Trace

TABLE 1—Continued

Food items	Occurrence	(%)	Volume (cc)	(%)
Dermoptera	78	19.0	82.0	0.8
Labiduridae, long-horned earwigs			63.5	0.6
Forficulidae, common earwigs			18.5	Trace
Homoptera	14	3.4	8.0	"
Cicadidae, cicadas, 8 adults, 4 nymphs			8.0	"
Cercopidae, spittlebugs, 1 adult			Trace	"
Cicadellidae, leafhoppers, 1 adult			"	"
Hemiptera	21	5.1	5.9	"
Belostomidae, giant water bugs, 19 adults			5.0	"
Naucoridae, creeping water bugs, 4 adults			0.2	"
Nepidae, waterscorpions, 1 adult			0.2	"
Notonectidae, backswimmers, 4 adults			0.2	"
Reduviidae, assassin bugs, 1 adult			0.2	"
Pentatomidae, stink bugs, 2 adults			0.1	"
Neuroptera	2	0.5	Trace	"
Myrmeleonidae, antlions, 1 adult			"	"
Sialidae, alderflies, 1 larvae			"	"
Hymenoptera	1	0.2	"	"
Formicidae, 2 adults			"	"
ARACHNIDA				
Araneida	349	85.1	489.5	4.7
Lycosidae, wolf spiders			472.5	4.5
Araneidae, orb weavers			9.0	Trace
Pisauridae			2.5	"
Salticidae, jumping spiders			2.5	"
Oxyopidae			1.5	"
Thomisidae, crab spiders			1.5	"
Theridae, black widows			Trace	"
Clubionidae			"	"
Tetragnathidae			"	"
OLIGOCHETA, earthworms	26	6.3	10.0	"
CHILOPODA, centipedes	20	4.9	10.0	"
CRUSTACEA, crawfish, <i>Procambarus clarki</i>	4	1.0	10.0	"
TURBELLARIA, free-living flatworms, <i>Bitatium kewense</i>	7	1.7	2.0	Trace
AMPHIBIA				
Salamandridae, <i>Notophthalmus</i> <i>viridescens</i>	1	0.2	0.5	"
Pelobatidae, <i>Scaphiophus holbrooki</i>	3	0.7	5.0	"
Bufonidae, <i>Bufo terrestris</i> , 20 adults, 149 juveniles	12	2.9	139.0	1.3
Hylidae	66	16.1	156.0	1.5
<i>Acris gryllus</i> , 231 adults			50.0	Trace
<i>Hyla cinerea/squirella</i> , ³ 102 adults			106.0	1.0
<i>Hyla ocularis</i> , 2 adults			Trace	Trace
Microhylidae, <i>Gastrophryne</i> <i>carolinensis</i> , 48 adults	37	9.0	48.0	"
Ranidae	43	10.5	310.0	3.0
<i>Rana catesbeiana</i> , 5 adults, 1 tadpole			52.0	Trace
<i>Rana heckscheri</i> , 4 tadpoles			52.0	"

TABLE 1—Continued

Food items	Occurrence	(%)	Volume (cc)	(%)
<i>Rana gryllo</i> , 3 adults, 1 tadpole			28.0	"
<i>Rana pipiens</i> , 25 adults			84.0	0.8
Unidentified <i>Rana</i>			94.0	0.9
Unidentifiable amphibian material			52.0	Trace
REPTILIA				
Iguanidae, <i>Anolis carolinensis</i> , 16	9	2.2	10.0	"
Scincidae	34	8.3	30.5	"
<i>Lygosoma laterale</i> , 44			24.0	"
<i>Eumeces laticeps</i> , 2			4.0	"
<i>Eumeces inexpectatus</i> , 2			2.0	"
<i>Eumeces egregius</i> , 1			0.5	"
Anguidae, <i>Ophisaurus attenuatus</i> , 1	1	0.2	7.0	Trace
Colubridae	3	0.7	11.0	"
<i>Storeria dekayi</i> , 1			6.0	"
Unknown <i>Natrixid</i> , 1			4.0	"
Unknown <i>Colubrid</i> , 1			1.0	"
MAMMALIA				
Cricetidae, <i>Sigmodon hispidus</i> , 1	1	0.2	12.0	"
TOTALS				
Invertebrata	409	99.8	9,726.8	92.6
Vertebrata	156	38.1	781.0	7.4
TOTAL FOOD MASS			10,507.8	

¹ Trace = 1 percent.

² Trace = 0.1 cc.

³ Formalin preservation prevented distinction between these two species.

Regurgitated pellets were taken from the nestlings during the period September to December. The diet of the young closely resembled that of the adult birds. Earthworms (*Lumbricus* sp.) were seasonal in the diet, frequently occurring (60%, by weight) during the rainy season (April to October). Skead (1956) also in South Africa examined numerous regurgitates and the stomachs of dead young in nesting colonies. In one stomach he found 33 grasshoppers, 10 centipedes, 1 wasp, 2 lepidopterous larvae, 1 spider, 1 homopterid, and 2 unidentified insects.

METHODS

About one thousand Cattle Egrets were shot in late afternoons at four roosts in Alachua and Marion Counties, Florida between 19 June and 16 July 1969 in connection with another study being made on endoparasites. The stomachs were removed within about 1 hour and preserved in a buffered 10 percent formalin solution. All empty stomachs (159) were discarded.

Based on the examination of a subsample of 100 stomachs, it was computed that a sample size of 400 stomachs would need to be examined to provide statistically valid food habit information at the 95 percent confidence level (Mendenhall, 1971: 195-199). A random sample of 410 was selected from the 841 stomachs.

The stomachs were examined individually; prey items were segregated into orders, the order noted as having occurred in that stomach, and the items pooled by phylogenetic order. After completing the examination of the 410 stomachs, each order was measured volumetrically. The families in the orders were identified.

Because of the relative importance of the Orthoptera and Diptera groups in the egrets' diet as determined by previous food habit studies, these prey items were identified to family taxa and their occurrence and volume tabulated as the examination progressed rather than after completion.

The remaining 431 stomachs were opened and the total contents pooled. The invertebrate food mass was searched for unique items and measured volumetrically. Vertebrate foods were identified to species, counted, and the total volume of each was calculated.

To determine the potential maximum amount of food consumed by an egret at one time, the largest 25 excised stomachs from one collecting trip were segregated. The volume of the contents of each stomach was measured. The average food mass for the entire sample of 841 egrets was also calculated.

RESULTS

Table 1 lists the food items identified from the first 410 stomachs. Our examination techniques assessed occurrence and volume data at order and family levels for only Orthoptera and Diptera. Table 2 presents the species, number, and volume of vertebrates identified in the remaining 431 stomachs as well as the total invertebrate volume.

Orthopterous insects occurred in 96.8 percent of the sample of 410 stomachs, amounting to 80.5 percent of the total food volume. Three families of this order, Acrididae (short-horned grasshoppers), Gryllidae (crickets), and Tettigoniidae (long-horned grasshoppers), together comprised 80.1 percent of the total diet. Other orthopterids found in trace amounts were praying mantids, cockroaches, and walkingsticks.

Diptera were found in 60 percent of the sample, but amounted to only 1.9 percent of the diet by volume. Tabanid flies were noted in 26.6 percent of the 410 stomachs examined, but totaled less than 1 percent of the diet volume. Many dipterids taken by the egret were members of the asilidae family, the predaceous robber flies. These flies were found in 41.7 percent of the sample, but amounted to only 1.1 percent of the diet volume.

The frequency of other orders commonly found but each amounting to less than 2 percent of the volume were Lepidoptera (40.9%), Coleoptera (38.5%), Odonata (32.4%), Dermaptera (19.0%), Hemiptera (5.1%), Homoptera (3.4%), Neuroptera (0.5%), and Hymenoptera (0.2%).

Spiders occurred in 85 percent of the stomachs and amounted to 4.7 percent by volume, placing this order second in importance. Wolf spiders (Lycosidae) comprised 95.7 percent of the spiders identified.

Other invertebrates identified in trace amounts from the sample were earthworms, centipedes, crawfish, and free-living flatworms.

TABLE 2
FOODS FOUND IN 431 CATTLE EGRET STOMACHS

Food items	Number found	Volume (cc)
VERTEBRATES		
Iguanidae		
<i>Anolis carolinensis</i>	17	24.0
<i>Sceloporus undulatus</i>	4	6.0
Scincidae		
<i>Lygosoma laterale</i>	52	34.0
<i>Eumeces laticeps</i>	2	4.0
Bufonidae		
<i>Bufo terrestris</i>		
Juveniles	76	4.0
Adults	22	130.0
Hylidae		
<i>Acris gryllus</i>	109	28.0
<i>Hyla cinerea/squirella</i>	76	91.0
<i>Hyla ocularis</i>	2	0.5
Microhylidae		
<i>Gastrophryne carolinensis</i>	43	37.0
Ranidae		
<i>Rana catesbeiana</i> (adults)	3	40.5
<i>Rana gryllio</i> (3 adults, 1 tadpole)	4	11.0
<i>Rana pipiens</i> (adults)	53	175.0
Unidentified <i>Rana</i>	?	11.0
Unidentified amphibian material		50.0
Cricetidae		
<i>Peromyscus</i> sp.	2	10.0
<i>Sigmodon hispidus</i>	3	53.0
Unknown cricetid	1	8.0
Vertebrate food mass		717.0
INVERTEBRATES		
Invertebrate food mass		11,280.0

Vertebrates comprised 7.4 percent of the diet by volume, occurring in 38.1 percent of the sample. The major vertebrate families identified were Hylidae and Ranidae. Together they amounted to 4.4 percent of the total food mass. The common oak toad (*Bufo terrestris*) amounted to 1.3 percent of the diet. Other amphibians identified were a newt (*Notophthalmus viridescens*), spadefoot toad (*Scaphiophus holbrooki*), cricket frogs (*Acris gryllus*), tree frogs (*Hyla ocularis*, *H. cinerea*, and *H. squirella*), narrow-mouthed toads (*Gastrophryne carolinensis*), bullfrogs (*Rana catesbeiana* and *R. gryllio*), river swamp frogs (*R. heckscheri*), and leopard frogs (*R. pipiens*).

Reptilian foods occurred in trace amounts of less than 1 percent of the total volume. Families recorded were Iguanidae, Scincidae, Anguidae, and Colubridae.

Seven field mice of two species were in the total sample of 841

stomachs: two *Peromyscus* sp., four *Sigmodon hispidus*, and one unidentifiable cricetid.

The total food mass was 22,504.8 cc, which averaged 26.8 cc of food per egret, not including empty stomachs. The largest of 25 filled stomachs averaged 67.2 cc and ranged from 54.0 cc to 99.0 cc.

DISCUSSION

FORAGING HABITS

Relationship with cattle.—From an apparent commensalistic existence with African plains ungulates, the Cattle Egret has adapted to a technique of capturing prey attracted to or disturbed by grazing livestock. Heatwole (1965) quantified the efficiency of this method in Puerto Rico and noted egrets that associated with cattle obtained 137 percent as much food as nonassociated egrets and expended only 63 percent as much effort.

It appears in Florida that the Cattle Egret has nearly monopolized this formerly unoccupied, highly productive feeding niche. In this study, nearly 90 percent of the foods identified from 841 stomachs were common pasture insects—varieties likely to be disturbed by cattle.

Food acquired apart from cattle.—The bird also forages alone and near other animals and machines, following tractors and mowing equipment as attentively as it does cattle. Meyerriecks (1960) watched the egret feeding on insects disturbed by foraging Sandhill Cranes (*Grus canadensis*) and has seen Cattle Egrets standing on top of a chicken coop, evidently after flying insects. Peterson (1954) and Van Someren (1947) reported egrets snatching insects driven ahead of grass fires. Crawford (1966) recorded Cattle Egrets feeding behind men tending rice fields at Rodupr, Sierra Leone. There were no cattle in the area, and the egrets were divided between centers of human activity. Reynolds (1965) noted the egrets closely approached his four-wheel drive vehicle to catch insects. He also saw Cattle Egrets feeding on flies attracted to rotting fish left over from village fish-cleaning operations in East Africa. Similarly, we have seen and have received numerous reports of Cattle Egrets perched on the carcasses of cattle, snatching flies attracted to the dead animals.

The birds are also found evenly distributed in fields searching for grubs and larvae turned up by recent plowing. Mackworth-Praed and Grant (1962) and Riddell (1944) reported similar habits in Africa. Meyerriecks (1960) described how egret flocks fed with a leapfrog technique, the rear birds flying over and ahead of the lead birds as the flock progressed across the field. Meyerriecks suggested this movement of many birds tended to put more insects to flight, increasing the feeding

opportunities. Blake (1939) saw the egret feeding on insects in flooded rice fields. We noted a similar instance where Cattle Egrets fed at the head of water overflowing a canal bank during an extremely high tide.

The egret appears to be a voracious feeder, continually stabbing at prey rather than remaining still, waiting for prey to approach within its reach, as some native waders do. When feeding alone apart from cattle, other egrets, or machinery, the egrets feed much in the manner of the native herons. We have watched the egrets moving slowly along the edge of a pond snatching cricket frogs from the low emergent vegetation. L. E. Williams, Jr. (pers. comm.) noted about 140 Cattle Egrets standing near the edge of Lake Lochloosa, Alachua County, Florida pecking emerging midges (Chironomidae) as the insects alighted on their plumage.

UNUSUAL CHARACTERISTICS OF THE SUMMER DIET

Ticks.—"Tick Bird," a local name for the Cattle Egret in Florida, apparently stems from the common sight of the bird associated with or actually perched on the backs of cattle. Florida natives believe that egrets pick ticks from the host's hide. Witherby et al. (1947), Whistler (1949), Roberts (1951), Peterson (1954), Skead (1956), Slud (1957), Imhof (1962), and Reilly (1968) make this claim, but Snoddy (1969) found ticks amounted to only 0.1 percent of the summer diet and Seigfried (1966) found only one tick in 15 regurgitates from nestling Cattle Egrets examined in South Africa. Bates (1937) reported that a Cattle Egret collected near a resting camel near Juddah, Arabia contained 68 engorged ticks (*Hyalomma aegyptium*). The proximity of the camel and the fact the ticks were engorged suggests that the egret picked up the ticks from the ground as they dropped from the host. Meyerriecks (1960) believes that egrets eat only a few ticks and mainly those that are engorged and recently dropped, rather than picked from the host mammal. Our 1,000 stomachs did not contain a single tick.

Fish.—Bates (1933), Whistler (1949), Smythies (1953), Peterson (1954), Valverde (1958), Imhof (1962), Lowe-McConnell (1967), and Reilly (1968) all report fish to be a part of the Cattle Egret's diet, but their accounts suggest that the information may have come from watching birds feeding rather than from examining the stomach contents. Kadry (1942) found 18 fish of three genera in the 478 stomachs he examined. We found many aquatic forms of vertebrate and invertebrate food (Tables 1 and 2) in the 841 stomachs, but no fish. It is striking that the egrets in our sample took no fish while taking other aquatic forms. The absence of this food in the diet is significant in regard to possible interspecific competition with native herons. Possibly Cattle Egrets may be forced

to eat some fish under certain circumstances, but they clearly did not select fish in central Florida during the summer of 1969.

Absence of common insects.—Some common summer insects were conspicuously absent from the stomachs we examined. Adult lubber grasshoppers (*Romalea microptera*) were plentiful from June to November, yet none were found in the 841 stomachs. The eastern lubber exudes a frothy brown liquid from the mesothoracic spiracles when disturbed (Helfer, 1953), which may be distasteful to Cattle Egrets.

Another common insect not found in the diet was the fly *Plecia nearctica*, which has two generations each year in north central Florida with flying adults in very dense numbers in May and September. While the egrets examined in this study were collected in June and July, the flies were available although their numbers were reduced. L. A. Hetrick (pers. comm.) has observed the insects near foraging egrets, the birds apparently ignoring their presence.

PREDATION OF BIRDS AND MAMMALS

Although primarily insectivorous, Cattle Egrets are opportunistic feeders and will take a variety of prey items. Small mammals have been reported in Cattle Egret foods by other investigators (Kirkpatrick, 1925; Kadry, 1942; Skead, 1956; Reilly, 1968; Duxbury, 1963; Boddiford, 1965; Burns and Chapin, 1969). As Cattle Egrets are capable of catching and eating small mammals, it was surprising that no young of ground nesting birds, such as Bobwhite Quail (*Colinus virginianus*) and Meadowlark (*Sturnella magna*) appeared in our stomach samples. Reports of isolated incidents of Cattle Egrets eating small birds appear regularly in the literature. Boddiford (1965) related the account of Kelly and Oglesby, who have seen Cattle Egrets chasing and eating young Bobwhites. Kelly was mowing a pasture with about 40 egrets following the mower when he came upon two broods of quail not yet able to fly. The Cattle Egrets caught the young and before eating them, flung them to the ground, presumably to stun or kill them.

Accounts of Cattle Egrets eating small birds on the Dry Tortugas, Florida are common. Transient migrants use this small island, west of Key West, as a resting place during over-water migration. The Cattle Egrets are able to capture and eat the exhausted small birds. While visiting the island in May 1962, Cunningham (1965) saw one egret swallow an adult male Blackpoll Warbler (*Dendroica striata*) and a Myrtle Warbler (*D. coronata*). Dinsmore (pers. comm.), while banding Sooty Terns (*Sterna fuscata*) and Noddy Terns (*Anous stolidus*) nesting at the Dry Tortugas, saw a Cattle Egret catch and eat an Ovenbird

(*Seiurus aurocapillus*) and an unidentified warbler. He also saw a Cattle Egret carrying a dead Barn Swallow (*Hirundo rustica*) in its bill. Stimson (1966) reported Cattle Egrets "observed eating dead warblers, Catbirds (*Dumetella carolinensis*), and other species, which occasionally died either from hitting walls [ruins of Ft. Jefferson] or from other causes."

Cunningham (1965) also noted an egret eating a Myrtle Warbler in a mowed field in front of the Flamingo Visitor's Center, Everglades National Park, Florida during January 1963. Alexander Sprunt IV (*in* Palmer, 1962) saw a Cattle Egret eat a Myrtle Warbler near Clewiston, Florida in February 1958.

Ridley and Percy (1958) reported that Cattle Egrets were the only serious predator in the Desnoeuvs (one of the islands in the Seychelles, northwestern Indian Ocean), eating both the eggs and the young of nesting Sooty Terns. McLachlin and Liversidge (*in* Roberts, 1957) stated that small birds were part of the egret's diet, but failed to provide information on the number, species, or frequency. Seigfried (1966) reported that from the regurgitates of 15 nestling Cattle Egrets he found one Guinea Fowl chick (*Numida meleagris*), two Francolin young (*Francolinus capensis*), and the head of an immature Cattle Egret. During the summer of 1969, Vernon Powders (*pers. comm.*), collected 20 Cattle Egrets for parasitological investigations from the same vicinity where the collections were made for the present study. One of the 20 specimens contained a young Bobwhite Quail.

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SUMMARY

The foods from 841 Cattle Egret stomachs from four roosts in north central Florida during midsummer 1969 were identified and quantified. Invertebrates comprised 93.3 percent of the foods by volume. Orthoptera were found in 96.8 percent of the stomachs and accounted for 80.5 percent of the total volume. No fish nor the young of ground-nesting birds were found in any of the stomachs.

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