



Ostrich

Journal of African Ornithology

ISSN: 0030-6525 (Print) 1727-947X (Online) Journal homepage: <https://www.tandfonline.com/loi/tost20>

Diet of chicks of Cattle Egrets *Bubulcus ibis* in the lower Soummam valley, Algeria

Rachida Gherbi-Salmi , Salaheddine Doumandji & Claire Voisin

To cite this article: Rachida Gherbi-Salmi , Salaheddine Doumandji & Claire Voisin (2012) Diet of chicks of Cattle Egrets *Bubulcus ibis* in the lower Soummam valley, Algeria, Ostrich, 83:2, 99-104, DOI: [10.2989/00306525.2012.690350](https://doi.org/10.2989/00306525.2012.690350)

To link to this article: <https://doi.org/10.2989/00306525.2012.690350>



Published online: 17 Aug 2012.



Submit your article to this journal [↗](#)



Article views: 61



View related articles [↗](#)

Diet of chicks of Cattle Egrets *Bubulcus ibis* in the lower Soummam valley, Algeria

Rachida Gherbi-Salmi^{1*}, Salaheddine Doumandji² and Claire Voisin³

¹ Laboratoire de Zoologie Appliquée et d'Ecophysiologie animale, Faculté des Sciences de la Nature et de la Vie, Université de Béjaïa, 06000 Béjaïa, Algeria

² Département de Zoologie Agricole et Forestière, Institut National Agronomique, El Harrach, 16200 Alger, Algeria

³ Muséum National d'Histoire Naturelle, UMS 305, CP 305, 57 rue Cuvier, F-75005, Paris, France

* Corresponding author, e-mail: salmi13mars@yahoo.fr

The diet of Cattle Egret chicks in the lower Soummam valley, Algeria, was investigated in 1998 and 2006, when 145 and 23 regurgitates were collected, respectively. In 1998, 1 698 individual prey items were identified. Insects formed the bulk of the diet of chicks: 94% in terms of frequency, 71% in terms of mass. Orthopterans were dominant, especially in terms of biomass (22% by frequency, 58% by mass), whilst Dipterans were well represented in numbers (59% by frequency). Vertebrates, despite their lesser frequency (3%), contributed 23% by mass of the diet. In 2006, 441 prey items were identified. The contribution of insects decreased to 79% by frequency and 15% by mass (mostly Orthopterans) but vertebrates made up a higher frequency: 20% of prey items and 85% by mass of the diet. The availability of prey items was not correlated to their occurrence in the diet, suggesting that the Cattle Egret is a selective predator, with adults selecting prey species for their chicks. A drought in the spring of 2006 increased the availability of fish and lizards to the Cattle Egrets.

Introduction

The Cattle Egret *Bubulcus ibis* is a species of Indo-African origin, which has become globally distributed in recent times. Its diet is made up principally of insects (Bredin 1983, Doumandji et al. 1992, 1993) and food may be a major determinant of the species' breeding success (Maddock and Baxter 1991, McKilligan 1997). Therefore, the diet of adult Cattle Egrets has been well documented around the world (Kadry 1942, Ikeda 1956, Kosugi 1960, Burns and Chapin 1969, Snoddy 1969, Siegfried 1971, Mukherjee 1972, Vázquez Torres and Márquez Mayaudon 1972, Fogarty and Hetrick 1973, Ruiz and Jover 1981, Bredin 1983, 1984, Ruiz 1984, Voisin 1991, Si Bachir et al. 2001, Si Bachir 2005). Several studies have been conducted on the diet of Cattle Egret chicks (see for example Valverde 1956 in Morocco, Siegfried 1966 in South Africa, Hanbrink and Denton 1969, Jenni 1973 in USA, Herrera 1974 in Spain, Hafner 1977 in France and McKilligan 1997 in Australia). In Algeria, the breeding biology (Si Bachir et al. 2000, 2008, Boukhemza et al. 2006, Samraoui et al. 2007) and adult diet (Doumandji et al. 1992, 1993, Boukrout-Bentamer 1998, Boukhemza et al. 2000, Si Bachir et al. 2001, Salmi et al. 2002, Setbel et al. 2004, Si Bachir 2005) of Cattle Egrets has been investigated. However, no study was previously done on the diet of chicks. The regular occupation of a breeding colony in the Soummam valley (Algeria) since 1993 provided the opportunity to study the dietary composition of chicks of Cattle Egrets during 1998 and 2006.

Study area and methods

The breeding colony of Cattle Egrets that was investigated is located 2 km east of the village of El Kseur (36°41' N,

04°51' E) and 20 km west of the town of Béjaïa in the lower Soummam valley. The colony is situated 300 m north of the Soummam River at 55 m above sea level. The climate is subhumid with hot and rainy winters (December to February) and springs (March to May). Our study was conducted during two years: 1998 and 2006. The spring of the two years differed considerably in the amount of rainfall experienced, 1998 being more humid (average precipitation 316 mm) than 2006 (average precipitation 117 mm). According to McKilligan (1997), spring rainfall is a determinant of pasture growth, and increased rainfall may lead to an increase in populations of Acrididae (grasshoppers and locusts), whose abundance may influence chick survival and breeding success of Cattle Egrets.

The nesting of Cattle Egrets in the Soummam valley lasts for more than four months, from late March to the end of July. Exceptionally, when weather conditions are favourable, a second breeding period can occur in August and September, as in 1998 (Si Bachir et al. 2008). The number of Cattle Egret pairs breeding at the study site was 665 in 1998 and 698 in 2006.

Regurgitates were collected once a week under the nests of the colony in the morning, between 07:00 and 08:00, by a maximum of two people to limit disturbance. Our presence in the colony induced some chicks to regurgitate their last meal (Bredin 1983, Voisin 1991). In total, 145 regurgitates were collected during five months in 1998: 10 in May, 64 in June, 37 in July, 13 in August and 21 in September. On the other hand, in 2006, when the spring was drier, it was rare to find regurgitates in the colony and only 23 were collected in two months: 15 in June and eight in July.

Samples were kept in separate containers, which were dated, numbered and filled with 70% ethanol, and later examined in the laboratory under a binocular microscope. The prey species were identified by comparison with reference collections and the use of identification keys (Perrier 1927, 1932, Chopard 1943, Villiers 1978). The contribution of each prey species to the diet was calculated as the percentage by number and by mass of the prey items eaten.

In order to assess the availability of prey species, sampling of prey was conducted at three different sites located within a radius of 2 000 m of the colony that were visited by the nesting adults: Prairie, Middle-type Wasteland and Citrus Orchard. Each site was sampled once per month from May to September in both 1998 and 2006. Vertebrates, molluscs and other terrestrial invertebrates, including Arachnida, Myriapoda, Crustacea and Coleoptera, were sampled with Barber traps, 10 of which were placed on a line in an area of 100 m² at intervals of 10 m between stations. Orthopterans were captured with a sweep net on the first day of each sampled month, in 10 squares of 10 m² at each site (Benkheilil 1991).

Statistical tests were performed using the Microsoft Excel analysis tool pack to determine whether the frequency of prey items sampled in three sites between 1998 and 2006 (Student's *t*-test) and whether prey availability was related to prey fed to chicks (linear regression).

Results

In total, 1 698 individual prey items belonging to 123 species were recorded in 1998, whereas only 441 belonging to 35 species were recorded in 2006, from the 145 and 23 regurgitates analysed in these years, respectively (Appendix). In 1998, 97% by number and 77% by mass of the prey items were invertebrates. By contrast in 2006, invertebrates contributed 80% by number but only 15% by mass of the prey, whereas vertebrates contributed only 20% by number but 85% by mass of the prey eaten (Table 1).

In 1998, most of the diet of chicks was insects: 94% by number and 71% by mass. Dipterans and orthopterans were the most common insects eaten (Table 1). However, despite their high numbers (59% of overall prey items), Dipterans, which were largely larvae, contributed only 7% of the diet by mass. In contrast, orthopterans contributed only 22% of all prey items eaten but 58% of the mass. More coleopterans than orthopterans were found among the prey species, but they were present only in small numbers. Arachnids, myriapods and gastropods contributed small amounts to both the numbers and mass of prey eaten.

In 2006, the contribution of insects to the total biomass of prey regurgitated was greatly diminished (Table 1). Arachnids and myriapods were again occasional prey items. Dipterans and orthopterans remained the most frequently encountered prey categories, but their contribution to mass eaten was <1% and 15%, respectively (Table 1). The contribution by mass of coleopterans to the diet also fell to <1%.

The most interesting differences between the two years concerned vertebrates, which contributed a much higher percentage in terms of both numbers and mass of the diet

Table 1: Composition of the diet of Cattle Egret chicks. *N* = number of prey items, *F* (%) = percentage contribution by number of prey items to the diet, *B* (%) = percentage contribution by mass of prey items to the diet

Taxa		1998			2006		
		<i>N</i>	<i>F</i> (%)	<i>B</i> (%)	<i>N</i>	<i>F</i> (%)	<i>B</i> (%)
(Insecta)	Invertebrates Mollusca	4	0.2	0.1	—	—	—
	Myriapoda	2	0.1	0.1	2	0.5	0.1
	Blattodea	11	0.7	0.3	—	—	—
	Odonatoptera	4	0.2	0.1	—	—	—
	Mantoptera	14	0.8	1.4	—	—	—
	Orthoptera	374	22.0	57.8	128	29.0	14.5
	Dermaptera	20	1.2	0.7	1	0.2	0.2
	Heteroptera	3	0.2	0.0	—	—	—
	Homoptera	3	0.2	0.1	—	—	—
	Coleoptera	102	5.9	3.4	32	7.3	0.5
	Hymenoptera	55	3.2	0.3	—	—	—
	Lepidoptera	8	0.5	0.3	—	—	—
	Diptera	1 005	59.2	6.6	186	42.2	0.1
	Vertebrates Amphibia	38	2.2	3.5	55	12.5	3.0
Vertebrates	Reptilia	4	0.2	13.2	13	3.0	27.7
	Mammalia	2	0.1	6.4	7	1.6	12.9
	Pisces	—	—	—	15	3.4	41.1
	Total	1 698	100.0	100.0	441	100.0	100.0

of chicks in 2006 than in 1998 (Table 1). Fish were not recorded in 1998 but contributed 41% of the mass eaten in 2006, followed by reptiles (28%), orthopterans (15%), mammals (rodents, 13%) and amphibians (tadpoles, 3%) (Table 1). Most fish were Algerian Barb *Barbus callensis* from the Soummam River. Reptiles were lizards *Chalcides chalcides*. Mammals were mice *Mus* sp. that frequented a garbage dump 1 400 m east of the colony. The only amphibian species recorded during both 1998 and 2006 was the Mediterranean Painted Frog *Discoglossus pictus*.

There were no significant differences in the relative frequencies of prey items at the three sites where prey was sampled between 1998 and 2006 ($t = 0.99$; $p > 0.05$). Gastropods, coleopterans and hymenopterans were the most numerous prey species in both years (Figure 1). Despite this, they were infrequent in the diet of Cattle Egret chicks (Table 1). Therefore, our results reveal that prey availability and diet were not correlated ($r = 0.014$).

Discussion

Larger chicks need to consume high quantities of food to sustain rapid growth (Mayaud 1950). The bigger chicks of Cattle Egrets have a diet similar to that of the adults and are able to swallow frogs and other vertebrates (Telfair 1994). Si Bachir et al. (2000, 2008) reported that the breeding success of Cattle Egrets in our study area varied considerably between years. They recorded the highest breeding success (80%) and the highest number of fledged chicks per nest in 1998, which had a humid spring (316 mm). In contrast, they reported low breeding success in 1997 and 1999, years with low spring rainfall (precipitation 81.5 and 98 mm, respectively). Similarly, over 10 years McKilligan (1997) found significant differences in mean brood sizes and chick survival between years: Acrididae were the

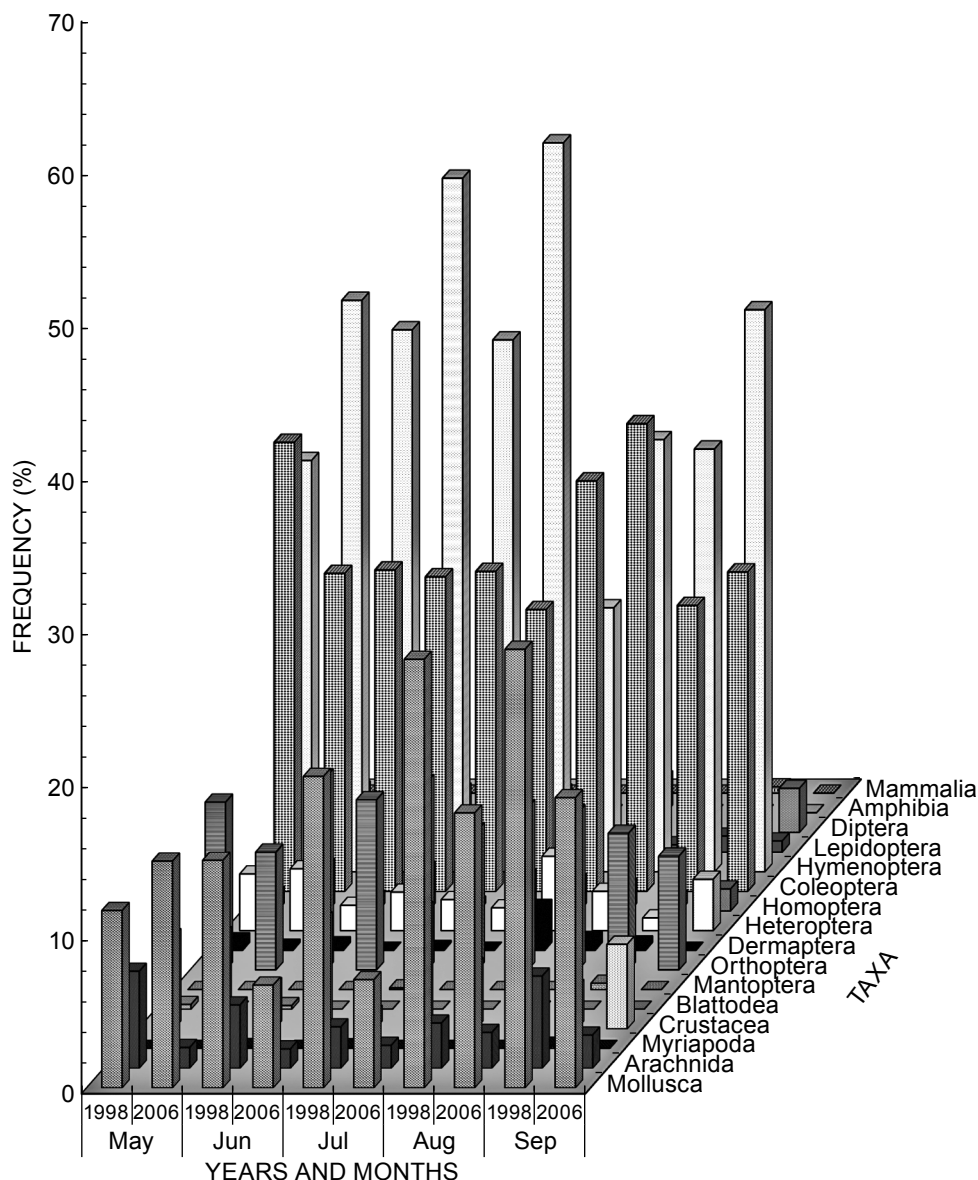


Figure 1: Percentage contribution by number of different prey categories to the overall abundance of prey at the three stations sampled for prey availability, May–September 1998 and 2006

main prey during eight humid spring years, in contrast to Gryllidae (crickets) and reptiles (vertebrates) in the two years that had drier springs.

Our results indicate that the availability of prey was not related to the diet of chicks. This was probably due to a number of factors, including: (1) a high consumption of Dipteran larvae at the garbage dump of El Kseur, a site frequently visited by Cattle Egrets; (2) the parents consuming more coleopterans in 1998 (26% by number in June and 13% in July; Salmi et al. 2002) than were fed to their chicks (6% in June, 5% in July); (3) gastropods, coleopterans and hymenopterans being the most prevalent prey species at the study site but being only occasionally consumed (Figure 1). Therefore, the Cattle Egret is a selective predator and adults choose prey species to feed their chicks. Cattle Egrets also feed opportunistically.

An example of this was in the dry spring of 2006 when a reduced flow in the Soummam River facilitated the capture by Cattle Egrets of fish and lizards. The diet also is likely to depend on other variables, including prey availability and feeding strategies and techniques (Telfair 1994).

A dominance of insects in the diet of Cattle Egret chicks is not uncommon, with other authors finding frequencies by number of 98% in Morocco (Valverde 1956), 89% in South Africa (Siegfried 1966), 96% in Mississippi, USA (Hanebrink and Denton 1969), 89% in Florida, USA (Jenni 1973), 94% in Spain (Herrera 1974) and 75% in Camargue, France (Hafner 1977). In our study, orthopterans were the most important invertebrate in both years in terms of mass (58% in 1998 and 15% in 2006). Unlike dipterans, orthopterans constitute a consistent food supply because of their abundance and the ease of their capture, thus providing a reliable source of

energy (RG-S unpublished data). Orthopterans have been reported elsewhere as the predominant insects consumed by Cattle Egret chicks (Valverde 1956, Siegfried 1966, Hanebrink and Denton 1969, Jenni 1973, Herrera 1974). According to McKilligan (1997), the proportion (by weight) of Acrididae in the chick's diet may predict egret breeding success, as it tends to be greater in years with lower chick mortality and larger, advanced broods. Coleopterans were only occasionally found in the diet of Cattle Egret chicks in El Kseur, probably owing to their strong sclerification, which makes them difficult to digest.

In conclusion, the diet of the Cattle Egret chicks of the lower Soummam valley is similar, in general, to that of the chicks of other areas in the world and is composed mainly of insects and some vertebrate species. However, our study demonstrated that climatic conditions can cause local variation in the diet, which indicates a good capacity by Cattle Egrets to adapt to their environment. Even though the adult Cattle Egret is an opportunistic predator, it was found that it becomes a selective predator with regard to feeding its chicks.

Acknowledgements — An excellent translation of the article to English was kindly undertaken by Mrs Dr Atmani Dina of the Laboratory of Applied Biochemistry, University of Béjaïa.

References

- Benkheil ML (ed.). 1991. *Les techniques de récoltes et de piégeages utilisées en entomologie terrestre*. Alger: Office des Publications Universitaires.
- Boukhemza M, Doumandji S, Voisin C, Voisin JF. 2000. Disponibilités des ressources alimentaires et leur utilisation par le Héron garde-bœufs *Bubulcus ibis* en Kabylie, Algérie. *Revue d'Ecologie (La Terre et la Vie)* 55: 361–381.
- Boukhemza M, Boukhemza-Zemouri N, Voisin JF. 2006. Biologie et écologie de la reproduction du Héron garde-bœufs *Bubulcus ibis* en Kabylie (Algérie). *Alauda* 74: 331–337.
- Boukrout-Bentamer N. 1998. Disponibilités en ressources entomologiques et modalités de leur utilisation par deux échassiers la Cigogne blanche *Ciconia ciconia* (Linné, 1758) (Aves, Ciconiidae) et le Héron garde-bœufs *Bubulcus ibis* (Linné, 1758) (Aves, Ardeidae) dans la Vallée du Sébaou (Kabylie, Algérie). Thèse Magister, Institut national agronomique, Algeria.
- Bredin D. 1983. Contribution à l'étude écologique d'*Ardeola ibis* (L.) Héron garde-bœufs de Camargue. PhD thesis, University Paul Sabatier, France.
- Bredin D. 1984. Régime alimentaire du Héron garde-bœuf à la limite de son expansion géographique récente. *Revue d'Ecologie (La Terre et la Vie)* 39: 431–445.
- Burns EC, Chapin JB. 1969. Arthropods in the diet of the Cattle egret (*Bubulcus ibis*) in southern Louisiana. *Journal of Economy and Entomology* 62: 736–738.
- Chopard L (ed.). 1943. *Faune de l'empire français. I. Orthopteroïdes de l'Afrique du Nord*. Paris: Librairie Larose.
- Doumandji S, Doumandji-Mitiche B, Hamadache A. 1992. Place des Orthoptères en milieu agricole dans le régime alimentaire du Héron garde-bœufs *Bubulcus ibis* Linné à Draâ El-Mizan en Grande Kabylie (Algérie). *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 57(3a): 675–678.
- Doumandji S, Harizia M, Doumandji-Mitiche B, Ait-Mouloud SK. 1993. Régime alimentaire du Héron garde-bœufs (*Bubulcus ibis* L.) en milieu agricole dans la région de Chlef (Algérie). *Mededelingen van de Faculteit Landbouwwetenschappen, Rijksuniversiteit Gent* 58(2a): 365–372.
- Fogarty MJ, Hetrick WM. 1973. Summer foods of Cattle Egrets in north central Florida. *Auk* 90: 268–280.
- Hafner H. 1977. Contribution à l'étude écologique de quatre espèces de hérons (*Egretta g. garzetta* L., *Ardeola r. ralloides* Scop., *Ardeola i. ibis* L., *Nycticorax n. nycticorax* L.) pendant leur nidification en Camargue. PhD thesis, University Paul Sabatier, France.
- Hanebrink KL, Denton G. 1969. Feeding behavior and analysis of regurgitated food collected from the Cattle Egret and Little Blue Heron. *Proceedings of the Arkansas Academy of Science* 23: 74–79.
- Herrera H. 1974. Observaciones sobre una colonia de Garcillas bueyeras en Andalucía. *Ardeola* 20: 287–306.
- Ikeda S. 1956. On the food habits of the Indian Cattle Egret (*Bubulcus ibis cormandus* Boddaert). *Japanese Journal of Applied Zoology* 21: 83–86.
- Jenni DA. 1973. Regional variation in the food of nesting Cattle Egret. *Auk* 90: 821–826.
- Kadry B. 1942. The economic importance of the Buff-backed Egret (*Ardeola ibis* L.) to Egyptian agriculture. *Bulletin of the Zoological Society Egypt* 4: 20–26.
- Kosugi A. 1960. On the food habits of some heron. *Ornithology* 15: 89–98.
- Maddock M, Baxter GS. 1991. Breeding success of egrets related to rainfall: a six-year Australian study. *Colonial Waterbirds* 20: 133–139.
- Mayaud N. 1950. Alimentation. In: Grasse PP (ed.), *Traité de Zoologie. Vol. XV: Oiseaux*. Paris: Masson et Cie. pp 655–687.
- McKilligan NG. 1997. A long term study of factors influencing the breeding success of the Cattle Egret in Australia. *Colonial Waterbirds* 20: 419–428.
- Mukherjee KA. 1972. Food habits of water birds of Sundarban, Parganas District, West Bengal, India. *Journal of the Bombay Natural History Society* 68: 45–70.
- Perrier R (ed.). 1927. *La faune de la France illustrée, Tome 5: Coléoptères (première partie)*. Paris: Delagrave.
- Perrier R (ed.). 1932. *La faune de la France illustrée, Tome 6: Coléoptères (deuxième partie)*. Paris: Delagrave.
- Ruiz X. 1984. An analysis of the diet of Cattle Egret in the Ebro Delta, Spain. *Ardea* 73: 49–60.
- Ruiz X, Jover L. 1981. Sobre la alimentación otoñal de la garcilla bueyera – *Bubulcus ibis* (L.) – en el delta del Ebro, Tarragona (España). *Publicaciones del Departamento de Zoología, Universidad de Barcelona* 6: 65–72.
- Salmi R, Doumandji S, Si Bachir A. 2002. Variations mensuelles du régime alimentaire du Héron garde-bœufs (*Bubulcus ibis*) dans la région de Béjaïa. *Ornithologie algérienne* 11(1): 50–55.
- Samraoui F, Menai R, Samraoui B. 2007. Reproductive ecology of the Cattle Egret (*Bubulcus ibis*) at Sidi Acchour, north-eastern Algeria. *Ostrich* 78: 481–487.
- Setbel S, Doumandji S, Boukhemza M. 2004. Contribution à l'étude du régime alimentaire du héron garde-bœufs *Bubulcus ibis* dans un nouveau site de nidification à Boudouaou (Est-Mitidja). *Alauda* 72: 193–200.
- Si Bachir A, Hafner H, Tourenq JN, Doumandji S. 2000. Structure de l'habitat et biologie de la reproduction du Héron garde-bœufs *Bubulcus ibis*, dans une colonie de la Vallée de la Soummam (Petite Kabylie, Algérie). *Revue d'Ecologie (La Terre et la Vie)* 55: 33–43.
- Si Bachir A, Hafner H, Tourenq JN, Doumandji S, Lek S. 2001. Diet of adult Cattle Egrets (*Bubulcus ibis*) in a new North African colony (Soummam Kabylie, Algeria): taxonomic composition and seasonal variability. *Ardeola* 48: 217–233.
- Si Bachir A. 2005. Ecologie du héron garde-bœufs, *Bubulcus ibis* (Linné, 1758), dans la région de Bejaia (Kabylie de la Soummam, Algérie) et son expansion en Algérie. PhD thesis, University Paul Sabatier, France.
- Si Bachir A, Barbraud C, Doumandji S, Hafner H. 2008. Nest site

- selection and breeding success in an expanding species, the Cattle Egret *Bubulcus ibis*. *Ardea* 96: 99–107.
- Siegfried WR. 1966. On the food of nestling Cattle Egrets. *Ostrich* 37: 122–135.
- Siegfried WR. 1971. The food of the Cattle Egret. *Journal of Applied Ecology* 8: 447–468.
- Snoddy EL. 1969. On the behaviour and food habits of the Cattle Egret, *Bubulcus ibis* (L.). *Journal of the Georgia Entomological Society* 4: 156–158.
- Telfair RC II. 1994. Cattle Egret (*Bubulcus ibis*). In: Poole A, Gill F (eds), *The birds of North America* no. 113. Philadelphia: Academy of Natural Sciences; Washington, DC: American Ornithologists' Union. pp 13–31.
- Valverde JA. 1956. Aves de Marruecos Espanol en Julio. *Ardeola* 20: 213–240.
- Vázquez Torres M, Márquez Mayaudon C. 1972. Algunos aspectos ecológicos y la alimentación de la garza garrapatera *Bubulcus ibis ibis* (Linneo) en la región de la Mancha, Actopan, Veracruz. *Anales del Instituto Biología, Universidad Nacional Autónoma de México, Serie Zoología* 43(1): 89–116.
- Villiers A (ed.). 1978. Faune des coléoptères de France I. Cerambycidae. Paris: Lechevalier.
- Voisin C (ed.). 1991. *The herons of Europe*. London: T and AD Poyser.

Appendix: Composition of the diet of Cattle Egret chicks in the lower Soummam valley, Algeria, in 1998 and 2006. For each species or species group, its presence in a year is indicated by '+'

Species	1998	2006	Species	1998	2006
<i>Ferossacia</i> sp.	+		<i>Labidura riparia</i>	+	
Araneidae sp.1	+	+	Reduviidae sp.1	+	
Araneida sp.2	+		<i>Nezara viridula</i>	+	
Araneida sp.3	+		<i>Cicadatra atra</i>	+	
<i>Dysdera</i> sp.	+		<i>Cicadetta montana</i>	+	
Solifugea sp.	+		Coleoptera sp.	+	
Phalangida sp.1	+		Cicindelidae sp.	+	
Phalangida sp.2	+		Carabidae sp.1	+	+
<i>Himantarium gabrielis</i>	+	+	Carabidae sp.2	+	
<i>Scutigera coleoptrata</i>	+		Carabidae sp.3	+	
Insecta sp.	+		<i>Macrothorax morbillosus</i>	+	
Blattodea sp.1	+		<i>Harpalus</i> sp.1	+	
Blattodea sp.2	+		<i>Harpalus fulvus</i>	+	+
<i>Lestes</i> sp.	+		<i>Harpalus mauritanicus</i>	+	
<i>Onychogomphus costae</i>	+		<i>Amara ovata</i>		+
<i>Sphodromantis viridis</i>	+		<i>Acinopus picipes</i>	+	
<i>Mantis religiosa</i>	+		<i>Dichrotrichus pallidus</i>	+	
<i>Ameles africana</i>	+		<i>Chlaenius</i> sp.	+	
Orthoptera sp.	+		<i>Campalita olivieri</i>	+	+
<i>Amphiestris baetica</i>	+		<i>Scarites buparius</i>	+	+
<i>Decticus albifrons</i>	+	+	<i>Poecilus purpurascens</i>	+	+
<i>Odontura algerica</i>	+	+	<i>Ophonus</i> sp.		+
<i>Platycleis tessellata</i>	+		Dytiscidae sp.		+
<i>Gryllus bimaculatus</i>	+	+	Staphylinidae sp.1	+	
<i>Gryllus</i> sp.	+		Staphylinidae sp.2	+	
<i>Thliptoblemmus batnensis</i>	+		<i>Staphylinus</i> sp.	+	
Caelifera sp.	+		<i>Ocypus olens</i>	+	
<i>Paratettix meridionalis</i>	+		<i>Silpha opaca</i>	+	+
<i>Pamphagus elephas</i>	+	+	Histeridae sp.	+	
<i>Anacridium aegyptium</i>	+		Dermestidae sp.1	+	
<i>Calliptamus barbarus</i>	+	+	Dermestidae sp.2	+	
<i>Pezotettix giornai</i>	+	+	Elateridae sp.	+	
<i>Aiolopus thalassinus</i>	+	+	Tenebrionidae sp.	+	+
<i>Aiolopus</i> sp.	+	+	<i>Lithoborus</i> sp.	+	
<i>Oedipoda coerulescens sulfurescens</i>	+		<i>Mylabris litigiosus</i>	+	
<i>Oedaleus decorus</i>	+		<i>Anthicus</i> sp.	+	
<i>Acrotylus patruelis</i>	+		Cerambycidae sp.	+	
<i>Locusta migratoria</i>	+	+	<i>Clytra viscina</i>	+	
<i>Acrida turrita</i>	+		Carpophilidae sp.	+	
<i>Omocestus raymondi</i>	+		Scarabeidae sp.	+	+
<i>Eyprepocnemis plorans</i>	+		<i>Pleurophorus</i> sp.	+	
<i>Platypterna tibialis</i>	+	+	<i>Gymnopleurus</i> sp.	+	
<i>Dociostaurus jagoi jagoi</i>	+		<i>Anoxia</i> sp.	+	
<i>Forficula</i> sp.	+		<i>Cetonia cuprea</i>	+	
<i>Anisolabis mauritanicus</i>	+	+	<i>Cetonia</i> sp.		+
<i>Oxythyrea squalida</i>	+		<i>Tipula</i> sp.	+	+
Curculionidae sp.1	+	+	Calliphoridae sp.1	+	
<i>Apion</i> sp.	+		<i>Lucilia</i> sp.	+	+
<i>Drilus</i> sp.	+		Muscidae sp.	+	+
Hymenoptera sp.	+		<i>Syrphus</i> sp.	+	
Formicidae sp.	+		<i>Cyclorrhapha</i> sp.1	+	
<i>Messor barbara</i>	+		<i>Cyclorrhapha</i> sp.2	+	
<i>Monomorium</i> sp. ind.	+		<i>Eristalis tenax</i>	+	
<i>Tapinoma simrothi</i>	+		Sarcophagidae sp.1	+	
<i>Plagiolepis barbara</i>	+		Sarcophagidae sp.2	+	
<i>Crematogaster</i> sp.	+		<i>Epistrophe balteatus</i>	+	
<i>Pheidole pallidula</i>	+		<i>Tabanus</i> sp.	+	+
<i>Tetramorium biskrensis</i>	+		Asilidae sp.	+	
Apidae sp.1	+		<i>Discoglossus pictus</i>	+	+
<i>Bombus</i> sp.	+		<i>Anguis</i> sp.	+	
<i>Apis mellifera</i>	+		<i>Chalcides chalcides</i>	+	+
Lepidoptera sp.	+		<i>Tarentola mauritanica</i>	+	
Noctuidae sp.	+		<i>Mus</i> sp.	+	+
Diptera sp.	+	+	<i>Barbus callensis</i>		+