

KCALORY DEMAND OF THE HERON COLONIES IN THE HUNGARIAN TISZA-VALLEY

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Abstract

A significant number of *Ardea cinerea*, *Ardea purpurea*, *Egretta alba*, *Egretta garzetta*, *Ardeola ralloides*, *Nycticorax nycticorax* and *Platalea leucorodia* nest in the Hungarian region of the Tisza river. The present paper studies the aliment demand of the larger colonies of these species, and determines that from Spring to Autumn (210 days) the 9407 kg biomass of the herons consumes 251 110 kg aliment equivalent to 430 104 megacalories, being exclusively from animal nutriment.

Introduction

The gallery forests in the valley of the Tisza are particularly suitable for the settling of herons nesting on trees, and their dense colonies represent a significant biomass. Their alimentation raises practical problems from the viewpoint of nature conservancy and economy. On the one part, the numerical demand of this high-numbered heron type should be evaluated in regard to the nutriment chain; on the other part their fish consumption means competition in the utilization of fishing and angling at the district. The intake of animal food in the largest amount is by the herons in the flood-plain. The results of VASVÁRI'S and STERBETZ'S analysis on the alimentation of the Hungarian herons are summarized in detail in the hand-books by BAUER—GLUTZ (1966) and CRAMP—SIMMONS (1977), therefore — regarding the prescribed length — this paper only comprises the studies on the amount of Kcalories taken up by the herons from Spring to Autumn from the flood plain.

Materials and Methods

On the basis of author's own studies and the publications by RADVÁNYI (1951), SZIJJ (1951), KOVÁCS (1968), LŐRINCZ (1975), MOLNÁR (1977), LŐRINCZ (1979), BALOGH—ZÁKÁNY (1980), OKTH (1981), BALOGH (1982), MOLNÁR (1982), KOVÁCS (1983) from the interval between 1948—1983, the average number of nests of the large heron colonies at the Tisza-valley was taken as the starting source (Table 1). According to his mortality studies carried out in 24 incubation seasons, author averagely counted with 3 raised up nestlings from the *Ardea* and *Egretta*; 4 from the *Ardeola*; and 2 from the *Nycticorax* and *Platalea* species. From the 7 species 135 stomach contents were at disposal, partly from the collection of the Ornithological Institute, partly using up the perished individuals found at the nest colonies. Due to nature conservancy reasons a larger amount of study material could not be collected (Table 2—3). The data on the weight of the collected individuals were used for the calculation of the biomass. Table 4. shows the biomass and the daily aliment weight. For the calculation of the Kcalory values of the aliment groups, the starch-value tables by HEROLD (1977) were used (Table 5—6), giving the final results in megacalory to avoid the big numbers (1 kg starch-value=2356 Kcalory=2.356 megacalory). The biomass-value applied for the calculations

only reflects the facts in the good alimentary relations of the years abounding in water. In the dry years, after leaving the nests, the majority of the herons wander far. The ecological relations of the Tisza II. Storage Tank's gigantic establishment have become permanently favourable, therefore the Summer scattering of the water birds is always significantly less there.

Results

The following aliment-types were found from the studied stomach contents:

Mammalia: *Microtus arvalis*, *Arvicola terrestria*, *Apodemus* sp., *Sorex* sp.

Reptilia: *Natrix* sp (10—20 cm), *Lacerta* sp.

Amphibia: *Bombina bombina*, *Rana* sp. *Hyla arborea*.

Pisces: *Acerina cernua* (10 cm), *Misgurnus fossilis* (10 cm), *Cyprinus carpio* (5—20 cm), *Tinca tinca* (5—10 cm), *Alburnus alburnus* (5—8 cm), *Rutilus rutilus* (6—7 cm), *Rhodeus sericeus* (2—3 cm), *Carassius carassius* (8—12 cm), *Esox lucius* (10—15 cm), *Silurus glanis* (10—20 cm), Pisces sp.

Gastropoda: *Lithoglyphus nacticoides*, *Succinea* sp., *Valvata piscinalis*, *Planorbis* p., *Gastropoda* sp.

Insecta: *Naucoris cimicoides*, *Ranatra* sp., *Notonecta glauca*, *Nepa rubra*, *Berosus spinosus*, *Hydrophilidae* sp., *Ditiscus marginalis*, *Cybister* sp., *Cicindela* sp., *Odonata larvæ*, *Gryllotalpa vulgaris*, *Libellula* sp., Insecta sp.

Crustacea: *Cammarus* sp., *Triops* sp., Crustacea sp.

From the listed species the heron colonies of the Tisza-valley take in an average of 1196 kg-s daily. In adult individuals the daily amount of nutriment corresponds to 16% of their body weight. The pullus individuals consume nutriment corresponding to 40—50% of their body weight at start. This amount decreases in proportion with their growth, reaching the value determined for adults in September. Therefore, in the case of juvenile individuals, 20% of their body weight was taken as an average. JUNOR (1972) also obtained results similar to author's determinations, when studying piscivorous birds.

The daily 12 quintal animal organism forming the nutriment of the herons is a highly significant amount in the trade in materials of the ecosystem. From economical point of view the prey of the Micromammalia means profit, the consumption of fish is partly nourishment competition with man. It is striking that in the flood plain the herons mostly consume fry. They only prey larger fish from the artificial fish-ponds, where the possibility of choice is minimal.

Table 1. Average number of nests regarding the studied heron colonies.

Heron colony (Period)	<i>Ardea cinerea</i>	<i>Ardea pur- purea</i>	<i>Eg- retta alba</i>	<i>Eg- retta gar- zetta</i>	<i>Arde- ola rallo- ides</i>	<i>Nycti- corax nycti- corax</i>	<i>Plata- lea leuco- rodia</i>
Sasér (1948—83)	55	—	—	55	21	92	—
Labodár (1968—83)	53	—	—	23	10	90	1
Environment Protection Area of the Middle Tisza (1949—82)	42	—	—	40	15	150	—
Bird Reserve at Tiszafüred (1980—83)	144	50	100	120	80	2000	270
Ároktő (1964—65)	100	—	—	50	15	100	—
Leninváros (1982)	82	—	—	—	—	—	—
Tiszaluc (1951—79)	40	50	—	15	15	170	—
Total	516	100	100	303	156	2602	271

Table 2. Distribution of stomach content according to the areas of collection.

Species	Hódmező vásárhely	Labodár (Csongrád)	Tiszafüred	Total
<i>Ardea cinerea</i>	10	5	4	19
<i>Ardea purpurea</i>	5	1	2	8
<i>Egretta alba</i>			3	3
<i>Egretta garzetta</i>	29		1	30
<i>Ardeola ralloides</i>	25			25
<i>Nycticorax nycticorax</i>	37		7	44
<i>Platalea leucorodia</i>		4	2	6
Total	106	10	19	135

Table 3. Distribution in time of the collected stomach contents.

Month	<i>Ardea cinerea</i>	<i>Ardea pur- purea</i>	<i>Eg- retta alba</i>	<i>Eg- retta gar- zetta</i>	<i>Arde- ola rallo- ides</i>	<i>Nicti- corax nycti- corax</i>	<i>Plata- lea leuco- rodia</i>
IV			2	3	1		
V	3	1		1	1		2
VI	5	2	1	8	7	10	4
VII		2		8	8	18	
VIII	7	2		6	7	8	
IX	4	1		4	1	7	
Total	19	8	3	30	25	44	6

Table 4. Basis of calculation concerning biomass and weight of nutriment.

Species	Adult.		Juv.	
	Weight of of ind	Weight of daily aliment	Weight of ind.	Weight of daily aliment
<i>Ardea cinerea</i>	1500	240	800	160
<i>Ardea purpurea</i>	1200	190	750	120
<i>Egretta alba</i>	1700	270	900	140
<i>Egretta garzetta</i>	500	80	370	50
<i>Ardeola ralloides</i>	300	40	200	30
<i>Nycticorax nycticorax</i>	450	70	300	50
<i>Platalea leucorodia</i>	1900	300	900	140

Table 5. Percental distribution of aliment types.

Type of aliment	<i>Ardea cinerea</i>	<i>Ardea purpurea</i>	<i>Egretta alba</i>	<i>Egretta garzetta</i>	<i>Ardeola ralloides</i>	<i>Nycti- corax nycti- corax</i>	<i>Platalea leucoro- dia</i>
Mammalia	18	23	10	2	2	8	—
Reptilia	—	—	—	—	2	8	—
Amphibia	7	12	—	7	18	33	18
Pisces	39	18	30	31	17	17	27
Gastropoda	—	—	—	11	6	—	—
Insecta	36	47	60	47	48	34	55
Crustacea	—	—	—	2	7	—	—

Table 6. Nutriment taken between the period III. 1—IX. 5.

Group of aliment	Weight of aliment (kg)	Megacalory
Mammalia	27 412	54 895
Reptilia	3 890	2 933
Amphibia	41 894	67 117
Pisces	71 802	152 247
Gastropoda	1 667	2 258
Insecta	103 846	149 243
Crustacea	599	1 411
Total:	251 110	430 104

Conclusions

The process of the anthropogenic transformation of the Tisza basin pauperizes in general the alimentation areas of the water birds. At the same time, the great water storage tanks established in this area provide abundant and select nutriment for the birds. Therefore, the heron colonies scattered at the Tisza flood plain gradually move to such artificial environment, having permanent favourable ecological fundamentals. This tendency is already becoming strikingly evident in the environs of Tiszafüred, and its increase is expectable in the future. This concentration of the Tisza's ecosystem is advantageous, since the huge storage tanks are more easily able to serve the high aliment demand of the heron species than the rest of the river sections.

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A magyarországi Tisza-völgy gémtelpeinek Kcaloria-igénye

STERBETZ I.

Kivonat

A Tisza magyarországi szakaszán jelentős mennyiségű *Ardea cinerea*, *Ardea purpurea*, *Egretta alba*, *Egretta garzetta*, *Ardeola ralloides*, *Nycticorax nycticorax* és *Platalea leucorodia* fészkel. A dolgozat e fajok nagyobb kolóniáinak táplálékigényét vizsgálja. Megállapítja, hogy a gémek 9407 kg. biomasszája tavasztól őszig (210 nap) kizárólag állati tápláléknemekből 430 104 megacaloriának megfelelő, 251 110 kg táplálékot fogyaszt. A folyó mentén épülő nagy víztárolók fokozatosan környezetükbe vonzzák a hullámtérben elszórt gémtelpeket, mivel ökológiai viszonyaik állandósultan kedvezők. Ez a tendencia Tiszafüred környékén máris feltűnően megnyilvánul s fokozódása a jövőtől várható.

Калорийная потребность журавлиной колонии в долине Тисы, находящейся на территории Венгрии

И. Штербец

Резюме

В находящейся на территории Венгрии долине Тисы гнездится значительное количество *Ardea cinerea*, *Ardea purpurea*, *Egretta alba*, *Egretta garzetta*, *Ardeola ralloides*, *Nycticorax nycticorax*, *Platalea leucorodia*.

Работа исследует потребность в пище более крупных колоний этих видов. Установлено, что журавлям для накопления биомассы в 9407 кг от весны до осени (210 дней) потребовалось 251 110 кг животной пищи, что соответствовало 430 104 мега кал.

Строящиеся вдоль реки водохранилища постоянно концентрируют вокруг себя разрозненные журавлиные колонии, поскольку обеспечивают выровненно благоприятные экологические условия.

Эта тенденция ярко проявляется в окрестностях Тисафюред и в дальнейшем ожидается её усиление.

Potreba kilo-kalorija kolonije čaplji doline reke Tise u Madjarskoj

STERBETZ I.

Abstrakt

Duž reke Tise u Madjarskoj gnezdi se značajan broj *Ardea cinerea*, *Ardea purpurea*, *Egretta alba*, *E. garzetta*, *Ardeola ralloides*, *Nycticorax nycticorax* i *Platalea leucorodia*. U radu su obuhvaćena istraživanja potrebe hrane većih kolonija. Utvrđeno je da za stvaranje 9407 kg. biomase, čaplje, koje od proljeća do jeseni (210 dana) isključivo troše životinjsku hranu, utroše 251 110 kg. hrane, odnosno 430 104 megakaloriju. Velika akumulaciona jezera, izgrađena duž reka, sa povoljnim ekološkim uslovima, postepeno privlače rasute kolonije čaplji sa plavnih zona. U okolini Tiszafüred-a ova je pojava očigledna, i u buduće se očekuje njeno intenziviranje.