INVESTIGATIONS INTO THE NUTRITION OF THE GREAT BUSTARD (OTIS T. TARDA L.) IN THE WINTER ASPECT OF 1977/78

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Introduction

The winter food basis is an essential factor in the localization of bustard populations living in an agricultural environment. With adverse feeding conditions the bustard of Central Europe is compelled to stryaing in winter, and under such circumstances it is endangered by weather, hunger, beasts of prey and man at an increased rate. Still heavier damage may result from the dispersals of individuals strying long distances apart that involves disintegration of the population. Upon such consideration, nature conservation has to take special care in providing for a food basis at the traditional sites of nesting and rutting. By this investigation, author intends to lend help to this practice.

Method

In choosing the site of research three fundamental requirements were taken in consideration:

— Helpmates were needed who had the possibility of daily controlling the bustards according to the aspects specified by the author who himself could personally see the area only every 10 to 12 days.

— A population small in number and of variable composition was needed all individuals of which could be watched.

— Finally, vegetation of the biotop had to ensure on large areas the kinds of winter food that are favourable for the bustard.

This threefold requirement was favourably united in the Csabacsüd pasture and surrounding fields situated in county Békés between the towns Szarvas and Orosháza (46°32′—20°34′). The area is a traditional habitat of the bustard. In the years from 1930 to 1940 about 300 individuals were kept in evidence that by 1973 have shrunk to 14 specimens. From 1975 on, there was a certain improvement in all certainty due to favourable environmental conditions. At the time of investigations the author was engaged in studying a population consisting of 35 individuals.

Registering of these birds by sex and age was carried out in spring 1977 when individuals in various states of development and differing in sex could be identified with absolute certainty. The 1977 summer progeny whose sexual distribution was not recognizable as yet in winter has been included in the group later on. For calculating mean values of average body weight and daily food amount consumed by individual, no specimens could be collected for reasons of nature conservation. Therefore, when estimating

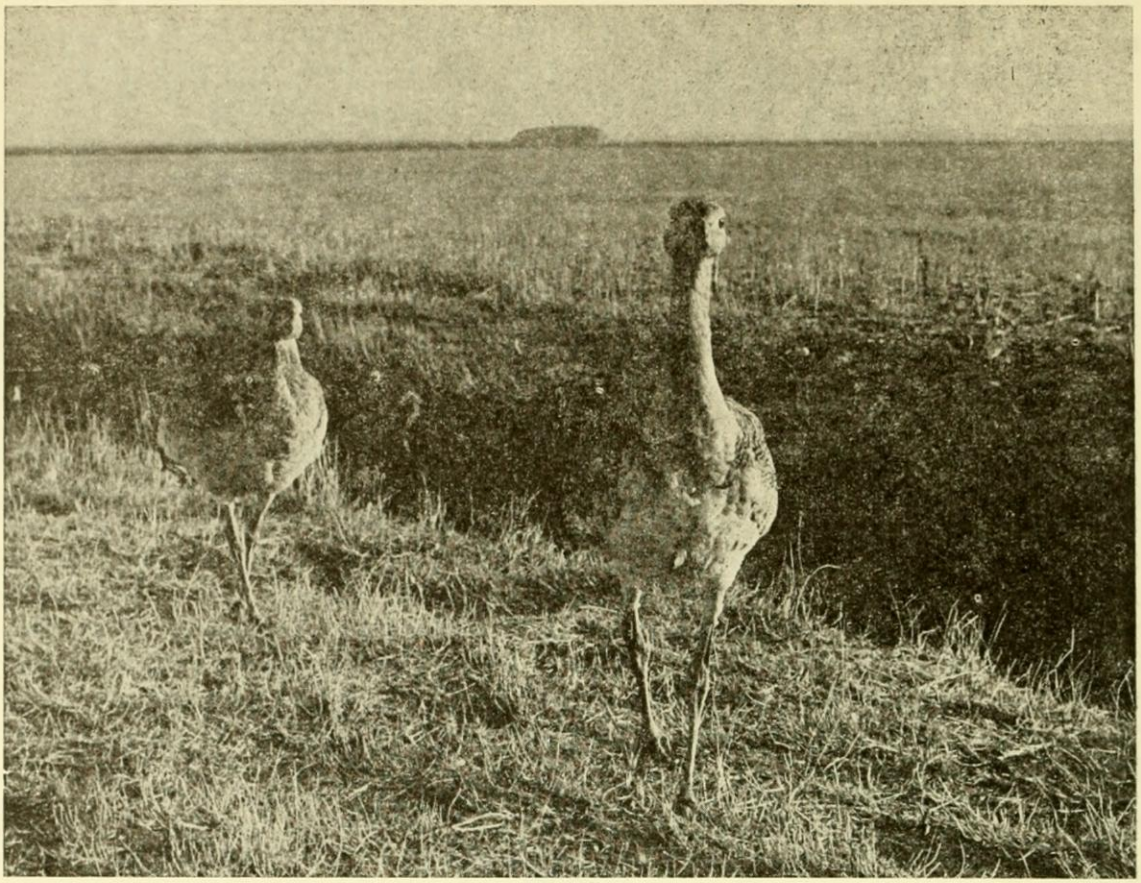

Fig. 25. *Bustards in natural steppe zone of area of investigation.*
25. ábra. *Túzokok a vizsgálati terület természetes sztyeppzónájában (Foto: Dr. I. Sterbetz)*

body weigth, experiences obtained during earlier hunting practice and data of literature (summaries in: Fodor—Nagy—Sterbetz, 1971; Glutz v. Blotzheim—Bauer—Bezzel, 1973) were taken in consideration. For the calculation of food wiegth, data were supplied by 4 winter specimens found dead. Out of these, three bumped against electric wires, the fourth has been wounded by a gun. The sources of error expectable from this small number are moderated by the fact that all specimens had their digestive tract filled.

To measure the complete material- and energy turnover no such capticity specimens were at disposal on hand of which the daily production and composition of excreta could have been established. That way, from the daily food weight only the taken up materials could be evaluated. For the practice of nature conservation, however, it was the quantity and composition of the consumed food and the tendency of feeding that was of interest.

According to summaries of the above cited literature and experiences gained in Hungary, winter food of the bustard is definitely of plant origin. Other kinds of food occur in small quantities, consequently, their presence can be neglected from the point of view of the character of the food basis. Merely plants on the homogeneous stand of which the population was staying for rather long periods can be considered as the winter food of bustards under observation on the Csabacsüd area.

For the evaluation of food components there is no internationally accepted

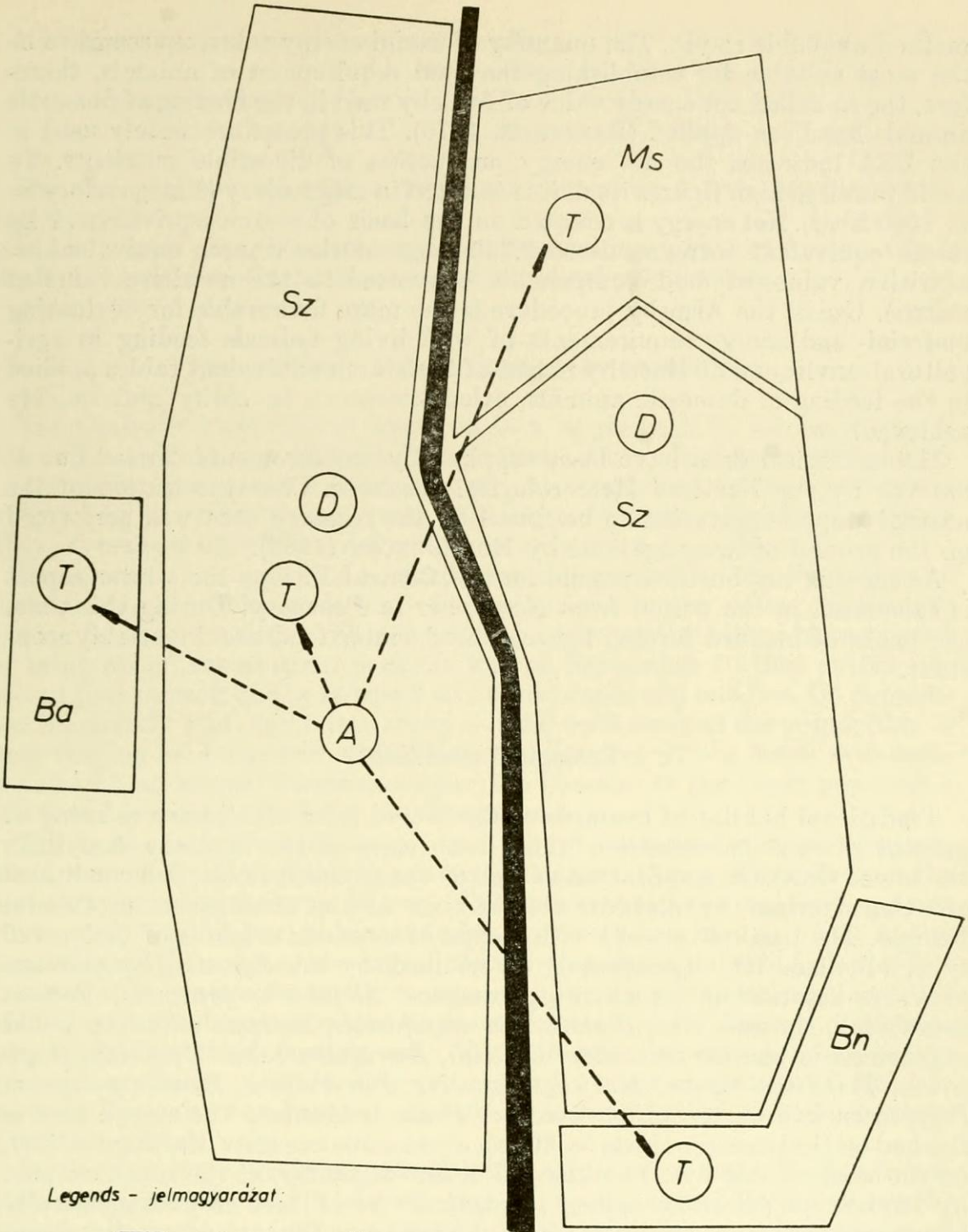

Fig. 26. *Wintering area of bustard population at Csabacsüd in season 1977/78.*
26. ábra. *A csabacsüdi túzokpopuláció telelőterülete 1977/78. idényben*

method available as yet. The quantity of useful energy taken up seems to be the most suitable for establishing the food requirement of animals, therefore, the so-called net energy value of Armsby used in the feeding of domestic animals has been applied (BAINTNER, 1976). This procedure widely used in the USA indicates the net energy production of digestible nutrients. To avoid puzzling high figures its unit is counted in megacalory (1 megacalory = = 1000 Kcal). Net energy is counted on the basis of starch equivalent. 1 kg starch equivalent corresponds to 2.356 megacalories (Starch equivalent = nutritive value of food components converted to the nutritive value of starch). Use of the Armsby procedure is the more favourable for evaluating material- and energy requirements of wild living animals feeding in agricultural environment since by means of the starch equivalent tables applied in the feeding of domestic animals, calculations can be easily and quickly achieved.

Meteorological data have been supplied by measurements carried out at Szarvas by the National Meteorological Institute. Charakterization of the natural steppe vegetation to be found on the research area was performed on the ground of investigations by BODROGKÖZY (1965).

As regards the bustard populations of Central Europe the winter aspect is calculated in the period from November to February. During this time, the packs of bustard formed for search of winter food are invariably constant.

Ecological conditions

Traditional habitat of bustards at Csabacsüd is an alkali pasture being at present of 2500 ha extension libing both sides of the highway that links the towns Orosháza and Szarvas as well as the adjacent fields. Soil conditions are characterized by meadow clay similar to the chernozems in Central Europe. The pasture covered with steppe of secondar origin is of „solonetz" type, alkaline. Its vegetation is determined by an *Agrosti-Alopecuretum pratensis* association. Dominant plants are *Alopecurus pratensis*, *Festuca pseudovina*, *Agrostis alba*, *Beckmannia eruciformis*, *Rorippa silvestris*. Other characteristic plants: *Limonium Gmelini*, *Scorzonera cana*, *Trifolium fragiferum*, *Trifolium repens*, *Medicago lupulina*, *Poa bulbosa*, *Mentha pulegium*, *Polygonum aviculare*, *Lolium perenne*, *Inula britannica*. The steppe area is flanked on the northern skirts by 300 ha continuous lucerne *(Medicago sativa)*, on the western side by 50 ha kale *(Brassica acephala)*, at the southern part by 150 ha rape *(Brassica napus)* plantations. All of these crops are generally known characteristic winter foods of the bustard. Due to systematic chemical plant protection measures, weed vegetation, micromammal and invertebrate fauna were detectable merely in traces.

Meteorological conditions of winter 1977/78 can be characterized by the following values:

Monthly means of coluds in %:	Nov. = 42,	Dec. = 71,
	Jan. = 66,	Febr. = 90.
Sum of sunshine duration in hours:	Nov. = 75,	Dec. = 50,
	Jan. = 50,	Febr. = 90.

Monthly mean values of temperature: Nov. = 6, Dec. = 2.1,
Jan. = —1, Febr. = 1 °C.
Sum of precipitation: Nov. = 41, Dec. = 30,
Jan. = 25, Febr. = 41 mm.

The area was covered with a 5 to 6 cm coat of snow from January 15 to February 19.

In the winter aspect the area was not touched upon by any human effect at all. Behaviour of the bustards could undisturbedly develop.

Composition and behaviour of the population

The Csabacsüd population wintered in a single pack in the period from November to February 1977/78. Composition: Ad. cocks 7 (estimated weight 12 kg/piece), juv. cocks 9 (estimated weight 6 kg/piece), hens 12 (estimsted weight 4 kg/pice), 1977 year young 7 (estimated weight 4 kg/piece). Accordingly, average weight of a total of 35 bustards was 6.45 kg/piece.

Emergence of the pack of bustards was determined by the dynamism of summer moult in old birds and of development in the young. Specimens having finished moulting and not heading anymore the young have started to bring about the autumn pack. It was on September 10 that author observed first in pack on the steppe 2 ad., 5 juv. cocks and one hen. On September 20, already 7 ad. and 6 juv. cocks — total cock stock of the population — were staying here together with 5 hens. On October 12 the pack was completed with additional 3 hens and 3 juv. On October 20 the whole population was found in a single pack for the first time.

During the whole winter season the bustard pack used a single sleeping-place, near the centre of the steppe area, at about 1.5 km distance from the motorway crossing the area. Distance between sleeping-site and feeding area: on steppe 0.7 to 0.8 km, in lucerne 4 km, in kale 2 km, in rape 4 km. At the beginning of the season, leaving of the sleeping-site was taking place a few minutes after sunrise. Later on, worsening of weather, shortening of sections of the day gradually retarded the beginning of feeding. By the end of December, bustards started feeding only 30 to 40 minutes after sunrise. In the evening, arrival to the sleeping-site showed similar tendency. In the last week of December, bustards started to their sleeping-site 20 to 30 minutes before sunset.

Feeding activity also changed with the advance of time. In November, birds still halted for 2 to 3 hours in grazing, by the end of December, on the other hand, search for food was almost continuous all day long. In the autumn and late winter season, on the occasion of shorter grazing periods food uptake was much more dynamic than in mid-winter when birds were in search of food all day long without interval. This is probably due to that in snowy-frosty weather, picking out of food has a greater role, there being less vegetation suitable for consumption.

In the wintering bustard pack, sexual differentiation and a certain hierarchy was observed. Cocks detached themselves also within the pack from the set of hens and less than one year old birds holding fast. Special guard-birds were signalling for cocks and hens the danger of an approaching man.

The last week of February brought about a change in the behaviour of cocks. By that time, sexually immature young specimens and old cocks apparently still more separated from hens. During the warmer noon hours old cocks ever more frequently made gestures characteristic of the initial phase of rutting. By day, they left the pack on several occasions, flying about in a 3 to 4 km radius to get acquainted with the area, in the first place in the direction of two traditional rutting sites. Their final separation occurred in the first week of March. Eight days later the young cocks and hens separated, too. The set of hens and young specimens of unknown sex left alone, disintegrated for good and all only in the second half of March when rutting of old cocks began.

Next to the wintering pack of bustards frequently herds of deer, hares, pheasants and coveys of partridges were observed. Bustards behaved indifferently towards these species but were aggressive against the rooks flying into the grazing pack of bustards. It seems possible that their aversion to this egg-destroying animal is self-consistent.

Winter food and calory requirement

The wintering pack was found to utilize the individual feeding areas in a consistent order. In the interval from November 1 to December 5 (35 days) they stayed on the *Agrosti-Alopecuretum pratensis* phytocenosis because here the vegetation revived by October rainfalls offered tasty food of high nutritive value. After hardening of fibre of the mixed grass stand the pack moved to lucerne *(Medicago sativa)* and stayed there from December 6 to December 29 (24 days). In the year of investigation this crop was utilized for seed production, therefore, the stubble offering coarse fibre did not attract earlier the bustards. Lucerne revived in the mild winter season has become suitable for grazing at the time the steppe vegetation has grown old. From December 30 to January 17 (19 days) it was kale *(Brassica acephala)* that provided food basis for the population. Snowing started on January 15. Three days later, on January 18 bustards moved to their most characteristic winter feeding site, to rape *(Brassica napus)* and stayed there until February 28, last day of the time of investigation (42 days). On snowy days they were grazing the juicy green foliage of rapes rising from under the snow. Small thickness of the snow-cover did not affect feeding.

Stomach content examination of the perished specimens as enumerated below presented a basis for calculating the food amount taken up daily:

1. Esztergom, year?, weight?, sex?: *Brassica napus* 250 gr.
2. Ócsa, 5th November 1972, 5 kg juv. cock: *Brassica napus*, *Trifolium vulgare* 185 gr.
3. Csabacsüd, 8th November 1961 8 kg cock: *Medicago sativa* 366 gr.
4. Csabacsüd, January 1972, 11 kg ad. cock: *Brassica napus* 401 gr.

In consideration of the food weight of the specimens investigated, daily food requirement of 35 bustards wintering at Csabacsüd was found to total 10.5 kg, the food quantity taken up daily by one specimen, 0.3 kg. Using these values, tables were compiled by the author showing the food consumed and the net energy taken up during the 4 months of the winter aspect 1977/78.

On hand of the data, after all, the daily requirement of a bustard specimen as measured in the winter season can be calculated with net energy corresponding to about 0.07—0.08 megacalories.

Evaluation of the investigation

The choice of food by bustards wintering at Csabacsüd indicated the tendency that can be generalized on the Great Hungarian Plain. From the practical aspect, the winter food exclusively consists of green plant parts, steppe grasses *(Gramineae)*, legumes *(Papilionaceae)* and crucifers *(Brassicaceae)*. Choice of food was determined by the quality and availability of the kinds of food. Accordingly, bustards did not promiscuously consume the various crops but in an order seprated to longer periods. In a remarkable way, in respect of the various food crops, the daily megacalory quantity per bustard showed but insignificant differences.

On hand of the results obtained the practice of nature conservation should endeavour to provide such plants in the vicinity of nesting and rutting sites

Table 10.
10. táblázat

Food of 35 bustards in winter 1977/78
35 túzok tápláléka 1977/78 telén

Kind of food A táplálék neme	Starch equivalent of 1000 g 1000 g keményítő értéke	Number of feeding days Táplálkozási napok száma	Food taken up kg Felvett táplálék, kg
Agrostis alopecuretum ass.	124	35	367,5
Medicago sativa	109	24	252
Brassica acephala	101	19	199,5
Brassica napus	73	42	441
Total – összesen		120	1260

Table 11.
11. táblázat

Net energy taken up expressed in megacalory
A felvett nettóenergia alakulása megakalóriában kifejezve

Kind of food A táplálék neme	Megacal. taken up for 120 days 120 napra felvett megakalória		1 day megacal. requirement of 1 spec 1 exempl. 1 napi megakalória-igénye
	35 exempl.	1 exempl.	
Agrostis alopecuretum ass.	107,36	3,06	0,08
Medicago sativa	64,71	1,84	0,07
Brassica acephala	47,47	1,35	0,07
Brassica napus	75,84	2,16	0,07
Total – összesen	295,38	8,41	

— determining the biochor of bustards — that supply green food of fine fibres and available in snowy weather, too. Both the steppe vegetation and lucerne can be only reckoned in snowless period, therefore, sowing of Brassica species is absolutely necessary their foliage being available with snow cover as thick as 10 to 15 cm. In Hungary, food conditions are favourable for the bustard. Rape *(Brassica napus)* is a good forecrop to wheat in the monoculture wheat growing systems. Its growing being profitable anyway, the acreage sown to rapes is large all over the country. In the bustard reserve at Dévaványa (county Békés) the nature conservation authority obligates the user of the area to grow yearly at least 50 ha rape.

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Vizsgálatok a túzok (Otis t. tarda L.) táplálkozásáról 1977/78 téli aspektusában

Dr. Sterbetz István

Közép-Európában a túzok télen elkóborol abban az esetben, ha az állomány fészkelő- és dürgőhelye közelében tápláléka egész éven át nincs biztosítva. A téli táplálékszerző kóborlás a populációk felaprózódását segítheti elő, ezért szükséges, hogy a természetvédelem állandó táplálékbázisról gondoskodjon. Közismert, hogy a túzok télen a természetes pusztai fűfélék, lucerna, takarmánykáposzta és repcevetések életterében tartózkodik. Táplálékát ilyenkor gyakorlatilag teljes egészében e növények levélzete képezi. A vizsgálat célja:

— olyan területen, ahol a felsorolt táplálékféleségek együttesen adottak, megállapítani a táplálékválasztás sorrendjét, és tisztázni annak magyarázatát;

— kiértékelni az átlagos napi táplálékszükségletet és az egyedenként, naponta felhasznált kalóriát.

A vizsgálatra a Békésmegyei Csabacsűdi-legelőn 1977/78 telén egyetlen csapatban tartózkodó, 35 példányt számláló túzokpopuláció adott lehetőséget. A kutatás eredményeit a közölt táblázatok tükrözik. A megfigyelések során bebizonyosodott, hogy a táplálékválasztást a táplálóknemek minőségének és elérhetőségének alakulása szabta meg. A túzokok mindenkor a fiatal rostanyagú, zöld növényi részeket részesítették előnyben. Havas időszakban a takarmánykáposzta és a repcevetések váltak elérhetővé számukra. Egy példány napi táplálóksúlya 0,3 kg zöldtakarmány, illetve 17,5 megakalóriának megfelelő nettóenergiaérték-átlagot adott. A különböző tápláléknemeknél az egy túzokra eső napi megakalóriamennyiség csak jelentéktelen különbségeket mutatott.