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FEED OF LITTLE OWL (*ATHENE NOCTUA* SCOP. 1769) IN AGRICULTURAL LANDSCAPE OF THE LUBLIN AREA

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Summary: The paper presents the results of analysis diet Little owl *Athene noctua* Scop. 1769. The material was collected for 5 months - from April-August during 2000 and 2001. The material for the analysis and compilation was collected at three study sites of little owl occurrence in the villages: Majdan Mętowski, Kalinówka and Skrzynice Pierwsze (Lublin Uplands). The mean number of victims per one pellet was 3.9, and the average size of a pellet – 32.8/13.3 mm. It was observed that little owls hunt for both vertebrates *Vertebrata* - 37.7% of the total number of victims, and invertebrates *Invertebrata* – 62.3%. The analysis showed that the little owl feeds on invertebrates significantly more often than on vertebrates. Among invertebrates, as high as 99.9% were insects *Insecta*, the remaining 0.1% being arachnids *Arachnida*.

Keywords: little owl, *Athene noctua*, diet, owls

INTRODUCTION

During recent decades, the disappearance of many species of animals has been observed, including useful birds. *Strigiformes* owls deserve special attention, as these nocturnal predatory birds which feed mainly on rodents are an important factor controlling their numbers.

Unfortunately, changes taking place in the environment caused by the use of insecticides and rodenticides, as well as its anthropogenic transformations, result in disappearance of proper nestling places and decrease in the food base for these animals. These factors threaten the population of owls, the numbers of which decrease at a fast pace.

The aim of the study was: the determination of food composition of the little owl in the agricultural landscape of the Lublin area; the recognition, based on

these birds' pellets, of the quantitative contribution in their feed of vertebrates (small mammals, amphibians and birds) and invertebrates (insects); determination of the frequency of the victims in the diet and biomass, as well as factors affecting seasonal changes in food composition of the little owl and its feeding preferences.

MATERIAL AND METHODS

Pellets were collected in the loft, around buildings and at the sites used by birds for hunting. The material was collected for 5 months – from April-August during 2000 and 2001. The methods of collecting pellets and their storage were carried out according to recommendations proposed by Styka [13] From soaked pellets the following preserved elements were skeletonized of vertebrates skeletons: long, cranium and mandible bones, as well as single teeth; also parts of insects bodies: chitinous scuta, wings, heads and limbs. The material prepared in this way was determined – if this was possible – to the rank of species, with the use of keys for determination: mammals [10], white-toothed shrews [8], birds [3], amphibians [2, 11], insects [4]. Body mass of individual victims was determined based on reports by Pucek [10] – mammals, Sokołowski [12] – birds, and Juszczyk [5] – amphibians.

The material for the analysis and compilation was collected at three study sites of little owl *Athene noctua* Scop. 1769 occurrence in the villages: Majdan Mętowski, Kalinówka and Skrzynice Pierwsze, located about 10-25 kilometers south-east of Lublin (Lublin Uplands). This area of intense agricultural economy is relatively densely populated.

The mean annual air temperature in this region is + 8.1°C. The warmest month is July, with a mean temperature of + 18.7°C, while the coldest is January with a mean temperature of - 3.0°C [7]. An annual amplitude of air temperature is therefore 21.7°C and belongs to the lowest in the region. The characteristic feature of the climate in this area is also a long summer season (100-110 days) and vegetation period (210-220 days), with a mean temperature of over 5°C) [6, 7].

RESULTS

The analysis of the material collected confirmed that in one pellet there were 1-26 remains of victims. The mean number of victims per one pellet was 3.9, and the average size of a pellet – 32.8/13.3 mm. It was observed that little owls hunt for both vertebrates *Vertebrata* – 37.7% of the total number of victims, and invertebrates *Invertebrata* – 62.3%. The analysis showed that the little owl feeds on

invertebrates significantly more often than on vertebrates. Among invertebrates, as high as 99.9% were insects *Insecta*, the remaining 0.1% being arachnids *Arachnida*. The main type of feed were coleopterans *Coleoptera* which constituted 96.6% of invertebrates and as much as 60.2% of the total number of victims. Little owls hunted them significantly more often than all other categories of victims in general. Moreover, the number of coleopterans per one pellet was significantly larger than that of other victims in the diet.

The order of coleopterans was represented mainly by two families: ground beetles *Carabidae* and chrysomelid beetles *Chrysomelidae* which constituted 8.5% and 7.5% of all food respectively. Among *Chrysomelidae* there was a common potato beetle *Lepinotarsa decemlineata* – 7.5%. The *Scarabeidae* family was also relatively numerously represented – 5.1%.

Apart from invertebrates which constituted the majority in the feed of the owl examined, vertebrates were also of great importance – 37.7% of the total number of victims. Among vertebrates the dominant group were rodents *Rodentia* - 96.1% (36.2% of the total number of prey). They were represented by the *Arvicolidae* and *Muridae* families, constituting in the whole feed of the little owl 24.7% and 11.5%, respectively. Among *Arvicolidae* the domination of field-vole *Microtus arvalis* was clearly noted – 21%, compared to other species of this family none of which exceeded 1% of the diet. The representative of *Muridae* most often found in the material examined was striped field mouse *Apodemus agrarius* (4.3% of the feed). Among vertebrates, insectivorous *Insectivora* also deserve attention, the percentage of which in the diet of the little owl was 0.7%. In this group there was also one mole *Talpa europaea* and 9 white-toothed shrews *Crocidura leucodon.* In the area in the study, birds and amphibians constituted the smallest percentage of the diet – 0.5% and 0.2% of the total number of victims, respectively.

The conducted analysis showed that the diet of the little owl periodically changes and its composition depends on the availability of individual types of feed. Little owl feeds both on vertebrates and invertebrates, with the differences concerning only their percentage in its diet according to the seasons of the year. Studies of the composition of little owls' feed during the spring-summer season (April-August) indicated that invertebrates constitute the basic feed of the owls in the study, their percentage increased from 37.5% in April to 95.7% in August, whereas the percentage of rodents ranged (decreased) from 60.9% in April to 4.3% in August.

While analysing the composition of little owl's diet during the period of the study it was observed that the increase in the percentage of invertebrates was correlated with the gradual decrease in the number of vertebrates, especially

related with the gradual decrease in the number of vertebrates, especially rodents. In April, rodents constituted 62.5% (25.3% of the total diet), then, their percentage gradual decreased and in August it was only 4.3% (0.1% of the total diet). The analysis of little owl pellets showed that this owl fed mainly with two types of feed, i.e. – insects and rodents, the proportions of which in the diet changed according to their availability and number in the environment. Invertebrates were the main feed of the little owl during the summer season and constituted as much as 62.3% of the whole diet. However, during the autumn-winter season, when the amount of insects is insignificant, the owl replaces them almost totally with rodents.

The rates concerning the frequency and biomass of individual victims in the diet of a specific animal usually vary. The differences between the values of frequency and biomass indices depend of type of victims consumed by the little owl. In the case of the mole, its frequency (0.2%) was 3.9 times smaller than biomass (0.7%) – Tab. 1. The situation is different with respect to the harvest mouse *Micromys minutus*, this constitutes only 0.8% of the biomass. This value is 3.3 times smaller than its frequency (2.7%). These differences result from a considerably greater mean body mass of the mole's body, compared to the mass of the hunted harvest mouse. The situation is similar with respect to other victims consumed by the little owl. The bigger and heavier they are, the greater their energetic value, the less of them the owl needs to fulfil its nutritional needs. These victims constituted a very small percentage in the frequency, while high in biomass. Here belong mainly birds, amphibians and reptiles which possess a relatively big body mass. It is different in case of small animals – mainly mammals, their mean body weight being usually below 50 g. They constituted 98.6% of the total percentage of mammals. In order to fulfil its energetic needs the little owl will hunt more of them, and despite small biomass, they obtain a significant frequency in the diet.

In the biomass of all victims of the little owl, similar to its frequency (55.7%), the field-vole was dominant (61.6% of the biomass of all victims), followed by the relatively heavy striped field mouse, the percentage of which in the total mass of victims was 10.7%, and the frequency in diet 11.3%. The subsequent positions among *Muridae* were occupied by wood mice and house mice – 4.7% and 3.3% of the victims biomass respectively. In the case of *Insectivora* a mole is worth mentioning with its mean weight 95 g, which was the heaviest prey of the little own in the whole material examined. It appeared in feed in the amount of only one individual mole; its percentage in the biomass, however, was as much as 0.7%. Birds and amphibians constituted a very small percentage both in frequency

and biomass. They appeared in very small quantity in the diet, and their mean weight did not exceed 30 g.

The remaining victims, which were invertebrates, were impossible to analyse due to the lack of literature concerning body mass of these animals, or its non-availability. The mean body mass of individual groups of invertebrates was very small, therefore this group of prey – with small biomass – obtained a very high frequency in the material examined.

DISCUSSION

The comparison of the results of studies conducted in the Lublin area during the season spring-summer with other European countries [9, 14, 1] showed that little owl feeds mainly on invertebrates. However, the scale of this phenomenon varies because invertebrates in little owls' diet may constitute from 50-100% of the total number of victims. While classifying individual European countries according to the increase in the percentage of invertebrates in the diet of the little owl it was observed that this percentage changes in various climatic zones. From the moderate zone climate with continental features to the Mediterranean zone the percentage of invertebrate in the diet of the little owl systematically increases, while that of rodents proportionally decreases (Tab. 1). This is consistent with the suggestion by Mikkola [9] that the percentage of invertebrates in the diet of this owl increases starting from the Central European areas at the Mediterranean Sea. It becomes evident that the little owl prefers invertebrates, which, as a rule, constitute over a half of all victims. Other groups of its prey vary in the countries examined with respect to both quality and quantity.

Table 1. Percentage of victims in little owl's diet in various European countries

Countries / Taxons	Moldavia [9]	Poland this work	Germany [9]	Holland [14]	France [9]	Spain [9]	Greece [1]
Invertebrates	56.5	62.31	72.3	91.2	94.4	95.9	99.44
Reptiles	0.1	0	0	0	0	0.5	0.28
Amphibians	1.3	0.22	0.5	0.2	0	0.2	0
Birds	1.4	0.51	0.8	0.5	0	0.4	0.09
Insectivorous mammals	0	0.73	0	1.1	0	0	0
Bats	1.5	0	0.4	0.1	2.5	0.3	0
Rodents	39.2	36.23	26	6.9	3.1	2.52	0.19

Following invertebrates, rodents were the biggest group of little owls' prey. In Poland, they constituted 36.2% of all hunted animals. A higher percentage of rodents in the diet was noted only in Moldavia (39.20%). In the remaining Euro-

pean countries their percentage gradually decreased and was closely associated with an increasing percentage of invertebrates (Tab. 1).

Based on the analysis conducted it may be presumed that the percentage of rodents in little owls' diet decreases with an increasing amount of invertebrates in this diet. According to the climate which affects the numbers and availability of these animals, the little owl feeds with them interchangeably. It replaces rodents with invertebrates and vice versa, which is connected with their current numbers and availability in the environment. The diet of the little owl in the rural area near Lublin depended on seasonal changes in the availability of various types of feed.

While comparing the qualitative and quantitative composition of the little owl's diet in various European countries it is noted that this composition varies (Tab. 1). Factors such as: geographical position, climate, and those connected with variations in fauna with respect to species and quantity, undoubtedly exert their effect on the composition and numbers of the little owl's prey.

CONCLUSIONS

The determination of food composition of the little owl in the agricultural landscape of the Lublin area showed that:

1. The material collected confirmed that in one pellet there were 1-26 remains of victims. The mean number of victims per one pellet was 3.9, and the average size of a pellet – 32.8/13.3 mm. It was observed that little owls hunt for both vertebrates *Vertebrata* – 37.7% of the total number of victims, and invertebrates *Invertebrata* – 62.3%.

2. The order of coleopterans was represented mainly by two families: ground beetles *Carabidae* and chrysomelid beetles *Chrysomelidae* which constituted 8.5% and 7.5% of all food respectively. Among *Chrysomelidae* there was a common potato beetle *Lepinotarsa decemlineata* – 7.5%. The *Scarabeidae* family was also relatively numerously represented – 5.1%.

3. Apart from invertebrates which constituted the majority in the feed of the owl examined, vertebrates were also of great importance – 37.7% of the total number of victims. Among vertebrates the dominant group were rodents *Rodentia* – 96.1% (36.2% of the total number of prey).

4. While analysing the composition of little owl's diet during the period of the study it was observed that the increase in the percentage of invertebrates was correlated with the gradual decrease in the number of vertebrates, especially rodents.

5. In the biomass of all victims of the little owl, similar to its frequency (55.7%), the field-vole was dominant (61.6% of the biomass of all victims), followed by the relatively heavy striped field mouse, the percentage of which in the total mass of victims was 10.7%, and the frequency in diet 11.3%.

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POKARM PÓJDŹKI (*ATHENE NOCTUA* SCOP. 1769) W KRAJOBRAZIE ROLNICZYM OKOLIC LUBLINA

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Streszczenie. Niniejsza praca przedstawia ustalony na podstawie wypluwek skład pokarmu pójdźki *Athene noctua* Scop. 1769. Materiał zebrano na trzech stanowiskach we wsiach: Majdan Mętowski, Skrzynice I i Kalinówka – położonych w krajobrazie rolniczym Wyżyny Lubelskiej. Wypluwki pójdźki zbierano w okresie 5 miesięcy – w latach 2000-2001 (od kwietnia do sierpnia), na strychach domów oraz wokół budynków gospodarczych. Stwierdzono, iż pójdźki polują zarówno na kręgowce *Vertebrata* – ok. 40% ogólnej liczby ofiar, jak i na bezkręgowce *Invertebrata* – ok. 60%. Analiza pokarmu wykazała, iż pójdźka żywi się bezkręgowcami o wiele częściej niż kręgowcami. Wśród bezkręgowców, aż 99% stanowiły owady *Insecta,* pozostałe to pajęczaki *Arachnida.* Głównym rodzajem pokarmu były chrząszcze *Coleoptera* z rodzin biegaczowatych *Carabidae* i stonkowatych *Chrysomelidae,* stanowiące około 60% ogólnej liczby ofiar. Oprócz bezkręgowców, dominujących w pokarmie badanej sowy, dużą rolę w jej diecie odegrały gryzonie *Rodentia* – ok. 30% ogólnej liczby ofiar z rodzin nornikowatych *Arvicolidae* i myszowatych *Muridae.* Wśród nornikowatych stwierdzono wyraźną dominację nornika zwyczajnego *Microtus arvalis,* a z myszowatych mysz polna *Apodemus agrarius.* W biomasie ofiar pójdźki – podobnie jak i we frekwencji – dominowały: nornik zwyczajny, mysz polna i zaroślowa oraz kret.

Słowa kluczowe: pójdźka, *Athene noctua*, pokarm, sowy