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The common hamster (*Cricetus cricetus* L.) population in the city of Lublin

Populacja chomika europejskiego (*Cricetus cricetus* L.) w mieście Lublin

SUMMARY

The common hamster is or becomes endangered in the scale of the whole continent. In Poland, the species range has shrinked to 25% of the former during just 30 years and now is restricted to the Polish Uplands. The Lublin Upland with Roztocze has remained one of the main parts of the species range in Poland. However, the urbanization of the area, especially around larger cities, is one of the causes of the population decline. In such situation the survival of the common hamster population in the city of Lublin, at the Experimental Station Lublin-Felin of the Agricultural University of Lublin, is especially interesting. The hamster burrows have been observed in the Station's fields since 2005. The burrows were counted and their localization charted in August 2008. The number of active burrows was 73, which is the upper limit of the hamster numbers in this area. The density of population is approximately 2.8 individuals per hectare, which corresponds with the average density population. The common hamster in Poland is a strictly protected species and destruction of its sites is prohibited according to the Habitats Directive and the Nature Conservation Act of 2004. The management plans for the considered area should take into account the presence of the common hamster as a strictly protected species.

STRESZCZENIE

Chomik europejski jest lub staje się gatunkiem zagrożonym w skali całego kontynentu. W Polsce jego zasięg zmniejszył się w ciągu 30 lat do 25% wcześniejszego i ograniczył do Wyżyn Polskich. Wyżyna Lubelska wraz z Roztoczem pozostała jednym z głównych obszarów występowa-

nia chomika w Polsce. Urbanizacja terenu, szczególnie wokół większych miast, powoduje jednak zanikanie populacji. Stąd też szczególnie interesujące jest zachowanie populacji chomika w mieście Lublin, na terenach Gospodarstwa Doświadczalnego Lublin-Felin Uniwersytetu Przyrodniczego w Lublinie. Nory chomików obserwowano na polach gospodarstwa od 2005 roku. W sierpniu 2008 nory zostały policzone i opisano ich rozmieszczenie. Liczba aktywnych nor wynosiła 73, co stanowi górną granicę liczebności chomików na tym obszarze. Zagęszczenie populacji wynosi w przybliżeniu 2.8 osobnika na hektar, więc jest to populacja o średnim zagęszczeniu. Chomik w Polsce znajduje się pod ścisłą ochroną i niszczenie jego siedlisk jest zabronione zgodnie z Dyrektywą Siedliskową i Ustawą o Ochronie Przyrody z 2004 roku. Plany zagospodarowania analizowanego obszaru powinny więc uwzględniać fakt występowania gatunku znajdującego się pod ścisłą ochroną.

Key words: common hamster, *Cricetus cricetus* L., species protection

INTRODUCTION

The common hamster was considered a serious pest of agriculture crops in many European countries up to the 70's of the 20th century. The species showed mass outbreaks and in consequence was strictly monitored and controlled by hamster trappers and use of rodenticides (Nechay 2000). Currently the species is endangered in the scale of the whole continent. Its range has been continuously shrinking and has become fragmented (Weinhold 2008).

The species range in Poland included central and southern part of the country, except the higher mountains (Surdacki 1971). However, since the 80's especially rapid decrease in the occupied area has started. The current species range was estimated in 2000–2005 and comprised the Polish Uplands only and some isolated populations in the Upper Silesia and Sandomierz Basin (Ziomek and Banaszek 2007). The current species range is no more than 25% of the former and is heavily fragmented. The biggest part of the contemporary, compact species range is the Lublin Upland with neighbouring Roztocze. Most probably it is also the only part of the Polish range which maintained contact with other parts of the area of the species occurrence through the Ukrainian populations. Moreover, the analysis of the genetic variability of the populations inhabiting the Lublin Upland showed quite high levels of diversity and moderate gene flow between populations. The whole system of populations in this area still functions in quite natural manner. In comparison, the populations of the Małopolska and Kraków-Częstochowa Upland, the second largest area of the common hamster range in Poland are in fact isolated from one another (Ziomek and Banaszek 2008, Banaszek et al. 2009). The lack of gene flow between populations enhances the deletorious effects of the genetic drift and in short time the inbreeding depression may appear, which often results in the extinction of the populations (Frankham et al. 2002).

The area of the Lublin Upland is important for any plans of the species protection. However, in this area the local disappearance of the populations can be observed, particularly in the northern and western part of the Upland (Ziomek and Banaszek 2007, 2008). Hence, the population, which survived in the city of Lublin, Felin quarter, also appears very valuable. The aim of this work was to describe the spatial distribution of the hamster burrows and to estimate the numbers of the common hamsters inhabiting the fields of the Experimental Station Lublin-Felin of the Agricultural University of Lublin.

MATERIAL AND METHODS

The Felin population was localized in 2005 during the search for active species sites in the Lublin Upland. The field inspections were conducted during 2005–2008 and the hamster burrows were counted and their spatial distribution described in the second half of August 2008. The hamster burrows are very characteristic through the presence of the big heap of earth with the slopewise corridor opening on it and several vertical corridors around (Ziomek and Banaszek 2008). After harvest the burrows can be easily counted. As the hamsters may change their burrows during the season it is crucial to distinguish between active (inhabited) and vacant ones. The vacant burrows often have the sloping corridors filled up with earth and spider's webs in vertical holes.

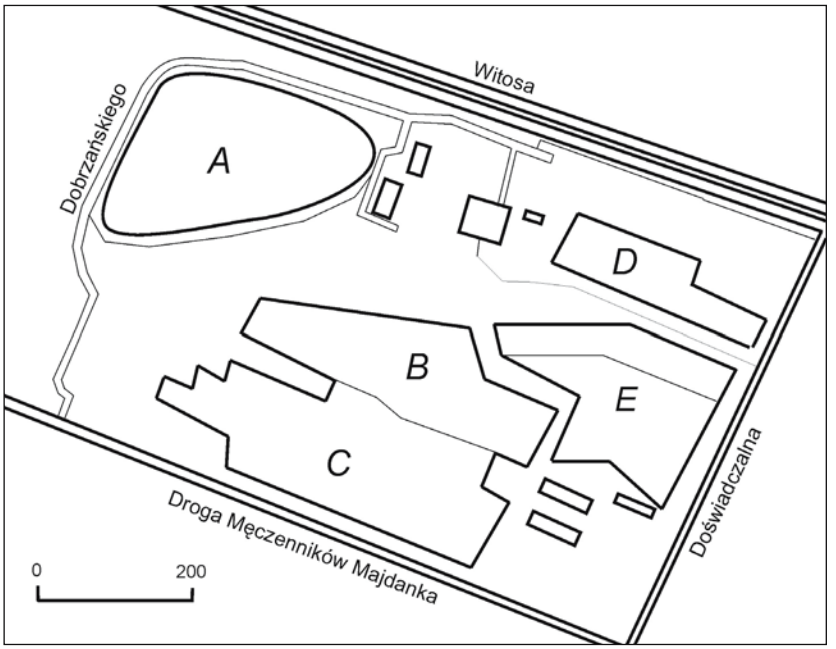

Fig. 1. *Odiellus spinosus* (Bosc): 1a – female, total view; 1b – pedipalp, lateral view; 1c – apical part of ovipositor; 1d – *receptaculum seminis*, th – thorns

The spatial distribution of the burrows was charted on the schematic maps created on the basis of the satellite pictures from the Google Maps, *maps.google.pl* (Fig. 1). The distance between the burrows was paced. The area of the fields was estimated on the basis of satellite pictures (Table 1). The Experimental Station comprises five fields (designated with letters *A – E*), which are sowed mostly with grains (wheat and barley). We have penetrated the area after harvest and checked for hamsters only on the stubble area, as not to cause any damage to small experimental fields with vegetables. One of the fields was ploughed very quickly after harvest, hence only the stripe of it (about 1.7 ha) was inspected for the burrows. The area of the Station is enclosed by motorways and settlements, hence its surroundings are urbanized. To the south, there are some agriculture fields in Abramowice quarter, however, migration through busy motorway is likely to be considerably reduced. In the centre of the station area two students' houses and several Institutes of the Agricultural

University are situated (Fig. 1). The fields are separated from each other by local, ground roads and overgrown areas with shrubs and trees. The fields *B* and *C* have very low and narrow boundary strip between them. The only field with high and mowed boundary is the field *A*, which is surrounded by the street and pavement leading to the student's houses. The boundaries of the other fields are overgrown.

Table 1. The numbers and density [per ha] of the common hamster (*Cricetus cricetus*) burrows in the fields of the Experimental Station Lublin-Felin of the Agricultural University of Lublin. The fields are labelled according to Fig. 1

Field	A	B	C	D	E
Field area [ha]	4.7	6.8	10.0	3.2	5.3 (1.7 was inspected)
Numbers of burrows	56	39	8	16	9
Density of burrows	11.9	5.7	0.8	5	5.3
Numbers of active burrows	33	22	3	9	6
Density of active burrows	7	3.2	0.3	2.8	3.5

RESULTS

The numbers of burrows in the particular fields are shown in Table 1. The density of the burrows was the highest in the field *A*, lower and comparable among fields, about 5 burrows per hectare, in the fields *B*, *D* and *E* and the lowest in the field *C*. The density of active burrows was similar with the highest density in the field *A* and the lowest in *C* one (Table 1). In total 73 active burrows were found, which gives the density of 2.8 burrow per hectare.

The localization of the burrows was shown in Figure 2. The hamsters readily utilized all the permanent elements of their habitats, which ensured the permanence of the burrows. The active burrows found after harvest most probably would become the wintering ones. High numbers of burrows were found in the boundary of the field *A*, as it is permanent with the pavement and road over it (Fig. 2). In other fields most of the burrows were in the field, as the boundaries were low and with heavy vegetation. In the field *D*, it was found that hamsters situated their burrows near the drains, which are omitted during ploughing (Fig. 2).

DISCUSSION

The comon hamster lives solitary, which means that one burrow is inhabited by one individual, with the exception of females nursing their young (Ziomek and Banaszek 2008). However, the number of burrows is not the same as the number

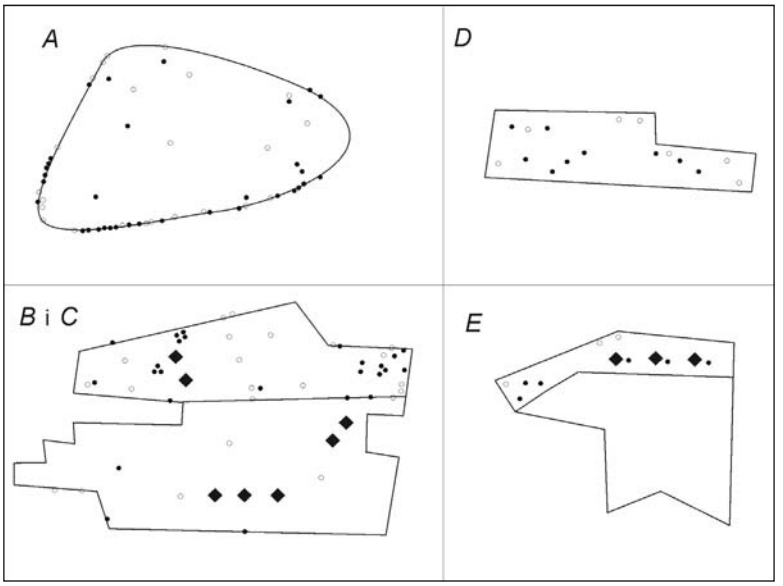

Fig. 2. The spatial distribution of the common hamster (*Cricetus cricetus*) burrows in the fields of the Experimental Station Lublin-Felin of the Agricultural University of Lublin. The active burrows marked with closed circles, the abandoned ones with open circles. The drains are indicated as larger squares. The fields are labelled as in Fig. 1

of hamsters, which inhabit the area. During the season the hamsters abandon and change the burrows depending mostly on the changes in the vegetation cover. They can utilize several burrows and the mean number in Poland is 4.43 burrows per individual (Górecki 1977). The number of burrows per individual increases during the breeding season and the males use more burrows than females. However, at the end of the breeding season the hamsters choose one burrow, where they store food reserves and subsequently hibernate. In Poland, the breeding season starts at the end of April and ends usually at the middle of July. In favourable conditions the second litter appears and then the breeding season ends at the middle of August (Ziomek and Banaszek 2008). In this project the field inspections and the burrow counting were performed at the second half of August, hence after the breeding season, when the number of active burrows and the number of hamsters is the most similar to each other. The end of summer is also a time, when the density of the population is the highest. The young hamsters disperse in the area, inhabiting the abandoned burrows. In the fields of the Experimental Station we found 73 active burrows, which is 2.8 burrow per hectare (Table 1). It is a good approximation of the number and density of hamsters in the Felin population.

However, the numbers of hamsters inferred from the burrow numbers may be overestimated because of the difficulties to count the burrows localized in the

fields boundaries. In the field, the burrow of one animal is easily distinguished from the burrow of the other individual as they are usually not situated very close one to another and have separate heaps of earth excavated from corridors and underground chambers. On the other hand, it is often difficult to establish which opening belongs to one burrow and one animal in permanent boundaries, especially that long-term burrows may not have earth mounds at all. In such case one can only count the openings and there is no practical way to distinguish burrows belonging to one animal. In the field *A*, where most of the burrows were localized in the boundary, the highest number of burrows was found in comparison with the other fields (Table 1, Fig. 2). Most probably this value and the number of hamsters inhabiting the field are overestimated.

The categorization of burrows density per hectare was established in the countries, where the hamsters showed mass appearances. It was used for practical decisions when to use the rodenticides. The density of 0.2–1 active burrows per hectare was considered low, 2–5 – medium, 6–20 high and 21–50 very high (Nechay 2000). Hence, the density of burrows was medium in the analized Felin population. The density of this population is also reflected by the trapping success. Eleven hamsters were collected from the fields *D* and *E* during three days in the August 2006. The animals were used for the genetic variability studies on the basis of the mtDNA control region and microsatellite DNA (Banaszek et al. 2009). It is important to mention that all hamsters were released after collecting material for DNA isolation.

Surdacki (1971) found numerous hamster localities in and around Lublin city, which were subsequently listed in *The Atlas for Polish Mammals* (Pucek and Raczyński 1983). It has to be remembered that in the 70's of the 20th century the city surroundings were agricultural areas, while nowadays they are heavily urbanized. During the study of the current range of the common hamster in Poland we inspected all the previously identified species localizations and found them all abandonded (Ziomek and Banaszek 2007). The Felin population was the only active locality in the city confirmed by field inspection. The closest sites with hamster populations around the city were localized near Łęczna (about 25 km) and Fajsławice (about 35 km) (Ziomek and Banaszek 2007). On the other hand, we have been receiving the information about the presence of the species in various localities in and around the city, which are not confirmed personally by us in the field. The presence of hamsters cannot be ruled out in such dubious localities, as finding hamsters in low density populations may be difficult. Such dubious localities are for example gardens in Sławinek or Czuby quarter, where presumably the hamsters were observed near the apartment buildings. It is probable as the common hamster is known to form synantrophic populations, which were reported from different parts of the species range, for example Vienna (Austria) or

Simferopol (Ukraine) (Franceschini-Zink and Millesi 2008, Surov and Tovpinetz 2007).

The common hamster is a strictly protected species in Poland under the Nature Conservation Act of April 16th, 2004. It is listed in the Appendix 1 of the ordinance to the act concerning strictly protected animal species with the information that it demands active protection. Moreover, the species is listed in the Appendix IV of the Habitats Directive, which ensures strict protection in all the EU countries. The status of the species in *The Polish Red Data Book of Animals* is still DD (data deficient) (Głowaciński 2001), although it has been proposed to change it to endangered (EN), (Ziomek and Banaszek 2007, 2009). According to the act and directive the deterioration or destruction of the breeding or resting sites of a protected species is prohibited. The cultivation of crops is allowed, however, the sort and terms of agricultural techniques should be adjusted to the breeding and hibernation season, i.e. biological demands of the species. The management of the described area should take into account the presence of the permanent population of a strictly protected species.

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