

## The common hamster, *Cricetus cricetus* in Poland: status and current range

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**Abstract.** The current range and distribution of the common hamster, *Cricetus cricetus* in Poland was established. The range of the species has dwindled substantially in the course of just 30 years and the process is still going on. The Polish populations are isolated from the Belarussian, Czech and German ones, there is low probability of some exchange with Ukrainian hamsters. Moreover, two main areas of hamster distribution in Poland are isolated from each other. In view of the marked shrinkage and fragmentation of the range, we propose changing the status of this species in Poland from unknown (DD) to endangered (EN).

**Key words:** distribution, endangered species, range fragmentation, isolated populations

### Introduction

As a result of human impact, an ever-growing number of species are listed as extinct, threatened with extinction, or just endangered. In some cases there are species belonging to groups that are commonly assumed to be abundant and considered pests. One of such groups is rodents because of the damage caused by some species to agricultural crops and the transmission of zoonoses. However, in spite of the real evolutionary success of this order of mammals and the real abundance of some species, rodent species are presently regularly being listed as endangered.

The rodent fauna of Europe is represented by 68 species in 10 families (Pucsek 1989). The list of the most endangered species in at least one European country contains 28 species, i.e. it comprises 41% of all rodents living in Europe. Ten species considered most endangered at the scale of the continent were selected from this group; among them is the common (European) hamster *Cricetus cricetus* (Linnaeus, 1758), (Pucsek 1989).

The common hamster is a mammal characteristic of an open, steppe-like and cultivated landscape. The Eurasian range of this species is wide and extends from the Yenisey river and the Altai Mountains in the east, through Siberia, eastern and central Europe, to some isolated populations in western Europe (Niethammer 1982, Berdyugin & Bolshakov 1998). In the past, the species thrived thanks to the expansion of agriculture, was encountered commonly, and very abundant. In some parts of the range it was characterised by mass outbreaks in not very regular, 5–7 years' cycles (Nechay et al. 1977). Because of the serious damage to agricultural crops it was strictly monitored in some European countries and controlled by hamster trappers and through the use of rodenticides. The numbers of hamsters caught in some years of mass outbreaks were extremely high, for example about 1.5 million in 1973 and 2.4 million in 1974 in Hungary, or about 1.3 million yearly between 1953 and 1966 in Germany (Nechay et al. 1977).

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However, mass outbreaks are already a phenomenon of the past. In some countries of western Europe like France, Belgium or the Netherlands, the hamster is threatened with extinction or in practice already extinct (N e c h a y 2000). In the Netherlands the whole remaining population was reduced to a few dozen individuals which were caught for a breeding programme and future reintroduction (K r e e k e l s 1999). In addition to the countries in western Europe where the hamster lived in isolated populations, the situation of the species in Germany and Ukraine is far from what it used to be some decades ago. Both countries were traditionally 'good' hamster areas just thirty years ago. Nowadays the species' range in Germany is reduced and divided into patches isolated from one another and from the main distribution (S e l u g a & S t u b b e 1997, S t u b b e et al. 1998). Similarly in Ukraine, the hamster is rare in the western part of the country or is not met any more in some other parts (G o r b a n et al. 1998).

On the other hand, in central Europe, especially in Hungary, Slovakia and the Czech Republic, hamster populations are quite abundant and the species is not endangered. However, the amplitude of numbers in population cycles keeps decreasing and a continuous decline in the populations can be observed (N e c h a y 1998).

In sum, whatever the current situation of the hamster in a particular country, over the last three decades in the whole of the European part of the species range a decline in numbers and a reduction in the inhabited area have been noted. Considering the critical situation of the species in western Europe, the common hamster was included in Appendix II (strictly protected species) of the Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979). Later, the common hamster was listed in Appendix IV of the Habitats Directive, which provides strict legal protection in all European Union countries.

In Poland the hamster is a strictly protected species under the Nature Conservation Act of April 16th, 2004 and an ordinance to the act concerning animal species under protection. The common hamster is listed in Appendix I of the ordinance concerning strictly protected animal species with an annotation that it demands active protection. However, in spite of its protected status, the actual state of hamster populations in Poland is unknown.

The species range in Poland was estimated in 1953–1970 (S u r d a c k i 1963, 1971) and the map of the hamster distribution in Poland given in *The Atlas of Polish Mammals* (P u c e k & R a c z y Ń s k i 1983) shows the state for 1971. As the situation of the species in Europe is rather alarming, it cannot be expected that the hamster range in Poland has not changed. Hence, it is necessary to verify the sites of hamster occurrence listed in *The Atlas of Polish Mammals* (P u c e k & R a c z y Ń s k i 1983) and the purpose of this study is to determine the current range of the common hamster in Poland.

## **Material and Methods**

The study of the current range of the common hamster in Poland was carried out in the years 1999–2005. Questionnaires with an exact description and photos of the hamster were sent to Environmental Protection Departments of Commune Offices as well as to Agricultural Advisory Centres.

In the years 2000–2005 the information about hamster sites collected via the questionnaires and interviews was subjected to verification by inspections in the field. They were conducted primarily during harvest and after, from mid-July to October. During such inspections a search was made for hamster burrows and a record kept of traces of feeding,

trails, and waste matter left. A total of 2,421 questionnaires were sent out, 1,200 interviews carried out, and 600 inspections made.

The obtained data on hamster sites were arranged in the following way (Fig. 1):

- a) positive information from questionnaires, interviews and field inspections (occurrence of the hamster after 2000) was treated as denoting current localities (black circles on the map);
- b) positive information from questionnaires and interviews (occurrence of the hamster after 2000) not corroborated by field inspections was treated as denoting dubious localities (grey circles). In the authors' opinion, the presence of the animal at those sites should not be ruled out because finding it on the vast area of a field is very difficult, given the big scatter and low density of its populations;
- c) negative information from questionnaires, interviews and field inspections was taken to mean total absence of the hamster from a locality (open circles).

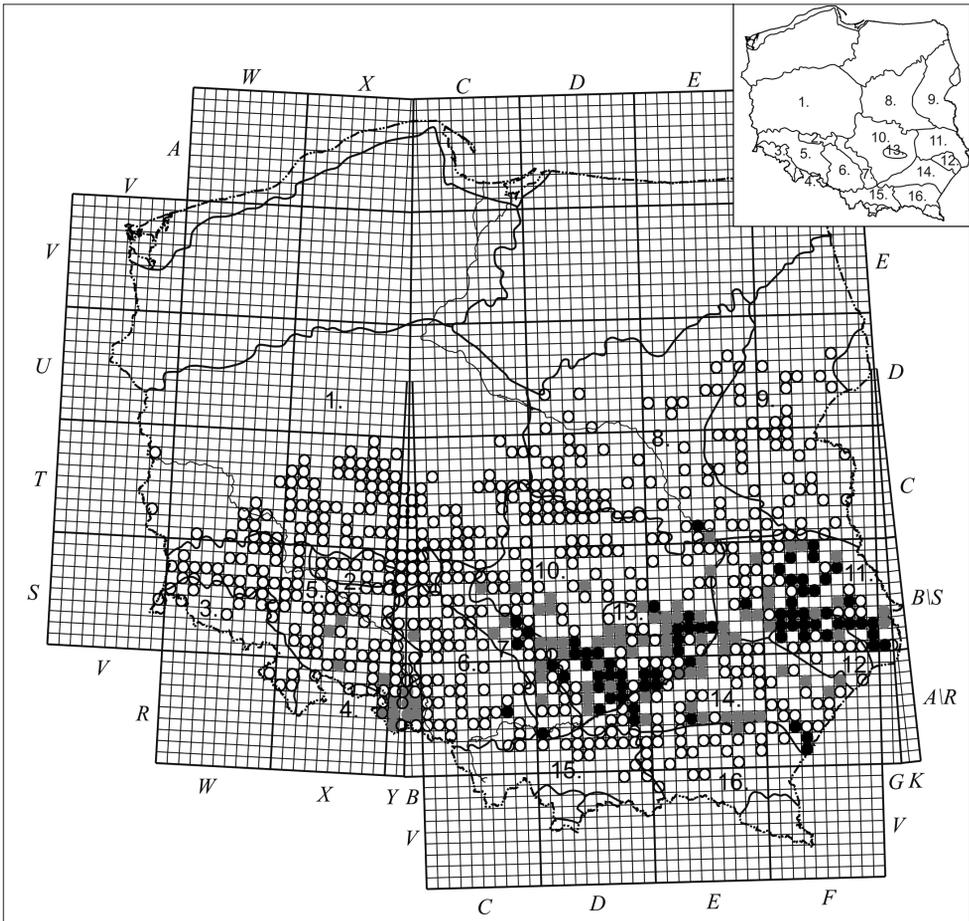
The maps were made using a UTM grid of 10 x 10 kilometres. One square contains a single point which can cover a few localities, hence the number of points on the map does not coincide with the number of localities given in the text.

The division of Poland into physiographic domains follows that of *The Atlas of Polish Mammals* (Pucsek & Raczynski 1983). The geographical names of mesoregions are given after Kondracki (1998).

## Results

The common hamster occurs in Poland in 103 localities (Fig. 1). An additional 146 dubious sites have also been distinguished where there is still the possibility that the hamster can be found because they are largely situated near the active ones. Some of the dubious sites are clearly located far from the current range of the species in Poland, especially those in the southern part of the Głubczyce Plateau, near the border with the Czech Republic, where it could be found in abundance until 1970 (Surdacki 1969, 1971). In areas with the dubious sites the hamster was supposed to occur even after 2000, but no hamster burrows were found during the field study (Fig. 1).

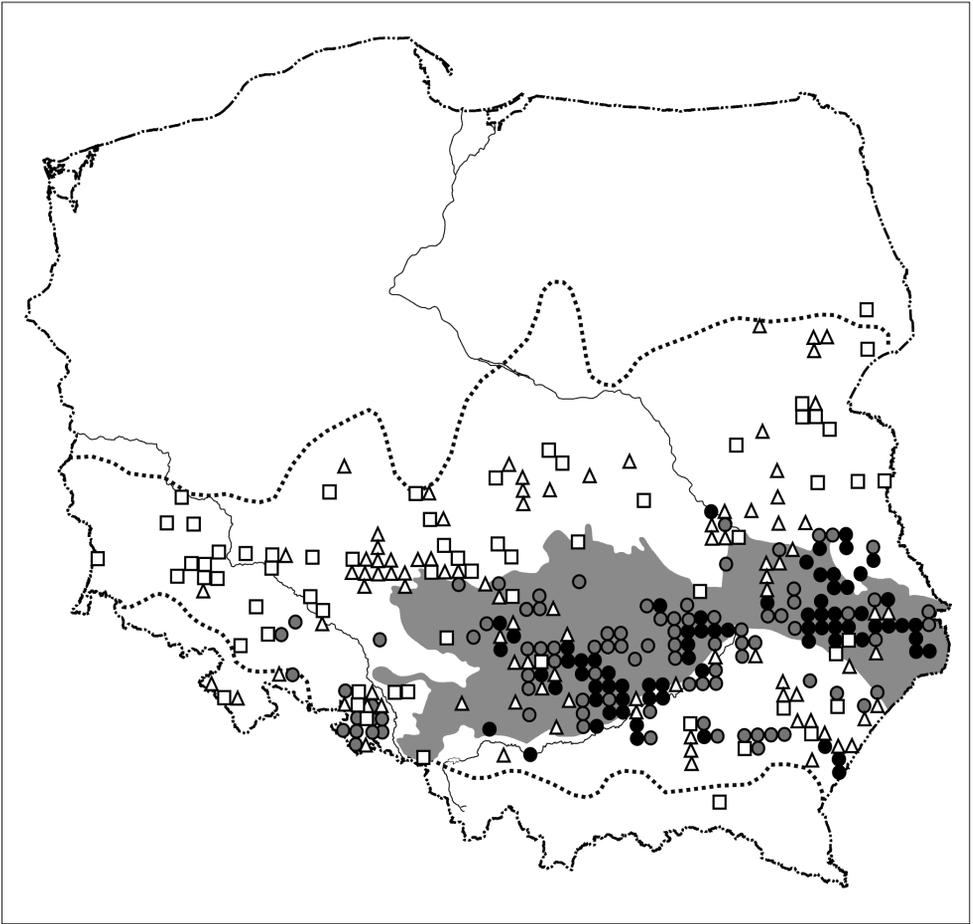
The greatest number of active localities are in the Lublin Upland and Roztocze as well as in the southern part of the Małopolska Upland (Fig. 1). They are especially abundant in mesoregions located where the Lublin Upland meets Western Roztocze, and in the Wołyń Upland. The northern limit in the Lublin Upland runs along the southern part of the Łęczyca-Włodawa Plain, with Garbatówka (UTM FB-49) as the northernmost locality. The site at Telatyn (UTM GB-00) in the Wołyń Upland is the easternmost one (Fig. 1). In the Małopolska Upland, the hamster inhabits the Sandomierz Upland, Pińczów Elevation, Proszów Plateau, Wodzisław Elevation, and Jędrzejów Plateau. Only a few localities survived in the Miechowska Upland. The sites in the Kraków-Wieluń Upland (Wysoka Lelowska – UTM CB-81) and the Częstochowa Upland (Zarebice near Przyrów – UTM CB-92) mark the western limit of the hamster in Poland. The site at Byczyna (UTM CA-75) is the south-westernmost one in Poland (Fig. 1). Single localities in Northern Podkarpacie, at Radłów (UTM DA-84), Brzeźnica (UTM EA-34) and Łączany near Czernichów (UTM DA-03), mark the southern limit of the occurrence of the common hamster in Poland. The most south-easternmost locality is the one at Hermanowice (UTM FA-31) situated south of Przemyśl (Fig. 1).



**Fig. 1.** Distribution of the common hamster *Cricetus cricetus* in Poland. Black circle – active locality, grey circle – dubious locality, open circle - abandoned locality. Physiographic Regions: 1. Wielkopolska-Kujawy Lowland, 2. Trzebnickie Hills, 3. Western Sudeten, 4. Eastern Sudeten, 5. Lower Silesia, 6. Upper Silesia, 7. Kraków-Wieluń Upland, 8. Mazovian Lowland, 9. Podlasie, 10. Małopolska Upland, 11. Lublin Upland, 12. Rostocze, 13. Świętokrzyskie Mountains, 14. Sandomierz Basin, 15. Western Beskids, 16. Eastern Beskids.

The hamster has totally disappeared from the Wielkopolska-Kujawy Lowland, Trzebnickie Hills, Lower and Upper Silesia, Mazovian Lowland, Podlasie, and the Western and Eastern Beskids (Fig. 1). Mozolice Duże (UTM EC-41), its northernmost locality in Poland, is also the only one left in the Mazovian Lowland (Fig. 1).

The common hamster was abundant in Poland in the 1950s and '60s. Its rapid disappearance started after 1980 in Lower Silesia and Podlasie. In the 1990s this process spread to the southern part of the Wielkopolska-Kujawy Lowland, northern Małopolska Upland, Głubczyce Plateau, Kraków-Wieluń Upland, Sandomierz Basin, and north-western areas of the Lublin Upland (Fig. 2). The rate of the disappearance of the common hamster from Poland and from smaller areas (e.g., a single mesoregion) differed. It is probably connected with the level and rate of man-made changes in vegetation landscapes and with the intensification of agriculture, as well as with the history of the development of regions and land-use patterns.



**Fig. 2.** Change in the range and history of the disappearance of the common hamster from Poland after 1970. Black circle – active locality, grey circle – dubious locality, empty square – localities in use until late 1980s, empty triangle – localities in use until late 1990s. The shaded area indicates Central Uplands (Kondracki 1998) and the dashed line shows the hamster range in 1971 after *Atlas of Polish mammals* (Pucek & Raczynski 1983).

## Discussion

The common hamster is an indigenous component of the Polish fauna, as shown by its fossil remains from the Pleistocene deposits in Cave Sąpowska (Pradel 1981). The range of the hamster in Poland formed after the retreat of the inland ice, when conditions appeared for the expansion of the steppe flora and fauna, and it did not exceed the maximum limit of the Last Glaciation (Pradel 1981, Surdacki 1971). Its expansion northwards was barred by postglacial sandy soils in which it was impossible to establish permanent burrows (Pradel 1981). The southern expansion of the species, in turn, was checked by rock lying at a shallow depth under the soil surface, hence the hamster did not occur in the higher parts of the Carpathians and the Sudeten (Surdacki 1963, 1971).

Until the 1970s, the hamster colonised the Małopolska and Lublin Uplands, Roztocze, Western and Eastern Beskids, Mazovian Lowland, Wielkopolska-Kujawy Lowland, Lower and Upper Silesia, and Podlasie (Surdacki 1971). The species was not expansive at

that time except in a few areas which had appeared as a result of environmental changes, e.g. drainage. Despite the relatively high population density in some areas, the hamster had never been a plague (G ó r e c k i 1977). That is why it had never been monitored so closely and fought so vigorously as, e.g., in Hungary or Germany. The hamster was found to occupy a total of 1,176 localities (P u c e k & R a c z y ń s k i 1983). Seventy seven per cent of them were in areas where the soils had formed from glacial and fluvioglacial deposits, and whose structure ensured permanence to the animal's burrows and a suitable soil microclimate during the winter sleep (temperature up to 6°C) (S u r d a c k i 1971, K a y s e r & S t u b b e 2003).

Over the last thirty years, between 1970 and 2000, the range of the common hamster in Poland had dwindled substantially, and the process is still going on, as indicated by areas with dubious localities from which the species disappeared probably only after 2000 (Fig. 2). Hamster burrows have only been found in 103 localities divided between two isolated areas: the Lublin Upland and Roztocze as well as the southern part of the Małopolska Upland. Single sites have survived in the Sandomierz Basin and the Kraków-Częstochowa Upland (Fig. 1).

Hamster populations from Central Europe are thought to occupy a compact, continuous range (N e c h a y 2000). Poland used to be a link between the compact range of the hamster in eastern Europe and the west European populations (S u r d a c k i 1971). Today the entire Polish population is isolated from those living in Germany, the Czech Republic and Belarus. The retreat of the hamster from western Poland has severed the link with east German populations. The hamster has also disappeared completely from Podlasie, a region bordering on Belarus. Moreover, Belarusian populations have only survived in the south-eastern part of the country east and south of the town of Gomel (N e c h a y 2000). The Polish population of the hamster can still keep in touch with the Ukrainian ones. In Ukraine, the hamster occurs in the south-western part of the country in the Sambir district, which is located south of Przemyśl, and near the town of Yavoriv, which is situated at the same latitude as Jarosław and Radymno (G o r b a n et al. 1998). However, the hamster localities in the vicinity of the village of Torki near Medyka (UTM FA-32) as well as Hermanowice and Nehrybka (UTM FA-31), situated south of Przemyśl, are isolated from other localities in south-eastern Poland. Points of contact between the Polish and Ukrainian populations may also exist in the east of Poland near Hrubieszów. This is doubtful, however, because after 2000 no hamster burrows were found near Hrubieszów (UTM GB-02) and Modryniec (UTM GB-03) (dubious sites – Fig. 2), while hamster density in Wołyń was only 3-4 burrows per 100 hectares in the years 1994–1997, and the present situation of the species there is unknown (Gorban et al. 1998). Contact between the Czech and Polish populations living in the Głubczyce Plateau was possible through the Moravian Gate (S u r d a c k i 1969). The hamster was abundant throughout the Czech territory, and its large clusters were reported from the vicinity of Prague, Hradec Kralové, Brno, and Jičín (G r u l i c h 1980). The present status of the hamster in the Czech Republic is unknown (N e c h a y 2000), and the survival of the Polish population in south-eastern Poland is highly unlikely (Fig. 1).

The present range of the common hamster in Poland is restricted to the Polish Uplands, or less than 12% of the country's area (Fig. 2). This is a region with a substratum built of loess layers (from 1 to 30 metres in thickness) and chalk layers on which fertile soils have developed: chernozems, brown earths, or rendzinas (K o n d r a c k i 1998). In mesoregions where hamster localities are the most numerous, there is a predominance of very good and good farmland with arable land of capability classes from I to III (K o z ł o w s k i 1994). The greatest number of hamster burrows in the Polish Uplands were found in cultures of

wheat (26%), barley (18%) and sugar beets (17%). They were also found in vegetables (7%), rye, clover, potatoes, and maize (6% each) as well as in oats and pulses (4% each).

What factors are responsible for the shrinkage of the range of the common hamster in Poland over the last thirty years, and which of them are decisive? In Europe the following are mentioned as the causes of the decline of the species: intensification of farming through mechanisation, deep ploughing, earlier harvest of crops and early ploughing of the stubble, high levels of agrochemicals, transformation of the structure of agrocoenoses into large-scale cultures, abandoning the cultivation of some crops, increase in areas being afforested or lying fallow, and increase in the built-up area and road network (N e c h a y 2000). The establishment of the causes of hamster disappearance from Poland requires further ecological and genetic studies as well as an analysis of statistical data concerning the transformation of the structure of agrocoenoses and changes in land management in the individual physiographic units. It can be assumed that the causes of the disappearance will be different in each part of the country. In contrast to western Poland, where large-scale monocultures were introduced between the 1950s and '70s (C h m i e l e w s k i & W ę g o r e k 2003), in Mazovia a mosaic type of farming landscape has survived. Instead, since the 1980s there has been intensification of agriculture there (P l i t 1996). Over the years 1970–1990, fertilisers, pesticides and other agrochemicals were used in concentrations and amounts exceeding the standards in force (C h m i e l e w s k i & W ę g o r e k 2003). The results and conclusions of an analysis of relationships between the disappearance of the hamster in Poland and the level and rate of landscape transformation and intensification of agriculture will be presented in a separate study.

Following the IUCN criterion (G ł o w a c i ń s k i 2001), in view of the marked shrinkage and fragmentation of the range of the common hamster in Poland, we propose changing the status of this species from unknown (DD) to endangered (EN). At such a fast rate of disappearance, the hamster may vanish from Poland entirely in a matter of thirty years (Fig. 2). Further studies of the ecology and genetic variation of the species will allow a more precise determination of the status of the hamster in Poland and a proper model of its protection. We would only like to mention here that creating any steppe-like reserves is not the way to protect hamsters – since agricultural habitats are much more preferable to them, they will simply move there. Hence, it seems clear that any way of hamster protection must involve the protection of traditional agriculture with a mosaic of land, not very intensive cultivation practices (for example ploughing long after harvest), and a diversified structure of cropland. The ideas of hamster management practices are thoroughly discussed by N e c h a y (2000).

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#### L I T E R A T U R E

Berdyugin K.I. & Bolshakov V.N. 1998: The common hamster (*Cricetus cricetus* L.) in the eastern part of the area. In: Stubbe M. & Stubbe A. (eds), Ökologie und Schutz des Feldhamsters. *Wissenschaftliche Beiträge Martin-Luther-Universität, Halle-Wittenberg*: 43–80.

- Chmielewski T.J. & Węgorzek T. 2003: The areas for agricultural production and biological diversity. In: Andrzejewski R. & Weigle A. (eds), Biodiversity of Poland. *National Foundation for Environmental Protection, Warszawa*: 284 pp. (in Polish).
- Głowaciński Z. (ed.) 2001: Polish Red Data Book of Animals. Vertebrates. *State Publishnig House of Agriculture and Forestry, Warszawa* (in Polish with English summary).
- Garban I., Dykiy I. & Srebrzydowska E. 1998: What has happened with *Cricetus cricetus* in Ukraine? In: Stubbe M. & Stubbe A. (eds), Ökologie und Schutz des Feldhamsters. *Wissenschaftliche Beiträge Martin-Luther-Universität, Halle-Wittenberg*: 87–89.
- Górecki A. 1977: Energy flow through the common hamster population. *Acta Theriol.* 22 (2): 25–66.
- Grulich I. 1980: Populationsdichte des Hamsters (*Cricetus cricetus*, Mamm.). *Acta Sc. Nat. Brno* 14 (6): 1–44.
- Kayser A. & Stubbe M. 2003: Untersuchungen zum Einfluss unterschiedlicher Bewirtschaftung auf den Feldhamster *Cricetus cricetus* (L.) einer Leit- und Charakterart der Magdeburger Börde. *Tiere im Konflikt* 7: 3–148.
- Kondracki J. 1998: [The regional geography of Poland]. *Polish Scientific Publishers, Warszawa* (in Polish).
- Kozłowski S. (ed.) 1994: Atlas of resources, values and degradation of geographical environment of Poland. *Polish Academy of Sciences, Institute of Geography and Spatial Organization, Warszawa*.
- Kreekels R. 1999: Beschermingsplan hamster 2000–2004. *Rapport Directie Natuurbeheer 41, Ministry of Agriculture, Nature management and Fisheries*.
- Nechay G. 1998: The state of the common hamster (*Cricetus cricetus* L. 1758) in Hungary. In: Stubbe M. & Stubbe A. (eds), Ökologie und Schutz des Feldhamsters. *Wissenschaftliche Beiträge Martin-Luther-Universität, Halle-Wittenberg*: 101–110.
- Nechay G. 2000: Status of hamsters: *Cricetus cricetus*, *Cricetulus migratorius*, *Mesocricetus newtoni* and other hamster species in Europe. *Nature and Environment series 106. Council of Europe Publishing, Strasbourg*.
- Nechay G., Hamar M. & Grulich I. 1977: The common hamster (*Cricetus cricetus* L.): a review. *EPPPO Bull.* 7(2): 255–276.
- Niethammer J. 1982: *Cricetus cricetus* (Linnaeus, 1758) – Hamster (Feldhamster). In: Niethammer J. & Krapp F. (eds), *Handbuch der Säugetiere Europas, Bd. 2/I, Rodentia II. Akademische Verlagsgesellschaft, Wiesbaden*: 7–28.
- Plit J. 1996: Anthropogenic and natural transformation of the vegetational landscapes of Poland's Mazowsze region (from the end of the 19<sup>th</sup> century to 1990). *Geographical Studies*, 166, *Continuo, Wrocław*: 7–134 (in Polish with English summary).
- Pradel A. 1981: *Cricetus cricetus* (Linnaeus, 1758) (*Rodentia, Mammalia*) from the Pleistocene-Holocene Deposits of Sąspowska Cave (Ojców, Southern Poland). *Acta Zool. Cracov.* 25 (12): 293–306.
- Pucek Z. 1989: A preliminary report on threatened rodents in Europe. In: Lidicker W.Z., Jr (ed.), *Rodents. A world survey of species of conservation concern. Occ. Papers IUCN SSC 4. Gland, Switzerland*: 26–32.
- Pucek Z. & Raczynski J. (eds) 1983: Atlas of Polish Mammals. *Polish Scientific Publishers, Warszawa*.
- Seluga K. & Stubbe M. 1997: Zur Bestandssituation des Feldhamsters (*Cricetus cricetus* L.) in Ostdeutschland. *Säugetierkd. Inf.* 4: 257–266.
- Stubbe M., Seluga A. & Weidling A. 1998: Bestandssituation und Ökologie des Feldhamsters. In: Stubbe M. & Stubbe A. (eds), Ökologie und Schutz des Feldhamsters. *Wissenschaftliche Beiträge Martin-Luther-Universität, Halle-Wittenberg*: 137–182.
- Surdacki S. 1963: The northern limit of the range of *Cricetus cricetus* (Linnaeus, 1758) in eastern Poland. *Acta Theriol.* 6 (11): 309–311 (in Polish with English summary).
- Surdacki S. 1969: The common hamster *Cricetus cricetus* (Linnaeus, 1758) on the Głubczyce Plateau and the surrounding areas. *Ann. Univ. Mariae Curie-Skłodowska, Lublin, Sectio B* 24: 313–332 (in Polish with German and Russian summaries).
- Surdacki S. 1971: The distribution and ranges of the European hamster *Cricetus cricetus* (Linnaeus, 1758) in Poland. *Ann. Univ. M. Curie-Skłodowska, Lublin, Sectio B* 26 (12): 267–285 (in Polish with English summary).