

RE-ESTABLISHMENT OF A VIABLE NETWORK-POPULATION OF THE COMMON HAMSTER IN SOUTH-LIMBURG, THE NETHERLANDS : IMPACT OF CROP MANAGEMENT AND SURVIVAL STRIPS ON BURROW DISTRIBUTION IN THE RELEASE SITES

G.J.D.M. MÜSKENS, M. LA HAYE, & R.J.M. VAN KATS

¹ Müskens G.J.D.M. – Alterra – Centre for Ecosystem studies– P.O. Box 47 – 6700 AA Wageningen – Netherlands – Phone (31) 31.74.78.758 – Fax (31) 31.74.24.988 – gerard.muskens@wur.nl

² LA HAYE Maurice – Alterra – Centre for Ecosystem studies - 6700 AA Wageningen – Netherlands – Phone (31) 31 74.78.759 – Maurice.LaHaye@wur.nl

³ VAN KATS Ruud – ALTERRA – 6700 AA Wageningen – Netherlands – Phone (31) 74.77.770 – Fax (31) 31 79.78.775 –ruud.vankats@wur.nl

Abstract

Monitoring of reintroduced Common hamsters in several reserves in South-Limburg, the Netherlands, revealed that the type of crop management in the arable fields and predation were key factors for the survival of reintroduced hamsters. Mixed cropping of summer- and winter cereals with alfalfa growing in strips, formed a suitable habitat for the hamster. Outside these hamster-friendly managed reserves, adjacent cereal fields were the most important habitat. A relatively small cover of cereal fields, combined with a high fragmentation impeded dispersal in the area. The presence of suitable Common hamster habitat such as surviving-strips at strategic locations, might be a solution for the re-establishment of a viable Common hamster network-population.

Zusammenfassung

Das Monitoring der wieder eingeführten Feldhamster in mehreren Reservaten im Süd-Limburg, in den Niederlanden, zeigt, dass Raubtiereinfluss und die Art der Kulturauslegung auf dem Ackerland Schlüsselfaktoren für das Überleben der wieder eingeführten Feldhamster sind. Mischanbau von Sommer- und Wintergetreide mit streifenweise Luzerne bildet einen passenden Lebensraum für den Feldhamster. Außerhalb dieser Feldhamster-freundlich gehandhabten Reservaten sind angrenzende Getreidefelder der wichtigste Lebensraum. Eine verhältnismäßig kleine Getreidefläche, kombiniert mit einer hohen Zerteilung verhinderten eine Verbreitung in der Zone. Die Verfügbarkeit von passendem Lebensraum, wie Überlebensstreifen an strategischen Stellen kann eine Lösung für die Wiederansiedlung von entwicklungsfähigen, vernetzten Feldhamster Bevölkerung sein.

Résumé

Le suivi des Hamsters communs réintroduits dans plusieurs réserves du Sud Limbourg indique que le mode d'aménagement des cultures en terre agricole et la prédation sont les facteurs clefs pour la survie des animaux relâchés.

L'alternance de bandes de cultures d'été, de céréales d'hiver et de luzerne forme un habitat favorable au Hamster commun. En plus de l'aménagement des réserves en milieu favorable à l'espèce, les cultures alentours forment également un habitat important.

Le faible couvert végétal des champs de céréales combiné avec l'importante fragmentation a empêché la dispersion dans ces secteurs.

La présence d'habitats favorables au Hamster commun ainsi que le maintien de bandes de «culture de survie» à des emplacements stratégiques semblent être les solutions pour reconstituer des populations viables de Hamsters communs.

INTRODUCTION

Since 2002 Common hamsters (*Cricetus cricetus*) from a Common hamster breeding program are released in hamster-friendly managed sites ('hamster reserves') in the province of south-Limburg, the Netherlands. The hamster reserves are located amidst of regularly managed agricultural fields. The reintroduction started in a reserve near Sibbe in 2002, followed by reintroductions in 2003 and 2004 in Amby and Heer, respectively. Only a few years ago, all these sites were still inhabited by wild populations of the

Common hamster. The reintroduced Common hamsters are the offspring of the last Dutch wild hamsters, which were caught in Heer in 1999. The offspring of these Common hamsters are reintroduced in different sites and are intensively monitored. The main challenge was to get information about levels of reproduction and to gain insight in factors affecting mortality and dispersal rate, including crop management and predation (MÜSKENS *et al.*, in press).

I. METHODS

I.1. Site description

The three sites Sibbe, Amby and Heer are all situated in the most southern part of the Netherlands in the province of Limburg near the city of Maastricht. Distances between the sites vary from 2 to 5 km (Fig. 1). Sibbe covers 50 ha hamster-friendly managed fields, Amby about 30 ha and Heer ca 40 ha.

I.2. Released hamsters

Between 2002 and 2004 a total of 224 Common hamsters were released (Table 1). About half of the individuals were supplied with an implant-radiotransmitter. The transmitted Common hamsters were after their release radio-tracked at

least once a week during the whole year, even during winter. Location and status of the burrow, and status of the animal (alive, sleeping, dead) was noted.

I.3. Site management

The main crops in the hamster reserves consisted of alfalfa (lucerne) (1/3 of the fields) and cereals (2/3 of the fields). The different crops were sown in strips of 40-50 m wide. Management as harvesting, ploughing, sowing, fertilizing and other measures were carried out with certain restrictions. All agricultural measures were carried out in close cooperation between researchers and the land owners (nature protection organizations or farmers).

On adjacent, regularly-managed cereal fields, farmers could get an agreement for so-called hamster-surviving strips. These are small strips of cereals (10-15 m wide, with a length of at least 100 m), which are not harvested in summer. The surface of these strips differed strongly from about 0.5 up to 10 ha. In these areas there were no restrictions for applying fertilizers or herbicides.

I.4. Survey of burrows

All reserves were year-round surveyed for new burrows. Known burrows were regularly checked for new Common hamster tracks. Especially in spring, when vegetation cover is low, we searched for newly opened vertical pipes, which were used by Common hamsters to leave their winter-burrows. We also searched for new burrows after each mowing event (lucerne or cereals).

Directly after the regular harvest of cereals in summer, there was a search for burrows on as many cereal fields as possible in the reserves and neighbouring areas. All burrows were mapped, number of slope and steep pipes were counted, and the presence or absence of a hump of soil was noted. Moreover, the burrows were checked for fresh Common hamster tracks.

II. RESULTS

II.1. Common hamster burrows in spring 2004

The burrow-survey in the spring of 2004 revealed many open steep pipes (from winter-burrows) in Sibbe and Amby. Because it was impossible to survey the complete area for burrows, and because not all Common hamsters leave their

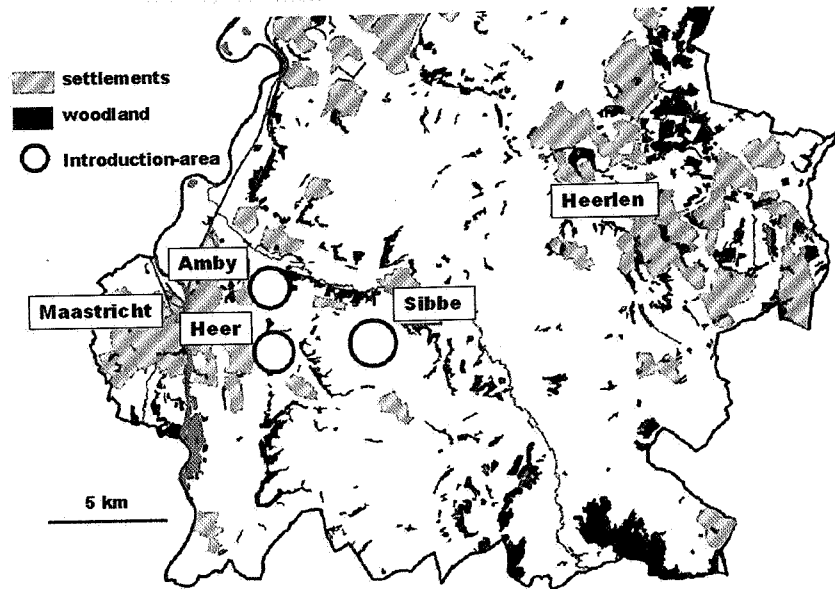


Figure 1: Geographic position of the three sites near Maastricht in the south of the Netherlands, where Common hamsters were reintroduced between 2002-2004.

Table 1: Number of Common hamsters released in sites in the Netherlands between 2002-2004.

SITE	YEAR			Total
	2002	2003	2004	
Sibbe	44	42	13	99
Amby		67	10	77
Heer			48	48
Total	44	109	71	224

winter-burrow at the same moment, it was not possible to provide an exact number of burrows. The estimated number of opened burrows in Sibbe was about 100-120, whereas in Amby 50-60 burrows were opened (Fig. 2). In summer and autumn of 2003 there were in close distance to the reserves only about 10 known and occupied burrows. In the spring of 2004 these burrows could, with the exception of one burrow in Amby, not be checked again, because of regular agricultural activities.

In Heer the last burrow of a wild Common hamster was found in the autumn of 2002. In the subsequent year no burrow or any other evidence for the presence of Commons hamsters was found anymore despite intensive surveys in spring and summer, indicating that the wild population was extinct. In April 2004, after an absence of nearly 1.5 year, Common hamsters from the breeding program were released again in this area. The red dots in Heer (Fig. 2) represent the occupied (partly artificial = reintroduction burrows) burrows shortly after reintroduction.

II.2. Common hamster burrows in summer 2004

From the harvest of cereals at the end of July till the beginning of September 2004, all cereal fields around the Common hamster reserves Sibbe, Amby and Heer were systematically surveyed for the presence of Common hamster burrows. Inside the reserves as many fields as possible were surveyed as well, however, due to the partial harvest of the fields, only half of the reserves could be surveyed. In Sibbe only 20 burrows were found inside and almost 30 outside the reserve. Most of the burrows outside the reserves were occupied when the harvest started (Fig. 3). In Amby almost 50 burrows were found inside and 50 burrows outside the reserve. In Heer 30 burrows were found inside and 15 burrows outside the hamster-friendly managed fields after harvest.

II.3. Vegetation and burrows

Common hamster burrows outside the reserves, were only found in cereal fields, because it was impossible to search for Common hamster burrows in other crops like maize and sugar beets. In Sibbe and Amby burrows were found in not-harvested alfalfa, winter-cereals and oat. Triticale and barley were not sown in Sibbe and Amby in 2004. In Heer some burrows were found in the most densely grown parts of the fields with winter-wheat and winter-barley, but in the parts with much more open summer-barley almost no burrows were found. All the

fields with cereals in Fig. 3 were surveyed for the presence of hamster-burrows.

To our surprise in the cereal fields north of Amby, hamster-burrows were totally absent in several suitable cereal-fields. Other small cereal-field within the reserve was hamster-friendly managed, with a low sowing density of cereals and no usage of pesticides. This field with a very high density of mice was heavily visited by badgers and foxes to hunt on mice and other prey. From other areas as well, it has become clear that such strips with high mice densities and a low sowing-density are avoided by hamsters. Although it is so-called hamster-friendly managed, in practice it turns out to be 'hamster-unfriendly'.

II.4. Vegetation patterns

It is important to notice that the total area with cereal fields in 2004 was relatively small and many cereal-fields were separated from each other by other fields with less attractive crops such as : maize, potatoes or sugar-beets, the most common agricultural crops in this region (Fig. 3). Between Amby and Sibbe areas with cultivation of cereals is very low and the fields with cereals are located at a relatively large distance from each other. The situation between Amby and Heer is different, there are several small fields with cereals at a relatively short distance from each other. Both maps show that the cereal fields are highly fragmented.

Common hamster burrows were found in regularly managed cereal fields, directly adjacent to the reserves. To the south of Amby, a cluster of burrows was discovered in cereal fields without a direct connection to the reserve. Between the reserve and the newly found burrows there was a field with carrots, which was apparently no barrier for hamsters. A second cluster of burrows was found more south-east of Amby, west of the first cluster, and separated from the reserve by a field used for grass-seed harvest.

The regular managed fields in the surrounding of Amby must have been colonised in 2004, because Common hamsters were absent here in the autumn of 2003. The greatest distance between an occupied burrow and the reserve was almost 1,100 m. In Heer, Common hamsters have also colonised adjacent fields with cereals. The greatest distance here amounted to ca 250 m.

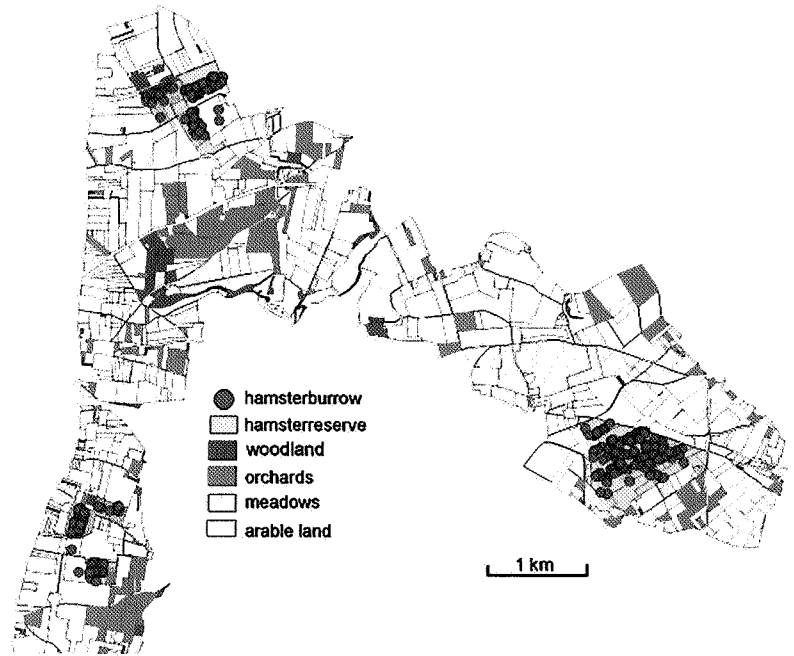


Figure 2 : Geographic location of Common hamster burrows in spring 2004 in the three release sites in the south of Limburg, the Netherlands. Blank polygons (fields) are farmland, blue fields are the Common hamster-reserves (with, in red dots, the known Common hamster-burrows), dark-green polygons are woodland, lighter green are the orchards and in very light green the grasslands.

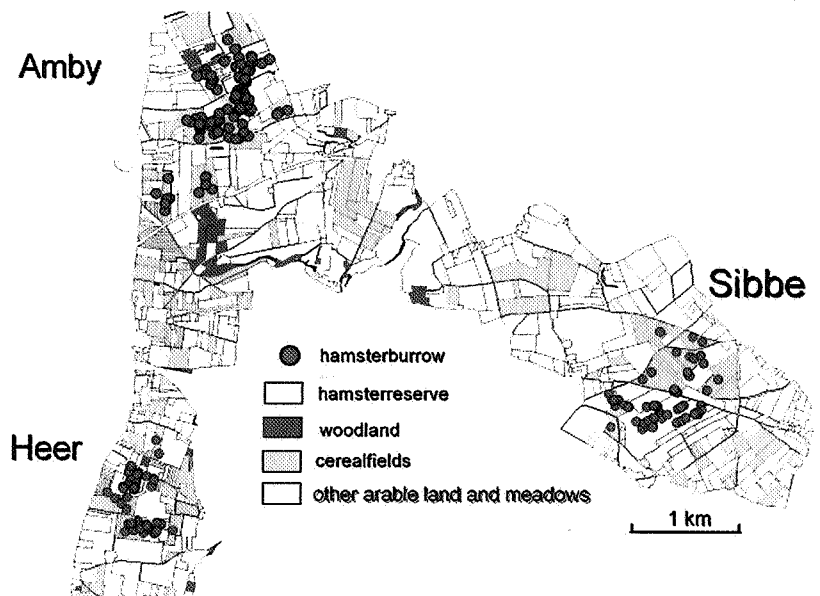


Figure 3 : The surveyed area around the Common hamster-release sites (light blue), with in yellow the fields with cereals. Red dots represent Common hamster burrows.

II.5. Surviving strips

After the harvest of cereals, Common hamster burrows were found in complete bare arable fields. To save at least a part of these hamsters, so-called surviving-strips were established on a few locations. The surviving-strips were surveyed for Common hamsters before and after harvest. In Amby only one burrow was present in the (planned) surviving-strips before the harvest and 14 burrows one month later (Fig. 4). This suggests that indeed some Common hamsters

moved from the harvested fields to these surviving-strips.

IV. DISCUSSION

The effect of the applied hamster-friendly management was monitored by surveying burrows in and outside the reserves, and by tracking Common hamsters supplied with a radio-transmitter. When Common hamsters awake in spring from hibernation, they look for suitable places providing forage and coverage.

Those Common hamsters that moved to fields with a suitable vegetation cover seemed to have a higher survival rate. Especially large fields with regular farming of cereals, bordering the fields with hibernation-burrows, seemed attractive. Vegetation density was here high and the number of rodents low, which meant that these fields were less attractive for predators. From half May till the beginning of August these regular managed fields with cereals were optimal for Common hamsters (enough coverage and forage), but after harvest they seemed to serve as 'ecological traps'. At that moment all cover and food disappeared at once. Common hamsters like females with a nest, or Common hamsters that cannot find a bordering place with enough coverage, formed an easy prey for predators. Especially on regularly-managed fields, there was not any good habitat left nearby, so most of the Common hamsters died. Surviving-strips or small fields with coverage in and around the harvested fields saved the life of at least a part of those hamsters.

A large part of the area between the reserves was unsuitable for hamsters. It might be possible for Common hamsters to use these fields (orchards and grassland) for dispersion, but they are not suitable for long-term survival. The potential habitat for Common hamsters is farmland, but from the regular farmland only cereal fields were good habitat (lucerne is only cultivated in the reserves). This fragmentation of the landscape will eventually delay the dispersal rate of the hamsters. The hamster-friendly management in the reserves created not only an optimal habitat for hamsters, but also for other rodents like field vole (*Microtus arvalis*), wood mouse (*Apodemus sylvaticus*) and brown rat (*Rattus norvegicus*). The reserves are a well-filled dish for predators like red fox (*Vulpes vulpes*), mustelids (*Martes sp.*) and birds of prey. Especially in spring, when the Common hamsters awake from hibernation, in summer and autumn after harvesting and ploughing (when the coverage of the vegetation disappears), predators are

attracted by a high density of rodents. These predators are also a severe threat for the starting Common hamster population, because the numbers are still quite low and extinction risk is high. Telemetry data suggested that predation was in this early phase of reintroduction the key-factor for the establishment of a viable population in the south of the Netherlands (KAYSER *et al.*, 2003 ; ULBRICH & KAYSER, 2004 ; MÜSKENS *et al.*, in press.).

REFERENCES

- KAYSER A., WEINHOLD U., STUBBE M. (2003) : Mortality factors of the Common hamster *Cricetus cricetus* at two sites in Germany. *Acta Theriologica*, 48 (1) : 47-57.
- MÜSKENS G.J.D.M., VAN KATS R.J.M., KUITERS A.T. (submitted) : *Reintroduction of the common hamster, Cricetus cricetus, in the Netherlands. Preliminary results.* In : Proceedings of the International Hamster Congress, October 2003, Budapest, Hungary. Altera, Wageningen.
- ULBRICH K., KAYSER A. (2004) : A risk analysis for the Common hamster (*Cricetus cricetus*). *Biological Conservation*, 117 : 263-270.

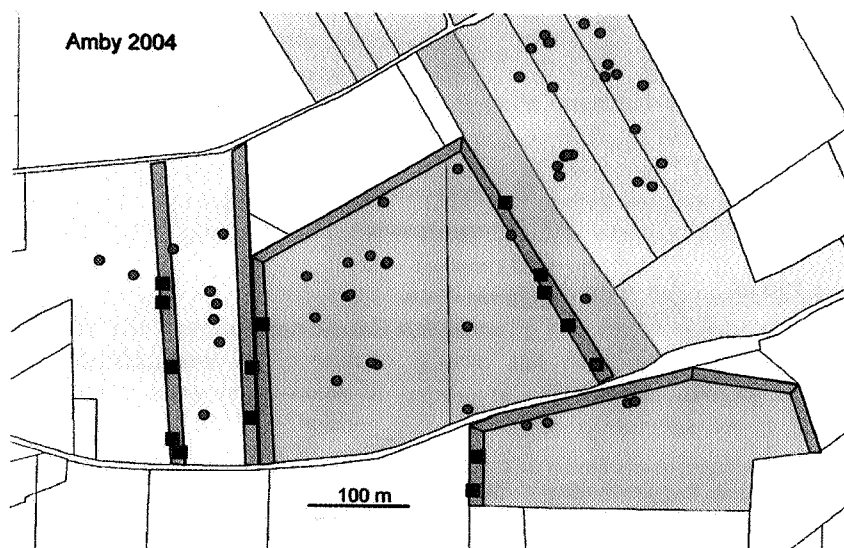


Figure 4 : Surviving-strips (blue-grey) in the cereal fields (yellow) bordering the Common hamster reserve (light blue) with Common hamster burrows in summer (red dots) and autumn (blue squares) in 2004.



I. Losinger