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## Hamster-management in the Netherlands: results and lessons

### Feldhamstermanagement in den Niederlanden: Ergebnisse und Lektionen

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**Zusammenfassung:** In diesem Artikel präsentieren wir Ergebnisse und Lehren des niederländischen Feldhamsterforschungsprogramms. Prädation ist die wichtigste Todesursache des Feldhamsters in den Niederlanden. Die höchste Rate ist im Sommer und vor allem auf Flächen wo die Bedeckung durch Ernte oder andere landwirtschaftliche Maßnahmen verschwunden ist. Um eine stabile Population zu erreichen, ist es wichtig, so spät wie möglich zu ernten. Nach unserem Modell ist in den Niederlanden keine Ernte die einzige Möglichkeit, eine wachsende Population zu erreichen.

Die Nachhaltigkeit der Population, zumindest in den Niederlanden, hängt einzig an den feldhamsterfreundlich bewirtschafteten Parzellen der Landwirte oder Naturschutzorganisationen. Es ist nicht wichtig, wie viele Felder ein Landwirt unter Feldhamster-Vertrag hat, es ist wichtig, dass er einige Felder unter Vertrag hat.

Ein ungewollter Effekt von Feldhamster-Vereinbarungen war die Aufgabe von Düngung und der begrenzte Einsatz von Herbiziden, was mit einer Zunahme ungewollter Unkräuter und mit einem starken Rückgang der Habitatqualität aus der Perspektive des Feldhamsters einherging. Die gängige Feldhamster-Bewirtschaftung wird besser und besser, obwohl nicht alle Probleme gelöst sind. In der nahen Zukunft wird unsere Suche nach einem besseren Management weitergehen.

**Schlagnote:** Feldhamster, feldhamsterfreundliche Bewirtschaftung, Hamsterbauplan

**Abstract:** In this article we present some results and lessons of the Dutch hamster research program. Predation is the most important cause of death of hamsters in the Netherlands. It peaks in the summer and mainly on locations where the cover has disappeared as a result of harvesting or other agriculture management practices. To achieve a stable population it is important to harvest as late as possible. According to our model, no harvest is the only possibility for a growing population.

The sustainability of the population, at least in the Netherlands, entirely depends on hamster-friendly managed parcels by farmers or nature conservation organisations. It is not important how many fields a farmer has under a hamster-contract, it is important that he has some parcels with an agreement. However, an unwanted effect of hamster-agreements was the abandonment of fertilizer and the limited use of herbicides, which resulted in an increase of unwanted weeds and a sharp drop of the habitat quality from a hamsters point of view. The current hamster management is getting better and better, although not all problems have been solved. In the near future we will continue our search for an even better management.

**Key words:** Common hamster, hamsterfriendly management, hamsterfriendly farmingscheme

### Introduction

The Common hamster (*Cricetus cricetus*) is a small rodent, with a high reproductive rate. The species lives on arable fields with a loess or loamy soil and crops which provide a lot of cover, mostly crops like cereals and Lucerne (*Medicago sativa*). Only a few individuals live longer than two years (KUITERS et al. 2007, FRANCESCHINI-ZINK & MILLESI 2008). Normally the number of litters is two, under very good conditions the number of litters is three (NECHAY

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2000; FRANCESCHINI-ZINK & MILLESI 2008; Harpenslager 2009). Females of the first litter can, sometimes, produce a litter in the same season (MÜSKENS et al. 2008). The mean number of young emerging at the surface after three weeks is probably five till seven (MÜSKENS unpublished).

An increase of a population is only possible if the mortality is low, the number of litters maximized and the number of juveniles per litter as high as possible (ULBRICH & KAYSER 2004). To achieve this, it is necessary to have some basic knowledge on the use of the agricultural landscape by hamsters, the reason of mortalities, the locations of reproduction, the period of reproduction and litter sizes. In this article we present some results and lessons of the Dutch hamster research program. The hamsters in our study were derived from the Dutch breeding program (DE VRIES 2003) and released in the wild or it were wild descendants of these reintroduced hamsters and trapped in the wild (MÜSKENS et al. 2005, LA HAYE 2008).

### Financial resources

The Dutch Ministry of Agriculture, Nature and Food (LNV) has financial resources available for some 500 hectares of hamster-friendly management, of which 300 hectares should be managed by farmers and 200 hectares should be managed by private nature-conservation organizations (LA HAYE & JANSMAN 2005). However, in 2009 275 hectares were managed by farmers and only 100 hectares were managed by nature-conservation organizations. Since 2002 our study has focused on improving the management for hamsters, but also to improve the practical aspects of the management for farmers and other participants.

### Results

Our study in the Netherlands on hamsters with a radio-transmitter clearly showed that predation is the most important cause of death (KUITERS et al. 2007, LA HAYE et al. 2008). Predation peaks in the summer and mainly on locations where the cover has disappeared as a result of harvesting or other agriculture management practices. In figure 1 a model is presented showing the effect of different harvest regimes on the development of the population during the year. This model is based on the data which were collected in the Dutch study in the period of 2002-2008 and is calibrated with real monthly survival-rates (KUITERS et al. 2007). The figure clearly shows that a stable population is only achieved when the harvest is late in the season. The only possibility to achieve a growing population is not to harvest, according to this model.

Measuring the effect of the agricultural management on the population of hamsters is possible using hamsters with a transmitter, but it is also possible to use burrow counts (VAN DER BEEK et al. 2006; LA HAYE 2008b). From midsummer till the begin of the winter all fields with Lucerne or cereals (stubble fields after the harvest and not harvested fields) were checked for the

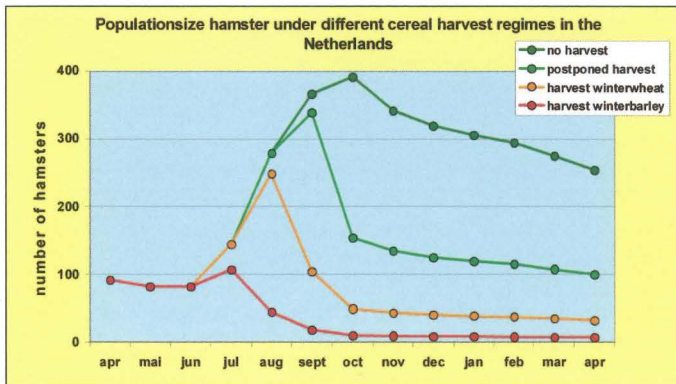
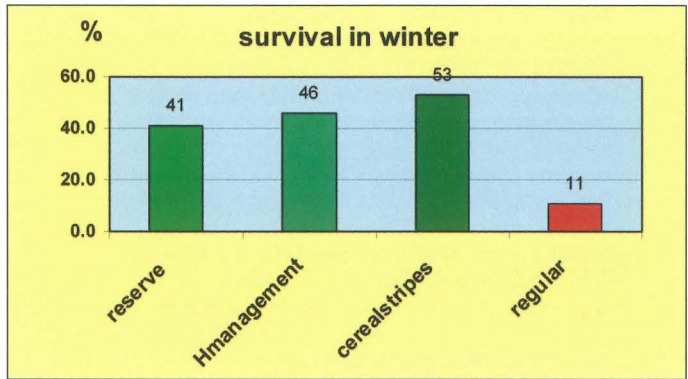


Fig. 1 Development of the hamster population under different harvest scenario's.



**Fig. 2** Percentage of the burrows, that were found between midsummer and the begin of the winter that are (still) occupied the following spring.

presence of burrows. The same burrow-locations were checked in spring to measure any signs of activity. It is important to make a differentiation between conventional managed fields and fields with hamster-friendly management. Figure 2 shows clearly that the survival of hamsters on hamster-friendly fields with almost 50% re-opened burrows is much higher then on conventional fields with only 10% re-opened burrows in the following spring (VAN DER BEEK et al. 2006; LA HAYE 2008b).

**Lessons: application of hamster-friendly management.**

**Vegetation**

It is known that hamster prefer fields with cereals and Lucerne (KUPFERNAGEL 2007). Our field observations showed that cover is the main factor of this preference and that the presence or absence of cover determines the survival of hamsters. On harvested fields or an fields with no cover, the mortality rate is very high and, as a consequence, the survival is very low. In the Netherlands is it necessary to provide cover during the complete summer, from July till September, to suppress the predation as much as possible. This is achieved by not harvesting the cereals and to abandon the cutting of Lucerne after the 15<sup>th</sup> of June. These measurements result in a maximum protection of the hamster.

**Subsidy-schemes for the Conservation of Nature and Landscapes**

Hamster-friendly management costs money because of the harvest restrictions. Farmers with an agreement are therefore financially compensated for their loss in income. Each farmer gets a compensation per hectare hamster-friendly management. The height of this compensation per hectare is calculated according to the EU-regulations and using a standard agricultural income, from the best agricultural areas in the Netherlands as a reference, plus a bonus of 20% because of the extra measures and management problems. Each year the compensation is calculated and corrected for the market-prices at that moment. A hamster-friendly agreement is signed for six years and afterwards the farmer can stop with the management. The presence or absence of hamsters has no juridical or other consequences. At the moment farmers are enthusiastic and willing to sign an agreement in the Netherlands. Hamster-friendly management has become an agricultural product which can and must compete with other agricultural crops and products.

**Research**

The experiences with hamster-friendly management started in 2002. The monitoring of the habitat quality on fields with hamster-friendly management soon showed that the abandonment

of fertilizer and the limited use of herbicides resulted in an increase of unwanted weeds and a sharp drop of the habitat quality from a hamsters point of view (MÜSKENS et al. 2005, MÜSKENS et al. 2008). This effect was seen on fields managed by nature protection organisations, but also on fields which were managed by farmers.

The abandonment of fertilizer is an automatic reflex of most nature conservation organisations and the use of herbicides is almost always forbidden. However, it was a surprise that the farmers showed the same reflexes. The explanation is quite simple, using fertilizer and herbicides is expensive, while the financial compensation was already known and not influenced by the habitat quality, the number of hamsters or the harvest. To prevent such effects in the future, another management system was developed. In the new system the use of fertilizer and herbicides is unavoidable, because the hamster-friendly management moves around on the land of a farmer. After three or four years of hamster-friendly management, the hamster management stops and the fields (crops) are managed conventionally. A farmer can choose every crop he wants in the year or years without hamster management. Most of the time this is an attractive construction for farmers, because in this way it is possible to have hamster management and to grow other conventional crops under long-term contracts like contracts for sugar beets or potatoes. The integration of conventional farming and hamster-friendly management in one overall farming scheme prevents the insufficient use of fertilizer and prevents an explosion of unwanted weeds.

### **Current hamster-friendly management**

The survival of hamsters on conventional managed fields are minimal (MÜSKENS et al. 2005). The sustainability of the population, at least in the Netherlands, entirely depends on hamster-friendly managed parcels (LA HAYE 2008a). It is therefore not important how many fields a farmer has under a hamster-contract, it is important that he has some parcels with an agreement. However, the possibilities to incorporate hamster-friendly management in the overall farming scheme are limited.

### **Survival stripes**

Survival stripes are very simple conservation measures to implement on a farm. A strip of at least 20x100 meter of conventional farmed cereals or complete fields of cereals are not harvested. In a conventional farming scheme 25% of the fields is normally sown with cereals, which gives enough opportunities for applying survival stripes. The only negative aspect of survival stripes is the location of the stripes which changes every year, because each year the cereals are sown on other fields. The hamsters have to follow the cereals and move to other fields each year.

### **Hamster-management in the farming scheme**

Implementation of hamster management on complete fields or parcels is more difficult than the implementation of survival stripes, because of the need to grow Lucerne on a specific field for at least three years. This results in some limitations for the growth of other crops. Table 1 presents an overview of possible percentages of hamster-management in different farming-schemes. The growth of potatoes and sugar beets is still possible within these farming-schemes.

### **Management**

The regulations for the management of cereals and Lucerne are simple. Lucerne in the hamster management has to be cut once a year before the 15th of June. Afterwards the crop will not be cut anymore until February the next year when the old vegetation is chopped. New sown Lucerne is cut once or twice when the crop has a height of ca. 15 cm to suppress the development of too much weeds.

The cereals are not harvested on the crops will, also, stay on the field until February the next year. From February onwards it is allowed to chop the remains of the cereals and to plough the

**Tab. 1** An overview of different farming schemes with different percentages of hamster management.

n - parcels % hamster	3 or 6 50 %	4 or 8 50 %	3 or 6 67 %	4 or 8 75 %	survival-strip 6.25 % - 25 %
year 1	lucerne	lucerne	free choice	lucerne	winterwheat
year 2	lucerne	lucerne	lucerne	lucerne	potatoes
year 3	free choice	lucerne	lucerne	lucerne	sugarbeets
year 4	winterwheat	winterwheat	free choice	free choice	wintercereals
year 5	free choice	free choice	winterwheat	winterwheat	
year 6	free choice	free choice	cereal / radish	summERCEREAL	
year 7		free choice		radish / cereal	
year 8		free choice		free choice	

fields. Fertilizer or manure is needed for a thick crop which gives enough cover for the hamsters. Herbicides may be used if necessary to prevent an increase in unwanted weeds. Within some farming schemes the growth of radish (*Raphanus sativus*) is prescribed. Radish has two advantages, it suppresses unwanted weeds in a natural way and second, the seedpods provide food for a lot of farmland birds during the winter (VAN DONGEN 2004).

## The future

The current hamster management is getting better and better, although not all problems have been solved. The ecological effect of too much weeds and a shortage in fertilizer is negative on hamsters and these problems have a negative influence on the up-take of hamster management by farmers. In the near future we will continue our search for an even better management, although a deficit of fertilizer and an increase of unwanted weeds should be solved with the current management prescriptions.

Hamster-friendly management is expensive, because it has to compete, financially, with other crops. We think that the up-take of hamster-management will be minimal, unless the financial compensation is high enough to be an attractive alternative for farmers.

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