

CAPTIVE BREEDING AND REINTRODUCTION



THE HARVEST MOUSE *Micromys minutus*

VICTORIA FORDER
ON BEHALF OF WILDWOOD TRUST
AUGUST 2006



Captive breeding of the Harvest Mouse *Micromys minutus*

Introduction

The harvest mouse *Micromys minutus* is the smallest British rodent and is highly inconspicuous to the human eye. It inhabits marginal habitats that are not always ideal, but it is adaptable, intelligent and highly opportunistic. Harvest mice are active both



Harvest mouse nest

during the day and at night, although most activity occurs at dawn and dusk.

Unlike the dormouse, they do not hibernate, but spend most of their time in winter underground.

Throughout the world, the harvest mouse is most common in wetlands and long grass.

Current Status

Harvest mice have a limited distribution, although they are often found to be locally common. Restricted for the most part to southern England, other scattered populations are found in Cheshire and Yorkshire. Isolated reports from Scotland and along the coastal belt of Wales are most likely a result of reintroductions. Harvest mice are absent from Ireland.



Harvest mouse feeding on corn

The population estimate for the UK is 1,425,000, with 10,000 individuals in Wales and 1,415,000 in England¹.

Harvest mice favour tall, dense vegetation; breeding nests can be found in long grass,

crops, reedbeds, rushes, ditches, bramble patches and grassy hedgerows. In suitable habitat areas, harvest mice can attain very high densities; however population numbers often fluctuate dramatically. One survey carried out on a wild population showed that only 0.7% of those animals survived after 30 weeks².



Harvest mouse on corn stalks

On the boundaries of its range, harvest mouse populations are very localised, limited to just one or two fields³. Due to the loss of so much natural habitat, roadside verges are now providing important breeding sites and refuges for the harvest mouse and other small mammals⁴. Population density varies with habitat; highest in reedbeds (20-50/ha) and lowest in cereal fields (0.05-0.4/ha)⁴. Under good environmental conditions, the population density of harvest mice can reach up to 220 animals per hectare in early autumn⁵.

Legal Status

At present harvest mice are not legally protected in Britain. Their priority status places them on the IUCN Red List of Threatened Species, under the category of near threatened. They are not a UK Biodiversity Action Plan Priority Species but are included in some Local Biodiversity Action Plans. Harvest mice are also protected by the Wild Mammals Protection Act, 1996.



Reasons for Decline

A reduction in hedgerows due to modern farming methods, combined with the use of combine harvesters, leaves harvest mice in grain fields with little chance of escape. Hedgerows are being removed by farmers to produce larger fields, reducing suitable harvest mouse habitat. A change from spring-sown cereals to winter sowing reduces opportunities for breeding due to the earlier harvest. Breeding is timed to coincide with the traditional ripening of crops.

Agricultural practices and land use changes such as pesticide use and stubble burning have had a negative effect on numbers⁴. In addition, harvest mice are prey to numerous predators including weasels, stoats, foxes, cats, owls and hawks.

It is believed that harvest mice are sensitive to climate change and have a preference for dry conditions¹. Numbers may be limited by summer rainfall. Harvest mice originally made their nests in corn stalks but are now rarely found amongst crops. Harvest mice are more common in England, as hedgerows and remnant hedgerows are the dominant linear feature in the landscape⁴. There are only isolated sightings in Scotland, where walls and fences are the linear feature in the landscape, providing unsuitable habitat. Grassy field margins are important refuges for harvest mice. These have been reduced along with hedgerows, the width being narrowed by close ploughing.

Competitive species have increased and perennial weeds are being removed by the use of herbicides¹. In the 1990s a Mammal Society survey found that harvest mice were no longer present in 30% of the 800 sites they were recorded at during the 1970s⁴.

It is thought that the reduction of small mammals in hedgerows is exacerbated by intensive hedgerow management. The high mortality



Combine harvesting

figure is caused in part by the fact that the habitat of harvest mice can change rapidly and can often disappear completely⁵.

General Ecology

Harvest mice are easily distinguishable from other species of mice purely by their size. They have a short blunt muzzle, with small, rounded, hairy ears and a golden-brown coat. This native British mammal is the smallest rodent in Europe, weighing on average 6g when fully grown. The head and body length is 50-80mm, with a further 50-70mm for the tail.

Harvest mice show a slight preference for nocturnal behaviour during the summer and show diurnal movements in winter⁵. Their diet consists predominantly of seeds, cereal, fruits and berries. They will also feed on insects and flowers as well as green shoots in spring when other foods are scarce. Longevity ranges from a maximum of 18 months in the wild to up to four years in captivity. The average life span in the wild is 6 months, with 95% mortality of the population over winter.

Harvest mice breed before they are one year old and can produce 3-7 litters a year. Their mating season is between May and October, but can continue on into December depending upon the weather. The gestation period is 19 days and the young are weaned by 15 days. Litters can range from one to eight young.

Harvest mice are the only British species with a prehensile tail that can be used as a fifth limb. Harvest



Adult and juvenile harvest mice

mice build non-breeding shelter nests as well as breeding nests which are completely different. Breeding nests are built in the stems of plants high above the ground, made from woven grass. Non-breeding nests are often smaller, built closer to the ground and not designed to last as long as breeding nests. Although harvest mice are predominantly solitary there is considerable overlap of adjacent home ranges.



Captive Breeding

Suitable housing

Harvest mice at Wildwood are housed in glass tanks which are 64 x 33 x 40cm in size. These tanks are covered by a lid containing a 0.6cm² mesh size; any larger mesh size and young harvest mice may be able to squeeze out.



Internal design of a captive breeding tank

The bottom of the tank is lined with sawdust and quite a substantial amount of hay is added for the harvest mice to make their nests from. Grass and leaves are added on occasion for the same reason. Millet sprays are attached to the roof and small branches are added for climbing. Small tubes are also provided to allow cover.



Captive breeding tanks

Breeding

A captive breeding scheme was set up at Chester Zoo in the late 1980s. Harvest mice are unlikely to breed if a single male and female are placed in a cage together. This species requires a competitive mate selection procedure.

The breeding procedure always starts with two males and two females in a group; the dominant female will conceive first. When this occurs the subordinate female is immediately removed. It can be difficult to determine the dominant male, but as soon as the subordinate male is identified, he needs to be removed. The submissive male is usually seen to be keeping out of the way of the other male, sitting high up around the edges. The pair can be kept together for up to 7 litters. If they have any more than this, the female may die giving birth.



Young harvest mice in nest

If more offspring are required from different pairings, the pair that is removed can be placed in with another pair. Hopefully the male will not remain the submissive individual in all cases. Cages must not be cleaned during breeding, except for the area at the front around where the food is placed. The nesting area must be left alone as territorial scent marking is an important factor in breeding success.

Sibling litters should be separated at between 8 and 12 weeks, as soon as aggression starts. At this point it can be assumed that sexual maturity has been reached and they must now be kept in single sex groups.

Food allocation

Equal parts of budgie, canary, finch and parakeet mix are provided in a small plastic lid. A small cube of fruit (apple, melon, banana or orange) is placed at the edge of the lid. A small pinch of Prosecto insectivore mix is added once a week. At present no live foods are provided. This may be considered in the future as in the wild insects constitute a high percentage of the diet. A small dish of water or water bottle is also provided.



Reintroductions

Suitable sites

A sustainable captive population of harvest mice is kept at Chester Zoo. It is believed that all harvest mice used in breeding programmes originated at some point from this stock.



Harvest mouse habitat in the wild

Three restocking releases have been carried out to date (2002, 2003 and 2004) in collaboration with the North of England Zoological Society (NEZS), the Cheshire Wildlife Trust (CWT), the British Association of Shooting and Conservation (BASC) and Chester Zoo. Reintroduction guidelines for harvest mice have been devised based on experience gained from these releases.

A countrywide survey was carried out from 1999-2000 to determine suitable release sites. Extensive pre-release monitoring was carried out through live mammal trapping at the release sites in accordance with the IUCN guidelines for reintroductions.

Selecting suitable sites for reintroduction takes a great deal of thought and consideration.

Health screening

A pre-release veterinary health screening protocol is carried out prior to release by Chester Zoo's veterinary team. Some small mammals in the release area caught during live trapping also undergo health screening. Screening of animals before they are transferred for release will reduce the possibility of introducing undesirable disease-causing agents into wild harvest mice populations. The general condition of the harvest mice should be observed in detail, paying particular attention to the state of the coat, skin, external genitalia, eyes, ears, nose, feet, legs and incisor teeth. External parasites can be observed by regular examinations. Only perfectly healthy individuals can be released, for example with full tails and no nicks in their ears.

In addition the resident harvest mouse population (if present) should be screened to identify any infectious agents or parasites it may be carrying, in case these might cause disease in the newly reintroduced population.



There are numerous features that are necessary for a site to be considered. The site should lie within the species' previous range and should have a suitable ongoing management plan where agricultural practices are kept to a minimum.

Harvest mice should not be introduced to areas with already established harvest mouse populations to avoid over-competition.



Harvest mice mating

Ideally harvest mice should be released into arable fields and their margins, ditches and long grass. They are less common in long grass near pasture. A survey carried out by the



Using prehensile tail

Essex Field Club in 1999 showed that of the 148 sites that harvest mice were found in, road verges made up 72% of the habitat and 62% of the surrounding vegetation consisted of bramble.

Preparation of Sites and Releases

An experimental release of 170 harvest mice was carried out in two sites in Cheshire during 2002. In May 2003, 100 harvest mice were released onto the Gatewath Site in Warrington. A further 270 animals were released in June 2003 onto zoo land adjacent to the Shropshire Union Canal in Upton-by-Chester.

To produce a reintroduction protocol for this species, these mice were released in a 50:50 sex ratio, with 50% being hard releases and 50% soft releases. Soft release enclosures aim to provide food, water, shelter, protection from predation and also the hope of establishing a small home range prior to actual release 48 hours later. Twenty animals were radio-collared and tracked for 20 days post release to determine survival, dispersal and habitat choice. All mice were fitted with 8mm PIT microchips subcutaneously, for individual identification prior to release. The 2004 release of over 400 animals took place in Anderton Nature Park, Northwich. This release was based on all relevant information accumulated during the releases in 2002 and 2003. Of the



Harvest mice prior to release from Chester Zoo

20 radio-collared animals, nine died, four were presumed dead and five were lost⁶. Many of the remains showed signs of predation.

There was no significant difference in survival time between hard and soft release mice⁶. Only individuals between 3 and 12 months are eligible for release.

Monitoring

The Cheshire Wildlife Trust is actively involved in the captive breeding programme, with several members of the group carrying out surveys of their local sites. Volunteers were trained in live mammal trapping techniques, as well as nest surveys, husbandry techniques and radio-tracking techniques. Live mammal trapping begins three weeks after release, and continues throughout the year in four to five week intervals, as regular post release monitoring is essential. All sites continued to be monitored throughout 2006.

Monitoring of existing naturally occurring mice within a release site is also essential. The aim for the twenty animals that were radio-collared



Harvest mouse wearing a radio collar

was to track each mouse twice during each of the four six-hour shifts (a 24 hour period), thus monitoring each mouse eight times within a 24 hour period, and to record its location and habitat choice.

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