# BIAZA - Husbandry care sheet

*Please complete all fields below. Information provided should be referenced or cited as a personal observation. Institutional support should be sought by the author before submission. By submitting a husbandry care sheet, the author acknowledges that the information will be freely available to all BIAZA members online at www.biaza.org*

## General species information

**Common name:** European Harvest Mouse **Scientific Name:** *Micromys minutus*

**IUCN Red List Status:** Least Concern **Lifespan Wild: 6-18 months** **Captivity:** 5 years

**Species population managed:** Not as yet **Species coordinator:** Catherine Doherty, Woburn

**Description:**
Harvest mice are the smallest British rodent, weighing around 5-9g with an average body size of 5-7cm long and a tail which is the length again of the body. They are distinguished from other murids by small hairy ears and a blunt muzzle, similar to voles. Non sexually dimorphic, adult or sexually mature animals are russet/orange dorsally, and pure white ventrally. Juveniles have overall grey-brown pelage which moults into orange-brown at adulthood. A moult into adult pelage may start at 30 days and be completed in 15-100 days according to season. A harvest mouse's physical attributes are adaptations for living in the 'stalk zone' of fields. They are small and light, and they have a tendon-locking mechanism in their feet to enable gripping stalks and twigs to be more energy efficient in their propensity to climb within grasslands. They have an opposable outer toe on the hind foot, and they possess a truly prehensile tail which they use as a fifth limb, and thus, their morphology is adapted for climbing and scansorial living.

**Habitat:**
The harvest mouse favours areas of tall dense grassy vegetation, and colonises early successional stages. Breeding and non-breeding shelter nests can be found in long grass, reed beds, grassy hedgerows, bramble patches and in recently planted farm woodlands, cereal crops and the margins of arable fields such as those left under farm stewardship schemes (see pics below). They also are often found nesting beside or over water where they can nest in reeds (Phragmites) which allows nest heights of over a metre. Road side verges are also an important habitat. These nests are usually 8-10cms in diameter, non-breeding nests smaller at less than 5cms. The height that the nests are located depends on the species of grass used and can be from 10-60cms high. The nests are woven from the living leaves of grasses and are initially green, then turns brown as the grasses dry. These above-ground nests, provide a characteristic field sign to determine the presence of mice in a habitat. In winter the mouse moves out of the stalk zone as the annual growing vegetation dies back and builds non breeding nests in the bases of grass tussocks**.**

**Behaviour and social organisation:**
A harvest mouse is crepuscular and lives in the 'stalk zone' in the summer as the vegetation grows to support nests for breeding**.** In the summer nests are distributed evenly through their habitats and are the mice are solitary. Home ranges have been recorded at 400m squared for males and 350m squared for females. These ranges overlap but the females defend a central small breeding area. There is territoriality in the breeding season, and breeding nests tend to be regularly spaced out. In captivity, females can chase males and it is believed that they are dominant to males. In the wild aggressive behaviour takes place as fighting or chasing in the stalk zone often accompanied by vocalization. Tails are often bitten in these encounters, and on ears and legs, with a loss of limbs recorded in captive mice. In captivity both young and adult mice can be killed and partly eaten. Vegetation die back in winter appears to cause a behavioural change, as the mouse retreats to ground level using the runway

systems of other small mammals. They have been recorded sharing nests with other harvest mice in winter, which suggests a post breeding/territoriality reduction in aggression. The mouse is active in winter and does not hibernate.
Harvest mice are sensitive to noises, silhouettes and vibrations, with a ‘freeze’ response in the first instance to locate the disturbance. Should there be a violent disturbance they will also abandon their nests and drop to the ground for escape. Harvest mice are olfactory, and will scent mark grass stems and leaves with urine and faeces. Little is known of the functioning of the scents, but it may play a part in the breeding season.

**Habitat Types**

Arable field margin habitat; SE England (Photo Steve Kirk 2023)

Extensive marshland habitat; Kent (Photo Steve Kirk 2023)

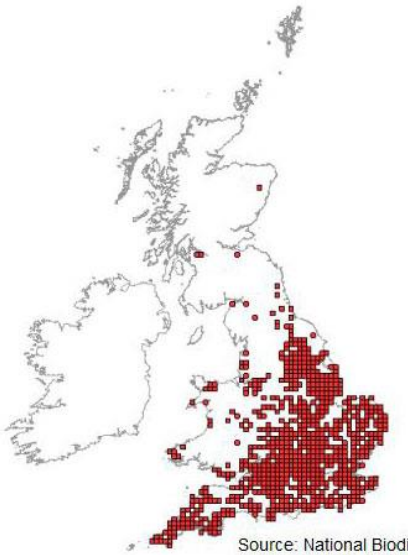
**Nest Types**

Classic nest in grass through brambles (Photo Steve Kirk 2023)

Nest supported by blackthorn in coastal reed, grass and scrub habitat (Photo Steve Kirk 2023)

**Distribution:**

The British distribution of Harvest mice is south-east of a line from the Bristol Channel to the Humber with an extension northward into Yorkshire. In Wales where they were found for the first time in the 1970's, they seem to be restricted to the northern and southern coastal counties. A few have been found in Scotland and those south of Edinburgh are probably natural whilst the ones to the north are probably intentional or accidental introductions. Local distributions can be marked by significant fluctuations in density on a seasonal and annual basis. This can challenge the methods of monitoring populations. As the number of nests fluctuate it can appear that locally the harvest mice has become extinct, only to reappear the following year.
In the rest of the world, the Harvest Mouse's range extends in an unbroken strip across temperate Eurasia into China with outposts in SE Asia. In Europe in extends north to the Arctic Circle in Finland (but excludes the rest of Scandinavia) and southwards to northern Spain and most of Italy



Source: National Biodiversity Network Gateway 28/10/2005

World Distribution of Harvest Mouse (Micromys minutus)

## Diet

**Wild weight (g):** **Captive weight (g):**

**Average range 5-9g** **Male: Range 6-8g Avg. 7g Female: Range 6-13g Avg. 10g**

**Body condition score available at:**
Species360 ZIMS Help (isis.org)
Body Condition Scoring Resource Center • AZA Nutrition Advisory Group (nagonline.net)

**Wild Diet:**

The small body mass of the harvest mouse gives a high surface area to volume ratio. To maintain body temperature, it has a high metabolic rate and needs to consume one third of its body weight per day. The mouse is seasonally omnivorous. In spring shoots are taken, invertebrates in summer and fruits and small seeds in autumn and winter. Examples being seeds of sedges, reed grass, couch grass. In autumn, winter and early spring crop grains are taken such as oat, wheat, millet sunflower, peas, beans. Hedgerow fruits such as hips, haws and blackberries. A variety of insects are also taken. Moths, caterpillars' flies and grasshoppers. Cannibalism can be common during winter and spring.

**Captive Diet:**
**Please see Appendix 1**

**Nutritional considerations and feed presentation**:
As harvest mice have fast metabolisms, it is essential that they have constant access to food and water.
The use of millet sprays allows for natural foraging and as a climbing activity. Food and water can be offered in small, shallow bowls, jam jar lids, or a small dropper bottle can also be used for water. Calcium supplements can take the form of commercial preparation of powder and/or broken pieces of cuttle fish shell.

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## Reproduction

**Sexing guidelines available at:** https://biaza.org.uk/resources/animal-husbandry/mammals Rodent Sexing Database

Sexing harvest mice follows the same rules as for many rodents. The position of the genitalia of males being further from the anus than in females. Females have four pairs of nipples, very visible in female nestlings. Males' testes are rarely obvious even in the breeding season.

Female genitalia: Note distance vulva from anus at base of tail. Also nipples showing to the left.

Male genitalia: Penis a greater distance from the anus and dark patch around the penis/anus area

**Contraception information available at:**
EAZA Group on Zoo Animal Contraception (EGZAC) - European Association of Zoo and Wildlife Veterinarians (eazwv.org)

**Inter birth interval:** 3-7 litters a year in the wild

**Gestation:** 18-21 days

**Number of offspring:** 1-8 young

**Age at weaning:** 15-16 days.

**Birthing and rearing considerations:**

In captivity reproduction can occur from April onwards, but in the wild the reproductive season starts later, early to mid-June. The reason being that many tall grasses do not reach sufficient height to hold breeding nests until June. There is a gradual increase in litter numbers into August-September when three quarters of all litters are born.

The young are born hairless and hidden in nests. In captivity other females have been observed assisting the female giving birth by cleaning the young, chasing off interested tank mates and disposing of still born young. Some females give birth and raise young successfully in the main enclosure and others appear to be attacked shortly after giving birth and the young killed by other tank mates. Weaning occurs around 15-16 days but young may appear out of nest from around day 9. It has been recorded that weaning is aided by regurgitation feeding, and the harvest mouse is one of the few mammal species (other than Canids) known to do this. Some dams will not tolerate their young near the nest after weaning, actively chasing them away. Survival rates up to this point are relatively high in captivity. It is advised that disruptive husbandry practices are minimised, certainly until the young are out of the nest and probably for the duration of the breeding season. The reasons being strong vibrations can cause mice to abandon their nests and secondly a reduction in the cleaning routine will not disrupt any scenting behaviour that plays a role in the breeding season. The young are sexually mature at 45 days and can start to breed. It is important that breeding is managed to prevent inbreeding and high stock densities.

Ideally, if breeding, the requirement would be for four tanks, all being 30cmx40cmx60cm as a minimum. This will form your breeding environment:

1. Main tank for breeding pair and neo-nates.
2. Nursery tank for young between 4-6 weeks' old
3. Tank for mice sexed as males
4. Tank for mice sexed as females

Glass sided aquarium tanks are ideal, but the lid must be a meshed as the mice can chew through plastic and wood. Mesh lids give ventilation, and allow a surface area for the mice to climb.

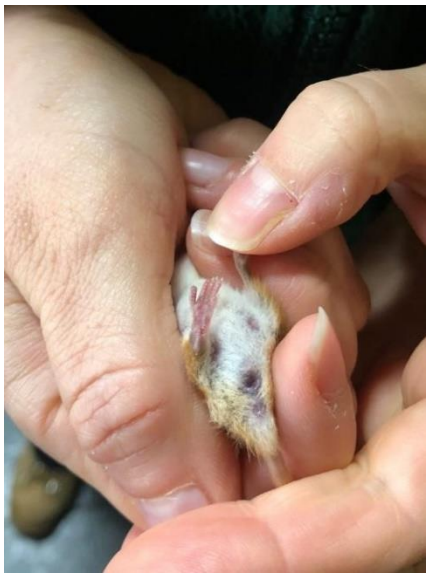
Once these are set up and you have your pair in the large breeding tank, the first sign of births is that the female will disappear from sight into her nest on the ground, (see enclosure features below for nest site information). Then she will reappear after a few days. It is important to note the date she 'disappears' as this can be an estimate of birth date. Increased activity is also an indication of birth as the female will come into season about two days after giving birth and will be mated again by the male. It is thought that once a female enters a breeding cycle she must not be removed from the male or given a 'break' as it disrupts her breeding, and she may not fall pregnant again for the rest of the season. Young should come out of the nest at 10 – 12 days of age. It is thought best to separate young from the dam at 14 -17 days of age. Some dams will tolerate previous litters when subsequent litters arrive others do not and can kill them. Sexing at 17 days is difficult which is why a nursery tank is used to allow the offspring to mature. Harvest mice have been known to breed at 6 weeks so sexing at 4-5 weeks is prudent and move into single sex tanks. Several litters can be held in this way but it is inadvisable to hold more than six to eight mice in one tank as they will fight and give injuries mainly biting off the tips of tails.

**Handling and restraint**:

Harvest mice are very fast moving and can become easily stressed. To catch a mouse in the tank, it is best to use a cupped hand and enclose the mouse on the floor of the tank under the cupped hand. Then hold the mouse lightly but firmly by the base of the tail. Alternatively, you can lightly scruff the mouse by loose skin on the back of the neck, or apply a cupped hand technique. (See photos below).

Lightly scruff loose skin at the back of the neck (Photo J Dunn 2023)

Mouse restrained by a hold at the base of the tail (Photo J Dunn 2023)



‘Cupping’ method for both restraining a mouse and for sexing purposes.
(Photo C. Doherty, Woburn 2023)

## Environment

**Optimum temperature range**: Natural temperate native range (consider additional heat in cold conditions under 0 degrees centigrade) For breeding a background temperature 18 -20 degrees Celsius is required. Avoid temperatures over 28 degrees. Glass tanks get very warm, with little opportunity to escape the heat. Consider using a fan (not directly on enclosure), ice chips, frozen berries/ food items or shade if in direct sunlight.

**Optimum humidity range**: can be taken as approximately 78% to 80%. As the average high humidity in England is 87-92% and average lowest is 69-74 %.

**Substrate**:
Small wood shavings to a depth of approximately 6cms can be used as the base substrate, ideally with a layer of hay on top which can be used for hiding, chewing or nest building. Some collections use coir as a primary material, but it may be that this material can cause condensation and humidity problems. The frequency of cleaning will depend on the size of the enclosure and the number of mice in the tank. Cleaning out too frequently can be stressful for harvest mice and aggression is much more likely if they are transferred to a smaller enclosure while theirs' is being maintained, so minimising the amount of time taken for cleaning is essential.

**Enclosure features**:
Harvest mice require relatively large housing areas despite their small size as they can get quite territorial and aggressive. Height is used more than floor space, but both are important, with 40cm being an absolute minimum for height. It is recommended a minimum 45cm cube for up to six mice, moving to a larger 60cm cube for larger numbers. The recommended housing for harvest mice would be a large glass tank with front opening doors which is kept off of the ground to minimise any vibrations. Harvest mice are great at chewing so tanks with plastic or wooden lids are not suitable. Mesh on the roof is recommended as it gives the harvest mice more space to climb on, although a mesh size of 6.35mm is required due to their small size.
It is important to include plenty of opportunities to climb and remain high in their enclosure. This could consist of branches cut from safe, untreated wood of native trees and shrubs, safe rope, plaited newspaper and hanging sprigs of millet. These climbing areas also increase visual barriers, helping to reduce aggression. Artificial finch nests make good hanging nesting areas for harvest mice, but plastic rodent houses, hanging flower pots, coconut shells and cardboard boxes can also be used. Harvest mice will construct their own nests if provided with plenty of grass in pots and corn stalks.

Breeding tank Wildwood Trust
(Photo H. Ryan)

Breeding Tank Wildwood Trust
(Photo H. Ryan)

Harvest Mouse Enclosure – Northumberland Zoo (Sept 2021) Mr. Weasel

Harvest Mouse Enclosure – New Forest Wildlife Park (Photo credit Jason Palmer 2023)

In addition to natural climbing opportunities and nest boxes, harvest mice can also be provided with other environmental enrichment such as cardboard tubes and pipes. These items allow the mouse exploratory opportunities, refuge areas, and areas to scent mark in.

*Picture: Millet and hawthorn used as climbing areas (Photo credit: Kate Buss, 2017).*

**SSSMZP recommendations available at:**
Secretary of State's standards of modern zoo practice - GOV.UK (www.gov.uk)

**General enclosure design guidelines:**
BIAZA - British and Irish Association of Zoos and Aquariums | BIAZA

**Enrichment information available at:**
The Shape of Enrichment, Inc. - Home (wildapricot.org)

## Common health problems

Harvest mice are not susceptible to any particular diseases, but general health issues that affect all mouse species should be watched out for. These include intestinal parasites, mites, obesity, and over grown teeth. In large colonies there is a risk of aggression, so it is recommended to frequently check mice for injuries.

## Routine preventative health care

Faecal screening for parasites and worms every six months

**Veterinary resources:**
BIAZA - British and Irish Association of Zoos and Aquariums | BIAZA

## Further Research

Further investigations into aspects of husbandry should always be ongoing. The use of UV lighting is one such topic where currently there are no documented peer reviewed studies. BIAZA's small mammal subgroup are currently investigating a definitive list of safe browse material for all small mammals. If you require further information, please contact the group. In terms of the pair breeding protocol as described in this document, there can also be an ongoing discussion of this compared to colony breeding. Colony breeding being where the enclosure environment is a sufficient size and complexity to house several males and females and allow natural breeding behaviours to take precedence. Research could then be developed to compare the success of each. Challenges with colony breeding may be managing the population size, inbreeding, and safety from fighting.

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Zoological Information Management Systems, ZIMS, Species360, Weight Comparison

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**Appendix 1 Diet Sheets**

**Diet Sheet for New Forest Wildlife Park**

## DIET SHEET PER INDIVIDUAL

New Forest wildlife park

### Eurasian harvest mouse

*Micromys minutus*

**Group Size:** 13:11:0

**Wild diet:** grass seeds, grain, berries, leaves and insects

**Lifespan in captivity:** 18 months

**Predators:** Weasels, stoats, foxes, cats, owls, hawks, crows and even pheasants

| DIET PER GROUP |
|---|
| **Daily** |
| **Fill feeding logs with seed, fruit and millet spray**<br><br>Fruit can be:<br>oranges, melon, berries, pear<br><br>Harvest mouse seed:<br>canary bird mix,<br>Sunflower seeds<br><br>Mealworms can also be added (N) |

**Other information**

- Nutrabol (N) to be sprinkled over mealworms
- Fresh water daily
- Remove old millet daily
- Broken cuttlefish should be replaced frequently for extra calcium

Diet Sheet for Woburn Safari Park

Harvest Mice: (*Micromys minutus*)
CURRENT GROUP NO's: 9.11.6
LOCATION: Harvest Mice House
DATE: 28/02/2023

| Daily diet per animal | |
|---|---|
| Wild bird seed mix | 2g |
| Mixed corn | 2g |
| Mealworms | 0.5g |
| Fruit/ Veg | 1g |
| Pumpkin seeds | 0.55g |

| AM | |
|---|---|
| Wild bird seed mix | 30g |
| Mixed corn | 30g |

| PM | |
|---|---|
| Mealworms; Mon, Wed, Fri | 7.5g |
| Blackberry, apple, carrot, grape pear orange banana, sweetcorn; Tues, Thurs, Sat | 15g |
| Pumpkin seeds; Sundays | 7.5g |

ADDITIONAL INFORMATION

- Fresh water daily
- Regularly provide fresh approved browse for enrichment, nesting and climbing opportunities.
- Fresh millet to be provided regularly.
- Broken cuttlefish provided for extra access to calcium supplement
- Provide fresh hay/ grass for nest building
- Mealworms offered should not still be alive due to the potential of bites.

**WILDWOOD TRUST – DIET SHEET**

**SPECIES OF ANIMAL**

| Common Name | Scientific Name | Average Weight |
|---|---|---|
| Eurasian Harvest Mouse | Micromys minutus | Approximately 4 – 11g |

**DIET PRESENTED (average per animal per day)** **Frequency Once Per Day (OPD)**
**Frequency Once Per Week (OPW)**

| Food Item<br>Non meat | Amount Fed | Frequency | Food Item<br>Meat | Amount Fed | Frequency |
|---|---|---|---|---|---|
| Parakeet Seed: Foreign Finch: Canary Budgie in a 1:1:1 ratio | 2g | OPD | Dried Mealworms x 2 | 0.25g | Twice per week |
| | | | | | |
| Grape or Blueberry | 0.5g | OPW | | | |
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| Comments/detail |
|---|
| |

**Browse if required**

| Name of browse item | Frequency of Use |
|---|---|
| Millet Spray | Ad-lib |
| Sedge | OPW |
| Grasses and seeds of tall ruderal plants | OPW |

**Composition of seeds**

| Name of Item<br>Parakeet Seed | | Name of Item<br>Foreign Finch Mix | | Name of Item<br>Canary Budgie |
|---|---|---|---|---|
| Millet | | White millet | | Black rapeseed |
| Plain Canary Seed | | Panicum millet | | Linseed |
| Sunflower hearts | | Red Millet | | Hemp seed |
| Safflower | | Aniseed Oil | | Yellow Biscuit |
| Hemp seed Oil | | | | Canary seed |
| Nyger seed | | | | |
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