

# Housing of rabbits – results of an European research network

## Haltung von Kaninchen – Ergebnisse eines Europäischen Forschungsnetzwerkes

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### Introduction

From 2000 to 2005 an European research network – the COST action "Multi-faceted research in rabbits: a model to develop a healthy and safe production in respect with animal welfare" was working including scientists from 14 countries and structured in 5 working groups. The main results of the working group 2 "Welfare and housing" are summarized in this paper.

### Welfare indicators in rabbit housing

Breeding rabbits are kept to a large extent in intensive husbandry systems, mainly in cages with wire nets or slatted floor. The housing of rabbits is related to behavioural, hygienic, environmental and welfare aspects. The meaning of "welfare" has been defined by many authors, as well as many definitions of welfare have been given (see literature in VERGA, 2000). According to the literature, the same welfare indicators used for other farm animals may be used on rabbits too (VERGA, 2000). The main welfare indicators are listed in the Table 1.

None or a low (unavoidable) mortality is the most important welfare criterium. Also, the health status of the rabbits is a main welfare parameter. The morbidity rate including infectious factorial diseases and injuries should be low and unavoidable. Hormone levels, heart rate variation and immune reactions can be used as indicator for the housing conditions but have to be discussed only in the relationship with other parameters (behaviour, morbidity). Examples are given by VERGA (2000). The practical problem exists that those parameters cannot be measured directly in the rabbitry. Special technical equipment is necessary.

The presence of "abnormal behaviours" (e.g. stereotypies) may indicate some problems for the animals. But, pawing on the floor or gnawing at the walls may also be considered "normal" behaviour in an inadequate environmental context. Other significant parameters of acute loading or stress may be evaluated looking at other behaviours, such as feed intake behaviour, social and maternal behaviour (see literature in HOY and VERGA, 2006). As far as the "normal" behaviour is known ethological observations can lead to results and assessments concerning changes or dis-

turbances in behavioural parameters caused by inadequate environmental conditions. A review on the rabbit behaviour under modern commercial production and managerial conditions is given by MARAI and RASHWAN (2003, 2004).

Parameters of performance (live weight development, feed conversion, fertility) also belong to the welfare criteria. A high performance is no proof for a high welfare level. But, a low performance is an indicator for problems in housing, environment and management.

So, housing of rabbits in conformity with animal welfare and protection means

- not more than unavoidable mortality,
- uninjured body,
- good health condition (not more than unavoidable treatments),
- species-specific behaviour and
- development of animals corresponding to age and sex (SWENSHON, 1997, HOY, 2005).

Non-conform with animal protection are rabbitries where injuries, pain and avoidable sufferings occur in rabbits, which could be avoided with necessary care and health-prophylactic measures (vaccination, medication, hygiene).

So, the following general requirements for housing of rabbits can be summarized:

- no pain, no avoidable sufferings and no injuries caused by housing (floor, walls, equipment),
- protection against predators, ectoparasites and endoparasites,
- provision of feed and water corresponding with the need of rabbits (ad lib),
- protection against adverse climatic conditions,
- removal of gases, dust and pathogenic germs from the rabbit house,
- a good handling of animals (safe and quick catching – no frightening, no injuries),
- separation of rabbits from their excrements by using perforated floors if possible (especially in the intensive housing),
- from time to time use of "all in – all out" with cleaning and disinfection,
- enriched housing system – e.g. 2<sup>nd</sup> floor/elevated platform for the rabbits.

### Housing of breeding rabbits

#### Group housing of breeding does

Group-housing facilitates social contact between does, allows more total space and variation and permits the expression of natural reproductive and maternal behaviour

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Table 1. Main welfare indicators for rabbits (after VERGA, 2000; HOY, 2005)  
*Wesentliche Welfare-Indikatoren für Kaninchen (nach VERGA, 2000; HOY, 2005)*

1. Mortality: no or low (unavoidable) mortality
2. Morbidity: pathologies ("internal diseases", infectious factorial diseases); injuries – the morbidity should be low and unavoidable
3. Physiology: hormone levels, heart rate variation, immune reactions – the physiological parameters should be in the species-specific standard
4. Behaviour: ethogram, reaction to behavioural tests – species-specific behaviour
5. Performance (production): growth, feed conversion, fertility rate – the performance should be on a high level

(BIGLER and OESTER, 2003; BIGLER, 2004; RUIS and COENEN 2004 a,b, STAUFFACHER, 1992). It is desirable to house domestic rabbits in groups, as they still have a need for social interactions, and many analogies exist between the social behaviour of wild and domestic rabbits (HOY and SELZER, 2002, SELZER and HOY, 2003, SELZER et al., 2004). More total space makes a division into functional areas (e.g. for resting, a separate area for the young) possible.

Although the advantages from a welfare perspective may be clear, as described above, group-housing leads to major changes in management and housing, and is associated with specific new (welfare) problems. The most important welfare issues in group-housing systems are:

- A free entrance of does to nest boxes of other does may cause a high mortality of kits.
- Aggression may prevail in groups of does with negative impact on productivity.
- The system requires high hygienic standards to prevent infectious diseases.
- The system is by its complexity labour-intensive.
- Production costs in group-housing systems are higher than in regular individual housing systems (RUIS, 2006).

As mentioned above, the free entrance of does to nest boxes of other does is one of the main problems in group-housing, causing a high mortality of young rabbits. This problem can be solved by the use of an individual electronic nest box recognition (IENR) system, only allowing a doe to have access to her own nest box (RUIS, 2006). In the Netherlands, a modified group-housing system was developed having the following characteristics: The group consists of eight does, one buck and offspring until weaning. The does are placed together at 17 - 18 weeks of age. A buck is introduced 5 - 7 days later. The total floor dimension of the system is 2.5 x 1.8 m. Nesting boxes are elevated, in order to create a resting area underneath the nesting area. The elevated floors to reach the nesting places are of plastic slats. The floor consists of plastic slats or a metal grid. A hay rack is used for hay and straw. Straw is not offered loose on the floor.

The dutch results show that the mortality of young rabbits was comparable to that in individual housing. The number of skin lesions were used as indication for aggressiveness. Small and superficial bites were observed around the formation of groups but on average the frequency was rather low and seemed to be the result of functional fighting for establishing and maintaining the social hierarchy. No aggressive behaviour by adults towards kits was observed (RUIS, 2006).

The breeding results are comparable to individual housing. Total litter size, the number of kits born alive and culling, did not significantly differ between group and individual housing (RUIS and COENEN 2004b)

In contrast to the often observed and unwanted high number of visits to nests in individual housing, the number

of visits to nests in the group-housing system was low, which can be subscribed to the use of a tunnel-like link to nesting places.

It was shown that parts of floor bedded with straw and solid elevated floors become very dirty (on average 50% covered with (smears of) droppings - RUIS, 2006). The risk for coccidiosis was assessed by counting the numbers of oocysts in the manure. Oocysts were always present in group-housing, and could not be found in individual housing after some time (RUIS, 2006). It therefore seems that the interaction between animals is a risk factor, in addition to the extent to which animals are in contact with manure.

Absence of a buck does not lead to social instability. SCHUH et al. (2003) and HOY and SCHUH (2004) have shown by analysing the social structure in groups of wild and domestic rabbits kept in enclosures that bucks are not involved in the social interactions between does.

Footpad injuries remain a problem. Surprisingly, the number and severity of footpad lesions was high on alternative plastic slatted floorings, as well as on the alternative flooring existing of thick wire with a diameter of 3 mm (all types of floors: between 20 and 25% of animals with moderate to severe injuries) (RUIS, 2006). It is hypothesized that the permeability of these floors was too low, leading to more manure on the floor and more moisturizing. It may be obvious, that this also may have hygienic disadvantages, although this was not found to lead to more health-problems.

The reproductive performance in group-housing reached the same standards as for the regular individual housing. However, a retardation of growth was observed with kits in group-housing, as observed at the age of 14 days (RUIS, 2006). This may be caused by a lower milk intake by the kits, possibly related to a lower milk production of the does or to multiple nursings by alien does in the pen. Summarizing the actual knowledge it must be concluded that at the moment the disadvantages (especially the labour-intensity, the production costs, the difficulties of health control and implementation of new does into the group) do not allow the use of group housing on farm-level.

### Single housing of breeding does

In most countries rabbit does are housed individually in 40 - 45 cm wide (W) cages, with length (L) of 85 - 95 cm and height (H) of 33 - 35 cm, including also the nest place. These cages are used for the does from some days before kindling till weaning. The minimum size of nest box is W: 35 - 45 cm, L: 24 - 27 cm, H: 30 - 38 cm. The young and non-pregnant/lactating does are often kept in somewhat smaller cages (W: 30 - 38 cm, L: 40 - 43 cm, H: 33 - 35 cm). Dual-purpose cages are used for breeding and for fattening, and the kits are reared in the cage where they were born till the slaughter.

Usually the width (40 - 48 cm) and height (30 - 35 cm) of the nest box is similar to the size of doe's cage, while its length is 24 - 27 cm. In most cases the nest place is a part of the doe's cage (built-in), but it can also be separated outside. The entry of nest box could be closed.

Generally wood shavings are used as litter, though sometimes other materials are applied as well. Two to three days are necessary for the does to prepare the nest for kindling (MATICS et al., 2002), therefore the nest box has to be hung up outside or has to be created inside (insert the tray and its front wall) on the 28<sup>th</sup> day after mating/insemination. Controlled nursing is a widespread management form, but the free nursing is also in the practice.

The floor of breeding cages is mainly built of wire net. The diameter of the wire on the bottom is 2.5 - 3 mm with a rectangular shape (73 x 13 mm). An increasing tendency can be observed in using plastic foot rests. The application of foot-rest on the wire net floor is recommended to provide a comfortable resting area and to avoid the footpad injuries. In some cases the bottom of the cage is slatted plastic floor.

The walls of breeder cages are mainly built of wire, though sometimes also of solid metal sheets. The solid walls can be advantageous if the air speed in the building is high but they prevent any connection between the individually housed does.

From the view point of welfare, the wire net wall is suggested to allow the individually housed rabbit does to have social (visual) contact with their neighbours.

In general, automatic feeders and nipple drinkers are used at commercial rabbit farms, and only limited experimental results are available in this field.

One of the aims to build a platform in a "two-floor" cage is to increase the floor surface, maintaining unchanged the base area of the cage. The walking surface may be increased by 70 - 80% (MARGARIT and FINZI, 2000). The other function of the platform is to keep away the does from their kits when they leave the nest box and want to suckle any time of the day. The third dimension (the elevated seat) seems to be more important than a larger space. SELZER (2000) demonstrated that the doe reacts to attempts by kits to suck in 89.5% of all cases by jumping on platform. In the unstructured concrete box, the doe has only the possibility to lay down (80.7%) or to run away (13.8%) as a reaction on attempts of kits to suck. Comparing the reproductive performance (conception rate, litter size, mortality, weight of kits and feed consumption), there was no difference between traditional and enriched (double height with platform) cages (MIRABITO et al., 2004 - personal information). Cages with platform may cause hygienic problems while using solid platform. The manure can accumulate on it though by built-in wire net platform droppings and urine fall onto the kits, feeders and drinkers. Further research is necessary to demonstrate the possible effects of the application of a platform in a two-floor cage on behaviour, hygiene, health and performance of does and kits.

Summarizing the published results it can be finally concluded that the cages (size, equipment etc.) used in rabbitries are suitable for the production and they are not against welfare, as well (SZENDRŐ, 2006).

### Housing of growing rabbits

The effect of stocking density was examined in different sized cages (0.21 - 0.66 m<sup>2</sup>), with different number of animals per cage (from two to ten) and with different stocking densities (9.6 - 28.2 animals/m<sup>2</sup>). Growth rate declined when the density was higher than 15.4 up to 19.8 animals

per m<sup>2</sup> (see literature in SZENDRŐ and LUZI, 2006). According to these results the effect of stocking density depends on cage size and on the final weight (age) of the rabbits. The total weights of rabbits per m<sup>2</sup> were calculated in relation to the density and the age of rabbits. If the total weight of rabbits per m<sup>2</sup> reaches about 40 kg up to 46 kg (SZENDRŐ and LUZI, 2006) a negative influence on weight gain is expected.

The growth rate is in close connection with feed intake and body weight of the rabbits. In most cases the stocking density did not influence feed conversion. Mortality was independent of stocking density. MATICS et al. (2004a) have shown that rabbits weaned at young age (21 d) like to huddle together. In a free choice experiment the weaned rabbits choosed one of the smallest cages where the stocking density reached 50 - 70 rabbits/m<sup>2</sup>. Based on this observation and on the optimal density in weight of rabbits/m<sup>2</sup> MATICS et al. (2004b) studied the two-phase rearing system, housing double number of animals per cage between 3 and 6 weeks of age and halve the groups afterwards. No difference was found in the productive traits compared to the control group.

A most promising method to improve rabbits' living conditions and their welfare is to ameliorate husbandry conditions by enriching them. The environmental enrichment is according to NEWBERRY (1995) defined as any modification in the environment of captive animals that seeks to enhance its physical and psychological well-being by providing stimuli meeting the animals' species-specific need. Environmental enrichment for rabbits may be obtained by provision of social companions (CHU et al., 2004), modification of rearing system structure by adding into the cage places to hide and rest, such as elevated platforms, closed boxes, alternative floors (RUIS, 2004), additional roughage food objects such as hay (BERTHELSEN and HANSEN, 1999), grass-cubes, gnawing sticks (LOVE, 1994) to satisfy the animal's need for chewing. The most often used environmental enrichment for growing rabbits was wooden stick for gnawing made of different types of wood. In most of the studies, it was observed that rabbits housed in enriched environment had a trend to higher daily weight gain and lower feed conversion rate and mortality than rabbits housed in non-enriched environment.

Summarizing the information from literature it can be concluded that the environmental enrichment is not important only from the animals' point of view but also from the farmers'. Besides the fact, that improved welfare of rabbits might result in increased economic returns by boosting growth rate or feed conversion efficiency, the introduction of environmental enrichment to farmed rabbits may also improve the public image of animal production in intensive breeding systems.

### Summary

The main welfare indicators to assess rabbit housing are mortality (unavoidable low), morbidity (unavoidable low), physiological parameters in the species-specific standard, species-specific behaviour and performance on a high level. Group housing of does with kits is possible if an individual electronic nest box recognition system is used. At the moment, the disadvantages (especially the labour-intensity, the production costs, difficulties of health control and implementation of new does into the group) do not allow the use of group housing on farm-level. The single housing of does with kits remains the main housing system also in the near future which can be characterized by detailed measures and parameters. Growing rabbits are

mainly kept in groups up to approximately 20 animals/m<sup>2</sup> (up to 46 kg/m<sup>2</sup>) with a tendency towards pen housing with different kinds of enrichment (e.g. wood sticks as gnawing material).

### Key words

Doe, single housing, group housing, welfare indicators, growing rabbits

### Zusammenfassung

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Die wichtigsten Welfare-Indikatoren zur Beurteilung von Kaninchenhaltungen sind eine niedrige (unvermeidbare) Mortalität, eine geringe (unvermeidbare) Morbidität, physiologische Parameter im Normbereich, ein arttypisches Verhalten und Leistungsparameter auf einem hohen Niveau. Die Gruppenhaltung von reproduzierenden Häsinnen ist möglich mit einem elektronischen Erkennungssystem zum individuellen Nestzugang. Gegenwärtig erlauben jedoch die Nachteile (besonders der hohe Arbeitszeitbedarf, die Kosten, die Schwierigkeiten bei der Tierkontrolle und bei der Eingliederung neuer Häsinnen) nicht die praktische Anwendung der Gruppenhaltung. Die Einzelhaltung von Häsinnen mit Jungen, die durch detaillierte Maße und Parameter charakterisiert werden kann, bleibt das dominierende Haltungssystem auch in naher Zukunft. Wachsende Kaninchen werden hauptsächlich in Gruppen bis zu einer Besatzdichte von etwa 20 Tieren (bis zu 46 kg pro m<sup>2</sup>) mit einem Trend hin zu Boxen und der Nutzung verschiedener Arten von "enrichment" (z.B. Knabberhölzer) gehalten.

### Stichworte

Häsin, Einzelhaltung, Gruppenhaltung, Welfare-Indikatoren, wachsende Kaninchen

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