Welfare and the intensive production of rabbits

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Summary: Rabbit production in Europe is concentrated largely in the “Latin” countries of Italy, France and Spain, in which animal protectionist attitudes are considered moderate.

However, in the case of rabbits, the intensification of husbandry necessitates strict observance of physiological, behavioural and health requirements, in view of the very special needs of the species and the sensitivity of rabbits to environmental conditions.

Rabbits are described as anxious, timid and emotional, with unusual arrangements for reproduction (induced ovulation) and digestion (caecotrophy). Therefore, these animals could not be reared intensively until the completion of extensive research, which has been conducted over the past twenty years, into the environmental and nutritional needs of rabbits, and the selection of lines having a calm temperament and maternal aptitude. This research was required to meet the welfare needs of this species.

These concepts are perfectly integrated into the current operation of intensive units, and should not be brought into question on the basis of fragmentary observations by some researchers who would wish to see a return to rearing on litter.

A discussion of rabbit welfare conducted in 1992 by specialists of the German branch of the World Rabbit Science Association approved modern methods of keeping rabbits on wire grids, provided that some changes were made to current procedures.


INTRODUCTION

The total annual production of rabbit meat in the twelve Member States of the European Union (EU) (formerly European Community) is approximately 465,000 tonnes, 80% of which is produced in Italy, France, Spain and Portugal (16).

Rabbit meat production in France, second in importance only to Italy, is approximately 150,000 tonnes of carcasses, 85,000 tonnes of which is produced in semi-intensive or intensive units and 60-65,000 tonnes in traditional units (3).

Over the past twenty years, there have been significant changes in rabbit production in France, with a marked decrease in the number of small traditional units (with less

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than twenty female breeding stock), from 1 million in 1970 to 350,000 in 1988, accompanied by a considerable increase in the number of intensive units.

In 1991, 6,000 units had 20-100 female breeding rabbits and 3,000 had 100-1,000 breeders.

These changes have not compensated for the overall drop in production caused by a fall in the number of livestock farms.

LEGAL ASPECTS OF THE PROTECTION OF RABBITS

Neither the Council of Europe nor the EU has made specific recommendations for rabbit farming, but rabbits are included as farm animals in the Convention on the Protection of Farm Animals, ratified by France in 1976, which prohibits unnecessary suffering and requires that the biological needs of the species be respected.

In French law, rabbits enjoy the same status as other domestic and wild species which have been tamed or are kept in captivity, under the law of 10 July 1976, as contained in the Rural Code, Volume 2, Chapter 5, Articles 276 to 283-6 (13).

HUSBANDRY CONDITIONS AND WELFARE

Traditional husbandry

The essential features of traditional husbandry are as follows: an individual hutch with plain walls (with the exception of a door grid) and placed out of doors, straw litter and a varied diet composed of vegetables and cereals.

This satisfies all the conditions for comfort and well-being, provided that the cage is so placed that the animal is protected from rain and the prevailing wind, and that the litter is kept clean and dry, which is seldom the case.

Diseases

The main disadvantage of this system is the near impossibility of effectively preventing parasitism (coccidiosis and cysticercosis), and the transmission of myxomatosis virus by biting insects (mosquitoes and fleas), which are numerous in this type of husbandry.

For the past few years, there has been the additional risk of introducing viral haemorrhagic disease (VHD), a viral hepatitis, the agent of which is excreted in large amounts by infected wild rabbits and can contaminate plants, which are the main feed under traditional husbandry. VHD has caused considerable losses in almost every European country, although rational husbandry units are less affected, as they are less exposed to contamination or may have been protected by vaccination.

Despite undeniable conditions of comfort, the traditional system is unsuitable for groups of more than twenty females, in view of the time required for cleaning, replacement of litter, feeding, etc. To reduce the time required for feeding, numerous farmers have adopted a complete diet, which robs this type of husbandry of its small-scale and rural character.

Apart from the health disadvantages, traditional husbandry is often accompanied by practices which are highly questionable from the welfare point of view.
**Water supply**

Rational hutches exist, in which water is supplied by automatic drinkers of the "constant level" or nipple type, but often the hutches of family rabbits are provided with only a rudimentary and irregular supply which is not protected from freezing.

One often encounters the false idea that rabbits do not need to drink, and this is firmly established in certain small units. This idea is particularly harmful to rabbits, especially when water-rich plants are even partially replaced by a concentrated feed.

**Handling**

In many small family units, rabbits are still sometimes picked up by the ears. This manner of handling is accompanied by violent movements, demonstrating the discomfort or even pain inflicted on the animal, and may lead to spinal fracture. The correct way of handling, taught to all prospective rabbit breeders, is to grasp the rabbit firmly by the skin of the back at shoulder level, and to support the animal with the other hand held under the hind legs.

**Slaughter**

Certain methods of slaughter, fortunately rare because of their cruel nature, might still be practised in small family units. There is absolutely no justification for the slow agony caused by the haemorrhage following enucleation of an eye after (or sometimes without) stunning.

The products of traditional husbandry are largely consumed within the family, although some might be offered on the market, where production costs and unevenness (in shape, weight and degree of fattening) preclude access to the more elaborate forms of distribution.

**Rational or specialised husbandry**

From the 1970s, the use of hutches made from wire grids, a complete diet in pellet form, and specialised premises have marked the arrival of rational husbandry (also referred to as “intensive” or “specialised” husbandry).

The main stimulus for this change has been the need for higher productivity at lower cost, and a more uniform product. Contrary to popular belief, the use of wire flooring to separate the animal from its droppings does not prevent the rabbit from satisfying its physiological needs by eating caecotrophes (soft faecal pellets high in protein, used for "pseudoruminatation").

The three prerequisites mentioned above have resulted in larger units. However, in rabbits more than for other animal species, large units require strict observance of physiological needs.

**Reproductive rhythm and stock renewal in intensive units**

As with other domestic species, the productivity of rabbits in intensive units increases due to the joint influence of genetics and feeding, but rabbits differ from other species in having induced ovulation. In other words, the husbandry conditions must not upset the "psychological" environment necessary for mating and ovulation during natural reproduction.

Female rabbits can become pregnant while still suckling. Pregnancy and lactation each last for one month. Until recently, the female was routinely mated on the day of parturition (the period most favourable for acceptance of the male and fertilisation).
While such mating may occur spontaneously in nature and under traditional husbandry, repeated post-partum mating can lead to premature exhaustion of females, with an abnormally high culling rate.

Under current practices, mating is performed 7-11 days after parturition, and if the entire breeding stock is renewed each year, this is mainly due to insufficient performance results.

However, such poor performance is relative, and is governed by technical management factors and by the need to recoup investment, which is particularly high for modern rabbit units.

Artificial insemination, following ovulation induced by the injection of pituitary hormones, has been practised successfully in large units.

**Feeding**

Significant progress has been made in identifying the nutritional needs of rabbits under rational husbandry, although considerable research is still needed (5, 8, 14).

Due to the anatomical peculiarity (a well-developed caecum) and physiological peculiarity (a predominantly cellulolytic intestinal flora and caecotrophy) of the rabbit, the species is able to digest large amounts of cellulose, averaging approximately 16% of the ration.

The concept of selective utilisation of different types of cellulose (hemicellulose, cellulose proper and lignins) has been successfully adopted for some years, thanks to the analytical techniques developed by Van Soest and Wine (18).

Table I summarises the usual composition of feeds used in intensive husbandry.

In addition to the importance of dietary composition for production parameters, diet is essential for maintaining a balanced intestinal flora. Volatile fatty acids arising from carbohydrate metabolism have an inhibitory effect on the pathogenic *Escherichia coli* bacteria responsible for enteritis, which is often fatal in rabbits (11, 15).

In this rodent-related species, feed is presented in the form of granules, and much research has been conducted to define the optimum characteristics of comminution of the various constituents, and the optimum size and hardness of granules (2.5-3.5 mm wide, 10-20 mm long).

The sensitivity of rabbits to smell and taste means that the selection of raw materials must not vary too greatly, and the quality of storage must be high. The fragility of the intestinal flora means that feed manufacturers must take special precautions. Rabbit feed can become contaminated with undesirable residual levels of certain drugs, such as ionophore anticoccidials added to poultry feed, persisting in the mixing plant from a previous batch of feed.

The presence of only a few grams of certain poultry anticoccidials in a tonne of feed can produce rapidly fatal illness in rabbits (12).

**Water supply**

In specialised units, water is usually supplied by automatic equipment, often in the form of nipple drinkers. Each breeding or fattening cage is provided with a drinker supplied from a constant-level tank. The purpose of a tank supplying a range of cages is twofold:
**Table I**

Some recommended nutrient levels in diets for intensively reared rabbits
(adapted from 8)

<table>
<thead>
<tr>
<th>Dietary composition (assuming 89-90% dry matter)</th>
<th>Units</th>
<th>Breeding stock</th>
<th>Young rabbits</th>
<th>Fattening rabbits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestible energy</td>
<td></td>
<td>&gt;10.5</td>
<td>&gt;9.5</td>
<td>9.8-10</td>
</tr>
<tr>
<td>(MJ/kg)</td>
<td></td>
<td>&gt;2,500</td>
<td>&gt;2,250</td>
<td>2,350-2,400</td>
</tr>
<tr>
<td>(kcal/kg)</td>
<td></td>
<td>&gt;9</td>
<td>&gt;9</td>
<td>9.3-9.5</td>
</tr>
<tr>
<td>Metabolisable energy</td>
<td></td>
<td>&gt;2,380</td>
<td>&gt;2,140</td>
<td>2,240-2,280</td>
</tr>
<tr>
<td>(MJ/kg)</td>
<td></td>
<td>&gt;10</td>
<td>&gt;9</td>
<td>9.3-9.5</td>
</tr>
<tr>
<td>(kcal/kg)</td>
<td></td>
<td>&gt;2,500</td>
<td>&gt;2,250</td>
<td>2,350-2,400</td>
</tr>
<tr>
<td>Crude protein</td>
<td>(% )</td>
<td>17.5-18.0</td>
<td>15.5-16.0</td>
<td>16.0-16.5</td>
</tr>
<tr>
<td>Digestible protein</td>
<td>(% )</td>
<td>12.8-13.3</td>
<td>10.5-11.0</td>
<td>11.2-11.7</td>
</tr>
<tr>
<td>Crude fibre</td>
<td>(% )</td>
<td>&lt;11.5</td>
<td>&gt;15.5</td>
<td>&gt;14.5</td>
</tr>
<tr>
<td>Acid detergent fibre</td>
<td>(% )</td>
<td>&gt;15</td>
<td>&gt;20</td>
<td>&gt;18.5</td>
</tr>
<tr>
<td>Indigestible crude fibre</td>
<td>(% )</td>
<td>&gt;10.0</td>
<td>&gt;14.0</td>
<td>&gt;12.5</td>
</tr>
<tr>
<td>Crude fat</td>
<td>(% )</td>
<td>4.5</td>
<td>3.5</td>
<td>3-5</td>
</tr>
<tr>
<td>Lysine</td>
<td>(% )</td>
<td>&gt;0.9</td>
<td>&gt;0.75</td>
<td>&gt;0.7</td>
</tr>
<tr>
<td>Starch</td>
<td>(% )</td>
<td>unlimited *</td>
<td>&lt;13.5</td>
<td>unlimited *</td>
</tr>
<tr>
<td>Cocci diostat</td>
<td></td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Probiotics</td>
<td></td>
<td>-/+ optional</td>
<td></td>
<td>-/+</td>
</tr>
</tbody>
</table>

- absent
+ present
-/+ optional
* no restriction defined for linear programmes

- to provide a constant pressure suitable for optimum functioning of the drinkers, without wastage;
- to facilitate medication, through the water supply, to some or all of the animals (with anthelmintics, vitamins or antibiotics).

Automatic constant-level drinking troughs have been almost completely abandoned in modern units because of their cost and the frequent cleaning needed when the water becomes soiled with feed.

Water supply presents no special problems, even for lactating females which drink up to three litres of water a day (in hot weather), except that rabbits are obliged to drink with the head held up, which is not the usual drinking posture.

New-born rabbits start to drink water at the same time as they begin eating solid food, at approximately twenty days of age. Young rabbits may be observed reaching the drinker nipple by climbing onto the back of the doe.

In correctly-designed specialised units, the problem of supplying water to young rabbits has been solved by lengthening the drinking nipples.

**Management of premises**

For animal husbandry experts, the rabbit has the most exacting requirements for environmental quality when kept in confinement.
Much research has been conducted on the sensitivity of rabbits to fluctuations in temperature, humidity, air flow and toxic gases (CO$_2$, NH$_3$) (4, 9, 10), and the extent of existing knowledge is sufficient to devise a habitat which meets the physiological needs of the animals.

All high-quality rearing in confinement needs air-conditioning/heating to reduce daily temperature fluctuations to less than 5°C, and to keep the ammonia concentration to less than approximately 10 ppm.

*Type of flooring and foot lesions*

The adoption of wire-mesh cages was a decisive step in the transition from traditional to specialised husbandry, making it possible to increase the number of animals by reducing the labour requirement.

Wire-mesh walls do not create any special problem, as they even allow social contact between animals (only males require solid walls to prevent conflicts), but flooring has been studied closely to reduce the occurrence of foot lesions.

Such lesions, which are a major cause of culling of breeding stock, commence with skin erosion at the tarsus and usually result in scab formation.

The posture adopted by an affected animal clearly demonstrates the discomfort and suffering produced by this lesion.

Manufacturers of flooring have assisted in solving this problem by adopting strict rules for the flooring of cages for breeding stock, namely:

- abandonment of 19 x 19 mm square mesh
- adoption of 75 x 12.5 mm rectangular mesh, allowing a better sitting posture
- using wire of not less than 2.4 mm in diameter
- removing all roughness from soldered joints.

For their part, breeders have taken into account morphological criteria, such as size and quality of paws, and density of the hair coat to reduce the incidence of foot lesions.

In recent years, breeders have started to use plastic grid floors for males, and often for females as well (Ph. Le Cerf, personal communication), to provide better comfort for the animals and solve the problem of foot lesions. Despite the conditions inherent in confinement, it is unnecessary to trim the claws because of the short average life of breeding stock.

*Available space*

**Breeding stock** in rational husbandry require an individual cage measuring 0.60-0.65 m long, 0.5 m wide and 0.30-0.35 m high. Females require a box attached to the outside of the cage, measuring 0.4 x 0.25 x 0.3 m, in which to give birth and to suckle their young. Keeping females in intensive cages has evidently not altered maternal behaviour, including the plucking of abdominal hair to make a nest.

In such cages of 0.325 m$^2$ (plus nest), movements are, of course, restricted. The rabbit can lie down in any position, but it is obvious that the height of 0.30-0.35 m does not allow the animal to stretch upwards, with or without its front legs in contact with the floor.

Mating, which takes place in the cage of the male rabbit, is perfectly feasible even with a ceiling height of 0.3 m. However, some manufacturers allow a height of 0.37 m in cages for males, in addition to the plastic grid floor mentioned above.
**Broiler rabbits**, between the age of weaning (30-40 days) and slaughter (10-11 weeks at 2.3-2.4 kg), are raised on grids at a density of 16-18 animals per m², in groups of 6-8 rabbits, not separated by sex (equivalent to 560-625 cm² per head).

The optimum size of a social group has not been fixed scientifically for rabbits, but experience has shown that a group of 6-8 rabbits, whether from the same litter or not, can be housed satisfactorily up to 11 weeks of age, despite the occurrence of some aggressive behaviour towards the end of the fattening period.

Apart from these features, which are generally found in specialised units, two attempts have been made to define husbandry conditions compatible with the well-being of animals:

- The *Code of recommendations for the welfare of rabbits*, produced by the Farm Animal Welfare Council (FAWC) in Great Britain (16).
- *Guidelines for the protection and welfare of domestic rabbits*, prepared by the German branch of the World Rabbit Science Association (WRSA) (7).

These guidelines and recommendations are summarised in Table II.

### Table II
**Surface areas recommended for rabbits by the Farm Animal Welfare Council and the World Rabbit Science Association**

<table>
<thead>
<tr>
<th>Rabbits</th>
<th>Surface area</th>
<th>Rabbits per m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female and litter</td>
<td>0.56 m² total (with nest)</td>
<td>–</td>
</tr>
<tr>
<td>Male and female breeders</td>
<td>0.56 m² total (with nest)</td>
<td>–</td>
</tr>
<tr>
<td>Nesting area</td>
<td>&gt;0.08 m²</td>
<td></td>
</tr>
<tr>
<td><strong>Broiler rabbits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-12 weeks</td>
<td>0.07 m²</td>
<td>14.3</td>
</tr>
<tr>
<td>Over 12 weeks (ceiling height)</td>
<td>&gt;0.45 m</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rabbits</th>
<th>Surface area</th>
<th>Height/rabbits per m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male and female breeders</td>
<td></td>
<td>Height</td>
</tr>
<tr>
<td>Up to 4 kg</td>
<td>0.2 m²</td>
<td>0.35 m</td>
</tr>
<tr>
<td>Up to 5.5 kg</td>
<td>0.3 m²</td>
<td>0.40 m</td>
</tr>
<tr>
<td>Over 5.5 kg</td>
<td>0.4 m²</td>
<td>0.40 m</td>
</tr>
<tr>
<td>Nesting area</td>
<td>0.1 m²</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Broiler rabbits</th>
<th>Surface area</th>
<th>Rabbits per m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 6 weeks</td>
<td>0.04 m²</td>
<td>25</td>
</tr>
<tr>
<td>Up to 3.3 kg</td>
<td>0.08 m²</td>
<td>12.5</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>0.35 m</td>
<td></td>
</tr>
</tbody>
</table>
Thus, the standards proposed by the WRSA, to which nearly all the research workers in rabbit production belong, are very close to current practice in modern units, with the exception of cage height (6).

*Comparison of solid-floor and cage husbandry*

In terms of welfare, the results of comparisons of solid-floor and cage husbandry differ from one author to another, depending on the criteria studied:

- If consideration is confined to the occupation of surface areas, solid floor husbandry may be regarded “as a possible alternative which also facilitates correct growth and non-aggressive behaviour” (2).

- If consideration is limited to certain psychological criteria, cage husbandry has been condemned by certain authors (1), because the following deviations have been observed in rabbits reared on grid floors: skeletal changes (more delicate long bones, vertebral anomalies); obesity (accumulation of abdominal adipose tissue); and behaviour (greater aggressiveness).

It is imperative that all unnecessary suffering be avoided. However, it must be recognised that progress in genetics, hygiene and feeding can induce physiological modifications which are admissible if they do not place heavy burdens (suffering) on the individual. Despite rarefaction of bones, fractures remain exceptional in intensive husbandry, and an excess of abdominal fat does not cause suffering.

It is as well to remember that vertebral trouble, excess abdominal fat and a tendency towards aggressive behaviour also occur in human beings (including research workers), and that our evolution seems to be irreversible without a return to an economy of gathering food and using flint implements.

**CONCLUSION**

Insufficient research has been conducted into the welfare of rabbits, and the studies performed are too fragmentary for standards to be drawn up or a given husbandry system imposed.

Experience gained from other species demonstrates the complexity of the problem and the importance of taking all factors into account, namely:

- behaviour
- physiology
- state of health
- production performance.

The socio-economic aspect, which is important for any reform of an existing system, must also be considered.

The rabbit is certainly one of the domestic species for which intensive husbandry requires extra precautions and expert knowledge.

The fact that this species is delicate, emotional and sensitive to its surroundings is well understood, and intensification of production has been accomplished only by strict observance of physiological and behavioural requirements.

More than any other animal species, rabbits react dramatically to any negligence or management error, and a rabbit breeder needs to be a veritable animal husbandry expert.
Competence, calmness, absence of brutality and environmental quality are the primary conditions for success in rearing rabbits, and no rabbit farm can survive for more than one year unless these conditions are fulfilled.

Twenty years of experience in the Latin countries of Europe are supported by the scientists and experts of the World Rabbit Science Association.

There is still progress to be made, particularly in terms of equipment, to further improve the comfort of animals, but use can be made here of experience gained in the protection of other species of animals. Any questioning of well-proven husbandry systems must be sound, and based on research which takes into account the entire problem. Intellectual satisfaction for the research workers and emotional responses of the public must take second place to objective analysis of animal welfare, considering the socio-economic aspect of animal production, to avert selection by the consumer based on purchasing power.

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REFERENCES


