Adequate checklist for an assessment of the current health and welfare state of rabbits in the various segments of the companion animal sector in the Netherlands

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Abstract

This study was part of a larger scale project and aimed to develop an adequate checklist for future health and welfare assessments in the different segments of the companion rabbit sector in the Netherlands. The resulting checklist could then later be used during the on-site visits that are to be conducted for the larger scale project. The research question 'Which factors are important to guarantee good quality of health and welfare in companion rabbits and how can these factors best be assessed in practice?' led to the development of a checklist based on the Welfare Quality Project welfare criteria, while taking the definition of animal welfare as defined by Ohl & Hellebrekers (2009) into account.

Information about welfare in rabbits was gathered from the literature and the Dutch law. Preferred and undesirable situations were described. Next, a checklist was developed, with reference to the information previously gathered, which consisted of two main components:

- Questions to ask the supervisor/owner/manager on the location;
- Factors that may be observed on the location.

An appendix was developed along with the checklist, which describes the preferred and undesirable situations in short and indicates if an observation has a good influence on the health and/or welfare of the rabbit(s), a bad influence on the health and/or welfare of the rabbit(s) or no influence on the health and welfare at all. Subsequently, the checklist was validated by four experts in the field of rabbit health and welfare. Their feedback was processed. Finally, a pilot study was conducted in order to test the feasibility and practicality of the checklist. This made sure the checklist is able to serve as an accurate measurement for the health and welfare assessment in companion rabbits in the Netherlands.

The developed checklist appears to be adequate to use for the assessment of the current health and welfare status of rabbits in the various segments of the companion animal sector in the Netherlands. However, there is still space for adjustments and improvements. Further research should aim at developing methods to assess injury and illness problems that are at this point not assessable on location. Furthermore, the severity of observations that have a bad influence on the health and welfare should be determined. For now, this checklist can be used when visiting commercial breeders, traders, pet shops, garden centres, animal shelters, petting zoos and consumers to assess the current health and welfare status of companion rabbits in the Netherlands. The outcome of this assessment may be used to develop measurements to improve the health and welfare of companion rabbits in the Netherlands.

Table of Contents

Introduction

The rabbit (*Oryctolagus cuniculus*) is one of the most commonly kept companion animals in the Netherlands, coming in third after the dog and cat. In 2014, a total of 1.2 million rabbits were estimated to be kept as companion animals in the Netherlands. This is an increase of 28% in the number of companion rabbits kept compared to 2010 (Feiten en Cijfers, 2015). However, despite the rabbit playing a major part as a companion animal in the Netherlands, a study from Vinke et al. (2011) among various stakeholders within the companion animal sector (i.e. pet stores, markets, veterinarians, shelters, petting zoos, enthusiasts and law enforcement and confiscation) showed that a considerable part of these rabbits are fed a suboptimal diet and are kept under suboptimal housing conditions leading to both health and welfare problems. These problems also influence the lifespan of companion rabbits in the Netherlands. They have an average lifespan of approximately 4.2 years, while rabbits could have a lifespan of 13 years (Schepers et al. 2009).

In the last century there has been discussion about the assessment of welfare. In 1965 the Brambell committee created the five freedoms, which included requirements that must be met before an animal can be in a state of good welfare. The five freedoms as created by the Brambell committee include the following:

- The animal must be free from thirst and hunger;
- The animal must be free from physical and thermal discomfort;
- The animal must be free from pain, injury and disease;
- The animal must be free from pain and stress;
- The animal must be free to perform natural behaviour (Brambell committee, 1965)

These five freedoms mainly use the exclusion of negative characteristics to identify good welfare. However, to be in good welfare, positive aspects also need to be taken into consideration. As a result, other definitions have been proposed, of which the one from Ohl & Hellebrekers is used at the faculty of Veterinary Medicine of Utrecht University. According to Ohl & Hellebrekers (2009) an individual is in a state of good welfare when it is able to actively adapt to its living conditions and therefore can achieve a state that it experiences as positive. In this definition, the adaptability of the individual animal and how the animal experiences the situation is also taken into account, which Ohl & van der Staay (2012) consider to be important in the assessment of welfare. Based on this view, the five freedoms can be adapted to the following definition to obtain a more complete image of the animal's welfare status: An individual is in a state of good welfare when it has the freedom *to react adequately to*

- hunger, thirst or incorrect food;
- physical and thermal discomfort;
- pain, injury and disease;
- fear and stress and thus,
- the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive (Ohl & Van der Staay, 2012).

Various risk factors that may affect the welfare of companion rabbits may be identified in their living environment. For example, the possibility of displaying species-typical behaviour of a companion rabbit needs to be taken into account. These species-typical behaviours include socializing with other rabbits, resting, hiding behaviour, marking their territory, exploration, standing fully stretched on their hind legs, digging, foraging behaviour and eating in a natural grazing posture (Magnus, 2005; Richardson, 2008; Sayers, 2010).

In most previous studies which assessed welfare in companion rabbits the definition of welfare as stated by the five freedoms from 1965 was applied. To get a more complete overview of the welfare status of the companion rabbit on the basis of the definition of Ohl & Hellebrekers (2009) further research is needed. As a first step, this necessitated the design and testing of a new welfare checklist according to the definition of Ohl & Hellebrekers. This checklist can subsequently be used for the assessment of welfare in a larger scale project of which this study is part of. On-site visits during which the checklist can be used are to be conducted for the larger scale project. The aim of this study was to develop a checklist that is adequate for the future health and welfare assessments in the different segments of the companion rabbit sector in the Netherlands. The research question 'Which factors are important to guarantee good quality of health and welfare in companion rabbits and how can these factors best be assessed in practice?' led to the development of a checklist based on the Welfare Quality Project welfare criteria, while taking the definition as stated by Ohl & Hellebrekers (2009) into account. To answer the research question and develop the checklist the research question was split into the following sub questions:

- What are the housing, diet and behavioural needs of companion rabbits?
- What health problems are common in companion rabbits?
- How can the health and welfare of companion rabbits be scored in a non-invasive, objective and reliable way?

Materials and methods

The checklist was based on the Welfare Quality Project welfare criteria, while taking the definition as stated by Ohl & Hellebrekers (2009) into account. It was adapted to the needs and behaviour of rabbits in captivity. This was done based on five closely connected questions:

- Do the rabbits/does the rabbit have the freedom to react adequately to hunger, thirst or incorrect food?
- Do the rabbits/does the rabbit have the freedom to react adequately to physical and thermal discomfort?
- Do the rabbits/does the rabbit have the freedom to react adequately to pain, injury and illness?
- Do the rabbits/does the rabbit have the freedom to react adequately to fear and chronic stress?
- Do the rabbits/does the rabbit have the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive?

All the questions were divided in two parts, namely:

- factors that may be observed in the environment of the rabbits;
- factors that may be observed in the rabbits.

First, preferred and undesirable situations related to the five questions were defined. This information was gathered from the literature (scientific papers, journals and books) and the Dutch law. A significant amount of the preferred and undesirable situations was based on information about free-living rabbits. Next, a checklist was developed, with reference to the information previously gathered, which consisted of two main components:

- Questions to ask the supervisor/owner/manager on the location;
- Factors that may be observed on the location.

An appendix was developed along with the checklist, which describes the preferred and undesirable situations in short. This checklist was made applicable to each segment of the companion rabbit sector that will be investigated in the subsequent study, i.e. regular consumers, rabbit fanciers, commercial breeders, traders, animal markets, retail, petting zoos and animal shelters. Subsequently, the checklist was validated by four experts in the field of rabbit health and welfare (Claudia Vinke, Yvonne van Zeeland, Christel Moons and Harry Arts). In this validation the experts were asked to provide feedback on the checklist, which was subsequently processed. Finally, a pilot study was conducted in order to test the feasibility of the checklist. This made sure the checklist is able to serve as an accurate measurement for the health and welfare assessment in companion rabbits in the Netherlands. For this pilot study, the checklist and the appendix to the checklist were translated to Dutch. The Dutch version of the checklist will be used in the subsequent study. During the pilot study, two petting zoos, two garden centres, two commercial breeders, two pet shops, two animal shelters and two regular consumers were visited. On these locations the checklist was applied to reveal missing parts and improvements. After the pilot study, the missing parts and improvements were added to both the Dutch and English versions of the checklist, making the checklist ready to be used.

Results

Characteristics of the rabbit

The European rabbit (*Oryctolagus cuniculus*) belongs, just as other rabbits, to the order Lagomorpha. Lagomorpha are characterized by peg teeth behind the central incisors (Varga,2014). The European rabbit digs burrows in which it lives in groups. The burrows can be about 4m deep and 45m long (Harcourt-Brown, 2003). The tunnels are about 15 cm in diameter (Vargus, 2014). Rabbits are strict herbivores and have a prey animal status. They are mostly nocturnal, although they can be seen hopping and grazing during the day. The majority of feeding takes place at sunrise and sunset, and approximately 70% of the time above ground is spent grazing (Magnus, 2005; Prebble et al. 2015). Rabbits scan the environment for potential threats by standing up on their hind legs, which is a part of their species-typical behaviour (Magnus, 2005). When a threat is spotted and a rabbit becomes frightened, it will thump the ground with its hind feet to warn the other rabbits to run to safety in the burrow (Harcourt-Brown, 2003; Vargus, 2014). They live in groups of two to eight adults with a social hierarchy, in which bucks can be very aggressive towards each other. Does tend to be less aggressive, but when they have a nesting site they will defend it fanatically (Harcourt-Brown, 2003; Magnus, 2005; Verhoef, 1997). When does give birth they isolate themselves. However, when the kits are born the doe returns to the group and only comes back to feed the kits for approximately three minutes a day (Leenstra et al. 2009). The kits are born completely hairless (Verhoef, 1997).

Rabbits mark their territory with pheromones, which they do in three different ways. They rub their chin with scent glands along surfaces, they spray urine and they leave hard droppings at a number of sites in the territory. These hard droppings are coated in anal gland secretions (Harcourt-Brown, 2003; Magnus, 2005; Richardson, 2008).

When rabbits greet each other, the more subordinate rabbit will cower and therefore look non-threatening to the dominant rabbit. Allogrooming is, along with the cower behaviour, an important social behaviour often observed in free-living rabbits and is a comfort behaviour that helps strengthen relationships, reduces parasite numbers in the fur and cleans places of the fur that are inaccessible for the rabbit itself (Magnus 2005; Varga, 2014).

Rabbits have been associated with humans since the Roman Empire, but true domestication happened only about 200 years ago. Many of the behavioural characteristics of the wild rabbit are still present in the domesticated companion rabbit. The domesticated rabbit is tamer and easier to handle, however (Vargus; 2014).

Through the years a lot of different rabbit breeds have emerged. Roughly all breeds can be divided into two groups: breeds that have been bred for a certain use and breeds that have been bred because of their attractiveness (Varga, 2014; Verhoef, 1997). There are also a lot of multiple purpose breeds. Rabbit breeds that are bred for a certain use are usually bred for meat production or for the use of their fur. For example, the Angora breed is usually used for fur and the New Zealand is a breed often used for the production of meat. Examples of breeds bred for their attractiveness are the Dutch Dwarf Lop, the Colour Dwarfs and Polish rabbits (Verhoef, 1997).

Rabbit breeds do not only differ in appearance but also in character. The smaller breeds are usually more difficult to handle than the bigger breeds. Characters also differ within a breed, every rabbit has its own character (Verhoef, 1997).

Diet

A balanced diet with suitable nutritional value is important. A suboptimal diet may be a cause of early death in companion rabbits (Schepers et al. 2009). The diet of companion rabbits is advised to consist of fibre, protein, carbohydrate, vitamins and minerals, of which fibre is often considered the most important because the digestion system of the rabbit is completely adapted to the ingestion of a high fibre diet (Richardson, 2008; Harcourt-Brown, 2003).
A suggested food analysis by Harcourt-Brown (2003) for adult companion rabbits consists of the following amounts:

- Crude fibre: > 18%;
- Indigestible fibre: > 12.5%;
- Protein: 12-16%;
- Fat: 1-4%;
- Calcium: 0.6-1.0%;
- Phosphorus: 0.4-0.8%;
- Vitamin A: 10,000-18,000 IU/kg;
- Vitamin D: 800-1200 IU/kg;
- Vitamin E: 40-70 mg/kg;
- Magnesium: 0.3%;
- Zinc: 0.5%;
- Potassium: 0.6-0.7%.

Sayers (2010) developed the following diet composition for companion rabbits:

- ad libitum access to hay (about 80-85% of the diet);
- fresh greens/dark leafy greens (about 10-15% of the diet);
- restricted amount of concentrate (about 3% of the diet).

Diets that do not consist of enough fibre predispose for gastrointestinal hypomotility and the retention of food and hair in the stomach. This may in turn lead to changes in gut flora and enterotoxaemia. Another important reason to feed rabbits enough fibre is their continuously growing teeth. The consumption of high fibre food leads to good wearing of the teeth and normal dental occlusion (Harcourt-Brown, 2003; Richardson, 2008; Sayers, 2010). A study from Mullan et al. (2006) showed that rabbits fed a concentrate mix without enough high fibre food were significantly more likely to have dental problems. Also, consuming high fibre food is a time consuming activity, which is in line with the behaviour of wild rabbits. They spend 70% of their time above ground feeding (Magnus, 2005; Prebble et al. 2015).
A study from Prebble et al. (2015) also indicated that companion rabbits need high fibre food as a time consuming action. In this study companion rabbits were fed different diets: high fibre diets and low fibre diets. The effects of these diets on rabbit behaviour were measured. The rabbits that were fed a low fibre diet started to chew the rubber matting used as flooring, which may be indicative for misdirected chewing as a result of reduced time feeding. This would indicate a negative impact on welfare through the inability to exhibit species-typical foraging behaviour.
A good source for high fibre is hay. It is often said that it should always be fed ad libitum to companion rabbits (Prebble et al. 2014; Verhoef, 1997). Cereal mixes, pelleted and extruded rations are advised not be fed daily in amounts of more than 2-3% of the rabbits' weight (Harcourt-Brown, 2003). This combination of hay and a limited amount of concentrate is advised to be supplemented with fresh vegetables and dark leafy greens, which should be part of the diet for approximately 10-15% (Sayers, 2010).
When feeding a mixed diet to rabbits, for example a muesli mix, the rabbits tend to consume the components they like most and leave the rest. This may lead to an insufficient nutritional intake since

the components that are mostly left uneaten are the pelleted components which often contain vitamin and mineral supplements (Mullan et al. 2006; Prebble et al. 2014; Verhoef, 1997). When selective feeding occurs, it is advised to change the diet (Harcourt-Brown, 2003). The study of Prebble et al. 2014 indicates that higher levels of selective feeding and lower hay and water intake occurs in rabbits that are fed muesli diets, in comparison to rabbits that are fed non-muesli diets. This indicates that muesli diets are inadequate. More suitable is a diet with ad libitum hay and a measured amount of pelleted food. This prevents selective feeding, ensures a higher hay and water intake and facilitates a balanced diet to maintain health (Prebble et al. 2014). Furthermore, companion rabbits are advised to have ad libitum access to water. It is often advised that the drinking supply gets cleaned regularly and checked for leakage (Richardson, 2008). To ensure ad libitum access to water it is often said that there should be at least one water supply per ten rabbits. Furthermore, the water supply is advised to be located on a height easily reachable for the rabbits (de Jong et al. 2011; Verga et al. 2009).

Housing

Social housing

Rabbits are social animals, and benefit from social housing (Richardson, 2008). However, when rabbits do not have a good relationship with each other (e.g. significant amounts of agonistic behaviour are shown) it is advisable to not house these rabbits together (Harcourt-Brown, 2003; LICG; Magnus, 2005; Schepers et al. 2009). A survey on welfare in companion rabbits of Schepers et al (2009) showed that solitary housed rabbits had a reduced lifespan. They died at a mean age of 3.3 years old, while socially housed rabbits died at a mean age of 5.1 years old, a difference of 1.6 years.
The advised housing combination is a neutered buck with a neutered doe. Young bucks in puberty can be very aggressive towards each other and therefore it is often advised to not house them together (Bays et al. 2006; Magnus, 2005). The same applies to older intact bucks. Housing intact does together can lead to aggression, however, aggression is minimal in groups of does that have been housed together from a young age (Bays et al. 2006; Magnus 2005).
Housing rabbits with guinea pigs is not recommended. Rabbits may carry *Bordetella bronchiseptica*, which is pathogenic to guinea pigs. Conversely, guinea pigs may carry *Pasteurella*, which is pathogenic to rabbits. Furthermore, interspecies aggression and indifference may lead to impaired welfare for both the rabbit and the guinea pig (Bays et al. 2006; Richardson, 2008; Sayers, 2010).

Enclosure facilities

Rabbits need a place where they can withdraw themselves when they need to rest (Richardson, 2008). The burrow facilitates this in free-living rabbits. In companion rabbits this place can be facilitated by an enclosure in the form of a hutch, that can be placed either indoors or outdoors. When rabbits are housed indoors it is advised to situate the enclosure in a relatively quiet place and not next to a window or radiator. When housed outdoors it is advised that rabbits have the possibility to seek shade or shelter when being exposed to direct sunlight. Furthermore, rabbits need the possibility to withdraw themselves from rain and wind. Also, rabbits need a well ventilated enclosure (Magnus, 2005; Richardson, 2008). Poor ventilation can be measured by the presence of high concentrations of ammonia and/or an ammonia scent. Respiratory tract infections and conjunctivitis may develop as a consequence of poor ventilation and ammonia build-up. Therefore, it is advisable to keep companion

rabbits out of garages or sheds. Rabbits do not like the smell of gasoline, which is another important reason not to keep rabbits in a garage (Magnus, 2005; Richardson, 2008). When housed outdoors it is advisable to place a covered enclosure in the garden against a wall. This location has the least exposure to direct sunlight, rain and wind (Harcourt-Brown, 2003; Magnus, 2005; Richardson, 2008; Verhoef 1997).

Daylight and temperature

Fairham et al. (1999) found that rabbits without availability to natural daylight had undetectable levels of vitamin D in their blood samples. Therefore, in order to prevent this vitamin D deficiency, it is advisable to give companion rabbits access to natural daylight.
Rabbits are relatively resistant to cold. However, they are more sensitive to heat. Their thermoneutral zone is between 15 and 25 degrees Celsius. In temperatures between 3 and 15 degrees Celsius and 15 and 28 degrees Celsius rabbits still thrive by adapting to the temperature through physiological and behavioural adjustments. When the temperature drops below 3 degrees Celsius, rabbits will experience cold stress. This can be prevented by providing the rabbits with measures to protect them from the cold (e.g. a warmer area/shelter). Cold stress may be recognized by a huddled posture, huddling together and shivering. Temperatures above 28 degrees Celsius may cause heat stress in rabbits. When these temperatures are reached measures may be facilitated to protect the rabbits from the heat (e.g. a cooler area/shelter) (Kluger et al. 1971; Sayers, 2010). Heat stress may be observed by red ears, panting and lying extremely stretched. Heat stress may lead to heat stroke with symptoms as respiratory distress, mouth breathing, weakness, depression, incoordination, convulsions and eventually death. It is advisable to have a thermometer available in the enclosure to monitor the temperature (Richardson, 2008).

Enclosure size

Companion rabbits need an enclosure of suitable size. The size depends on the location of the enclosure, the absence or presence of a freely accessible run and the size of the rabbits. The LICG recommends the following measurements for an enclosure with freely accessible run:

- Two small rabbits must have a minimum enclosure of 150cm x 60cm x 60cm. A suitable size of the run is at least 3-4m^2.
- For two rabbits of 5 kilogram or more the enclosure should be at least 200cm x 80cm x 80cm and the run at least 5m^2.

When there is no freely accessible run the following measurements for the enclosure are recommended by the LICG:

- The enclosure should be high enough to allow the rabbits to stand fully stretched on their hind legs.
- For two dwarf rabbits the enclosure should be at least 80cm x 150cm.
- For two rabbits of 2 kilograms the enclosure should be at least 80cm x 200cm.
- For rabbits between 2,5 and 5 kilograms the enclosure should be at least 0,3m^2 per kilogram bodyweight.
- For rabbits heavier than 5 kilograms at least 0,25m^2 per kilogram bodyweight should be available (LICG; Richardson, 2008).

Resting area and bedding

In the enclosure it is advisable to have at least one resting/retreat area available per rabbit. This area functions as the burrow and is a safe space for the rabbits (Richardson, 2008; Sayers, 2010).
It is recommended that bedding is used on the floor of the enclosure. There are a lot of options for bedding material available for rabbit enclosures. Materials that are used are hay, straw, newspaper, hemp fibre, cotton, flax, wooden chips, wooden pellets, sawdust, cardboard grains, garden peat, wood shavings, grass, earth, and cat litter (Harcourt-Brown, 2003; Mullan, 2006; Richardson, 2008; Sayers, 2010). Straw is cheap and allows fluid to drain away from the surface of the bedding, reducing potential contact with the skin of the rabbit. However, depending on the type of crop it is made of, some types of straw may be quite sharp and may injure the rabbit. Oat straw is a suitable option as bedding as it is soft as well as encouraging fluid drainage. Wood shavings are not suitable because of sharp edges that may injure the rabbit. Furthermore, wood shavings may cause ocular and respiratory problems. Wood bedding containing aromatic oils may cause hepatotoxicity and respiratory irritation and therefore these materials are also not suitable (Vargus; 2014).

Enrichment

It is advised that companions rabbits have enrichment in their living environment to prevent boredom. The following types of enrichment can be used:

- food enrichment (food puzzles, hanging food, hidden food, etc.);
- sensory enrichment (sounds, scents, flavours, etc.);
- exploration possibilities (novel objects, cardboard boxes, etc.);
- gnawing possibilities (branches, logs, gnawing blocks, cardboard, etc.);
- tunnels/pipes;
- digging possibilities (bedding, sandpit, etc.) (Huls et al. 1991; Mullan 2006; Richardson 2008; Sayers 2010).

Water

On average a rabbit drinks a tenth of its body weight per day (Verhoef, 1997). Water for companion rabbits may be supplied either in a bowl or in a bottle with a nipple (called a nipple drinker). A Study from Tschudin et al. (2011) recommends the use of an open bowl instead of a nipple drinker, because it is easier and quicker for a rabbit to consume water from an open bowl. However, Richardson (2008) and Verhoef (1997) advise to use a nipple drinker, because it is more hygienic than an open bowl and cannot be thrown over. Harcourt-Brown (2011) acknowledges both the pros and cons of open bowls and nipple drinkers and concludes that using an open bowl is the best way to ensure good health and welfare of companion rabbits. This is because an adequate water intake is very important, especially to sick rabbits, and it should be ensured that companion rabbits can satiate their thirst quickly. This they can do best and with the least effort from an open bowl (Harcourt-Brown, 2011). With concern to dental problems that damage the tongue, which is a common issue in companion rabbits, a nipple drinker is not suitable either. Licking the nipple may be very painful for these rabbits while drinking from an open bowl is not painful (Harcourt-Brown, 2011; Mayer et al, 2017).

Hygiene

It is advisable to clean the enclosure at least once a week, just as the drinking bottle or bowl (Harcourt-Brown, 2003). The food tray and the part of the enclosure in which faeces are deposited are advised to be cleaned on a daily basis (Harcourt-Brown, 2003). To make this daily cleaning easier a litter box may be placed in the location(s) where the faeces are deposited. A litter box is easy to take out and clean. Suitable litter materials for these boxes are corn cobs, wood pulp, soil, cat litter, peat, straw and hay (Harcourt-Brown, 2003). Sometimes clay is used. However, this is not recommended since the clay may be eaten by the rabbits and impact the caecum (Brown, 1997). Peat also neutralizes ammonia and thereby reduces irritation to the eyes and respiratory tract (Harcourt-Brown, 2003).

Exercise

It is advised that rabbits exercise on a daily basis (Harcourt-Brown, 2003; Magnus 2005; Mullan, 2006; Richardson, 2008; Rooney, 2014; Schepers, 2009). Almost all studies and books on rabbit housing and welfare state that rabbits need exercise. However, they do not indicate the exact amount of exercise needed. Only the book from Richardson (2008) indicates an exact amount. She advises that companion rabbits should have the ability for free exercise for at least four hours a day. Insufficient amounts of exercise predispose of ulcerative pododermatitis, urine sledging, osteoporosis and spinal fractures (Varga, 2014). A study from Harcourt-Brown and Baker (2001) illustrates the importance of exercise in rabbits even further. In their study, rabbits kept under free-living conditions were compared to rabbits kept in enclosures. Blood samples from the rabbits kept under free-living conditions showed higher lymphocyte and red cell counts than the rabbits kept in enclosures, suggesting that the free-living rabbits were healthier. Furthermore, the free-living rabbits had almost no dental problems while a lot of the rabbits kept in enclosures had advanced dental disease.

Behavioural needs

To ensure good welfare it is important that companion rabbits have the possibility to perform species-typical behaviour (Harcourt-Brown, 2003; Magnus, 2005; Mullan et al. 2006; Richardson, 2008; Sayers 2010). Species-typical behaviours of rabbits include hiding behaviour, resting behaviour, standing fully stretched on their hind legs, digging behaviour, hopping behaviour, exploring behaviour, territory marking, eating in a natural grazing posture, foraging behaviour and social behaviour (Harcourt-Brown, 2003; Magnus, 2005; Mullan et al. 2006; Richardson, 2008; Sayers 2010). As mentioned before, the possibility to perform resting and hiding behaviour should be facilitated by offering a resting area in the enclosure. Social housing will enable the rabbits to perform social behaviour.
Wild rabbits scan the environment by standing up on their hind legs (Magnus, 2005). Companion rabbits are therefore advised to be able to stand fully stretched on their hind legs in the enclosure (Richardson, 2008). Hopping behaviour may be facilitated by allowing companion rabbits to hop at least three to four times from one side of the enclosure to the other. Furthermore, hopping behaviour may be facilitated by at least four hours of free exercise daily (Richardson, 2008; Sayers, 2010). It is also advised to facilitate companion rabbits with the possibility to dig (Harcourt-Brown, 2003; Magnus 2005; Mullan et al. 2006; Sayers, 2010). Digging may be accommodated in an outside run, to protect the rest of the garden. Buried wire walls may be used in order to prevent the rabbits from escaping the run by digging underneath it (Varga; 2014). Exploring behaviour may be stimulated by providing toys as enrichment (Magnus, 2005).
Wild rabbits spend 70% of their time above ground feeding, which shows that it is a time-consuming behaviour (Magnus, 2005; Prebble et al. 2015). This is an indication that companion rabbits do not only need food for the nutrients it contains, but also as a possibility to perform species-typical foraging behaviour. Reduced opportunity for foraging in rabbits has been associated with the development of abnormal and stereotypical behaviour (Lidfors, 1997). To prevent this, food may be used as enrichment. Hay is considered to be the most suitable option. It takes more time to consume in comparison to other foods suitable for rabbits and therefore reduces the chance of chronic stress development (Berthelsen et al. 1999; Prebble et al. 2015).
In a preference-test study by Prebble et al. (2015) it was found that rabbits preferred eating hay from the ground or from inside an elevated hayrack, rather than from an elevated hayrack while standing on the ground, which required them to lift their heads up while eating. They conclude that rabbits prefer eating in a natural grazing posture (Prebble et al. 2015).
Furthermore, it is part of the species-typical behaviour of rabbits to mark their territory with faeces. It is advisable to make it possible for companion rabbits to perform this behaviour (Magnus, 2005; Richardson, 2008). When the rabbits are housed indoors litter box(es) may be placed in the house to enable the rabbits to mark the house (Magnus, 2005; Richardson, 2008).
It is advisable to habituate companion rabbits to being handled. Otherwise the rabbit may react with a fight, fright or flight reaction which might cause negative stress. A study from Mullan et al. (2007) showed that rabbits that were handled frequently struggled less than those that were not handled frequently. This indicates that companion rabbits get used to being handled, possibly reducing negative stress.
To further prevent stress in companion rabbits protection from the presence of possible predators and unusual noises and scents is advisable. Predators that may be found in the environment of companion rabbits are animals such as dogs, cats and foxes (Varga, 2014).
When companion rabbits do not have enough possibilities to perform species-typical behaviour, stereotypic behaviour may develop, which indicates impaired welfare. Stereotypic behaviour that is seen in companion rabbits includes digging on a solid surface, gnawing on parts of the enclosure,

manipulation of food trays, water bowls or nipple drinkers, fur pulling, intensive licking and head swaying (Rooney et al. 2014; Schepers et al. 2009).

Health

When companion rabbits are not in a good health status this may influence their welfare and make it unlikely that the rabbits perceive their own state as positive. To get an indication of the health of a rabbit a standard clinical examination may be carried out. Desired and undesired findings during this clinical examination will be appointed here.
Before the start of the clinical examination it should be noted if certain indicators associated with pain in rabbits are present. These indicators are half-closed/dull eyes, a strained facial expression with bulging eyes, holding the head in an elevated and extended position, pressing the abdomen to the floor, immobility, lethargy or reluctance to move, overgrooming, lack of grooming, hair pulling, squealing, stretching with the back arched, teeth grinding, tucked appearance to abdomen and self-mutilation (Bays et al. 2006). Hereafter the clinical examination may be carried out.
In healthy rabbits the fur is smooth, shiny and contiguous without ectoparasites visible. The nails are not overgrown. The mucous membranes of the eye and mouth are pink, moist and without bleeding spots or laesies. Eye outflow and nose outflow may indicate that a rabbit is not in good health. When nose and/or eye outflow is present there may be determined whether the outflow is serous, mucous, mucopurulent or purulent. Nose outflow in rabbits may be recognized by the presence of dirty and/or wet spots on the medial side of the forepaws (Rijnbeek et al. 2005). Furthermore, in healthy rabbits there is no wet fur around the mouth and thorax as this may be an indication of an excess production of saliva (ptyalism) (Mullan et al. 2006). In a standard clinical examination of a rabbit it is important to check for pododermatitis. Pododermatitis may negatively influence the welfare of rabbits. The disease is associated with a lack of exercise, abrasive or soiled cage floors, obesity and rabbits that stamp frequently (Harcourt-Brown, 2003; Richardson, 2008; Rijnbeek et al. 2005).
The respiratory rate of a healthy rabbit is between 32-60 breaths per minute, the heart rate between 120-325 beats per minute and the temperature between 37,5-39,5 degrees Celsius (Rijnbeek et al. 2005).
Some of the digestion organs in rabbits can be examined through palpation. In healthy rabbits the colon can be felt as a soft, dough-like mass. In the colon descendens droppings may be palpated. Furthermore, the kidneys and the bladder are palpable in healthy rabbits and no other organs or tumours are palpable (Rijnbeek et al. 2005).
The weight of companion rabbits can be assessed in two ways. The weight of a rabbit can be compared to reference values of the breed. Furthermore, when a scale to weigh the rabbits on is not available, a body condition score (BCS) can be used. With the BCS can be determined if the rabbit is emaciated, very thin, thin, good, fat or obese. Table 1 shows the reference weights of some common breeds in the Netherlands. The BCS is determined by palpation and observation. Table 2 describes which characteristics fit with the different body condition scores (Mullan et al. 2006).

Flemish Giant	6-7,5 kg	Russian	1,5-2 kg
Lotharinger	6-7 kg	Angora	3.25-4.25 kg
Harlequin Rabbit	3-4 kg	Dutch Dwarf Lop	max. 1.81 kg
French Lop	5-7 kg	Colour Dwarf	~ 1 kg
Wener	1.5-2 kg	Polish	max. 1.59 kg
New Zealand	max. 5.44 kg	Rex	max. 4.76 kg
Dutch	max. 2.49 kg	Thrianta	max. 2.72 kg

Table 1. Weight of some common rabbit breeds in the Netherlands (ARBA; Konijnenstandaard, 2007; Nationale Vlaamse Reuzen Club; Ned. Rijnlander- Eksterkonijn en Japannerclub; Nederlandse Vereniging van Angorakonijnenfokkers; Sanders et al.)

BCS	Description, keep in mind the rabbit's coat type
0: emaciated	Ribs and spine prominently visible along with other bony protuberances. General appearance of very poor condition.
1: very thin	Ribs likely to be visible and spine easily visible and very prominent on palpation; generally poor appearance; no dewlap present in does.
2: thin	Spine likely to be visible but ribs may not be visible, both prominent on palpation; dewlap may or may not have some fill in does.
3: good	Ribs not visible and spine not easily visible but both palpated easily; generally thin appearance with small dewlap in does.
4: fat	Ribs and spine not visible but palpated moderately easily; generally rounded appearance; moderate dewlap in does.
5: obese	Ribs and spine not visible and palpated with difficulty; generally rotund appearance often with large skin/fat folds; large dewlap present in does.

Table 2. Determination of the body condition score in companion rabbits (Mullan et al. 2006)

Dental problems are a very common reason of impaired welfare in companion rabbits (Sayers, 2010). The teeth of rabbits have the following composition: I: $\frac{2}{1}$ C: $\frac{0}{0}$ P: $\frac{3}{2}$ M: $\frac{3}{3}$ = 28, and grow continuously during the rabbits' life (Varga, 2014).

Inspection of the teeth without anaesthesia is limited in rabbits because of a cheek/lip fold between the incisors and oral cavity (Rijnbeek et al. 2005). According to Sayers (2010) otoscopic oral examination in a conscious rabbit is an essential part of a routine clinical examination, even though it is limited. About 40% of dental problems in rabbits can be identified by otoscopic examination. Harcourt-Brown (1997) developed the following dental grade on a scale from 1 to 5:

- Grade 1: Normal
- Grade 2: Subclinical
- Grade 3: Acquired crown abnormalities and occlusal defects
- Grade 4: Major abnormalities of the crowns and cessation of tooth growth
- Grade 5: Osteomyelitis and abscess formation

With otoscopic examination not only the incisors can be examined, but also the cheek teeth. The otoscope is inserted into the side of the mouth through the diastema (Varga, 2014). When an otoscope is not available inspection of the teeth is still possible. However, less information can be gathered than through otoscopic observation as only the incisors can be observed. This inspection can be done by lifting the lip at one side of the mouth, and after that on the other side of the mouth. The nose should not be compressed so that the rabbit can still breath freely. When inspecting the incisor teeth length, shape, position, occlusion, fractures and decolouration are considered (Rijnbeek et al. 2005). Problems that are often associated with dental disease in rabbits are teary eyes (dacrycocystitis), intestinal obstruction (ileus), reduced appetite, lethargy, a sloppy coat, ectoparasitic problems and uneaten caecotrophs (Sayers, 2010; Varga, 2014). It is probable that rabbits with dental disease experience pain when consuming food, especially high fibre food, which is necessary for good gut motility. The decreased intake of fibre in combination with the pain and stress associated with dental problems increases the risk of gastrointestinal hypomotility (Varga, 2014).

Mullan et al. (2006) found that nearly all of the owners used in their study were unaware of the dental disease of their rabbits. They also found that dental diseases were more abundant in rabbits housed in hutches than those housed in the garden.

Figure 1. Oral cavity of a rabbit (University of Utrecht)

During inspection of the teeth the presence or absence of ptyalism can be observed. When ptyalism is present it becomes visible by wet fur under the mouth and on the thorax (Mullan et al. 2006).
Other common seen indicators of impaired welfare in companion rabbits are perineal soiling and/or uneaten caecotrophs (Sayers, 2010). Indigestible fibre passes down the colon and is eliminated as hard, dry faecal pellets. Smaller particles and fluids pass into the caecum where the particles are processed through bacterial fermentation which releases volatile fatty acids and synthesizes proteins and vitamins. This process forms pellets of soft faecal contents (caecotrophs) which are periodically expelled from the anus and directly re-ingested as a source of vitamins (Varga, 2014). Uneaten caecotrophs is one of the causes of perineal soiling. Table 3 shows more underlying causes of perineal soiling.

	Reason	**Effect**
Low-fibre diet	Decreased drive to eat caecotrophs	Caecal soiling
Dental disease	Inability to physically reach the anus to eat caecotrophs	Caecal soiling
	Pain/discomfort leading to polydipsia	Polyuria leading to urine soiling
Musculoskeletal problems	Inability to reach the anus	Caecal soiling
	Pain leading to polydipsia	Polyuria and resultant urine soiling
	Inability to assume normal micturition stance	Urine self-soiling
Renal disease	Decreased renal function	Polyuria leading to urine soiling
Neurological disease	Inability to physically reach the anus to eat caecotrophs	Caecal soiling
	Inability to assume normal micturition stance	Urine self-soiling
	Poor sphincter control leading to urine overflow	Urine self-soiling
Obesity	Inability to physically reach the anus to eat caecotrophs	Caecal soiling
	Normal micturition stance can be assumed, but fatty tissue present	Urine self-soiling
	Voiding stance can be assumed but fatty tissue present	Faecal self-soiling
Excess calcium	Build-up of calcium precipitate in bladder leading to irritation of the bladder wall or urethra, or discomfort and associated polydipsia	Signs of cystitis, urine soiling, polyuria and associated urine soiling

Table 3. Underlying causes of perineal soiling (Sayers, 2010)

When there is no intention to breed with companion rabbits it is advisable to neuter them. The rabbits have to be sexually mature before the procedure. Does should be at least 5 months of age and bucks at least 12 weeks. The uterine horns and ovaries of does are very small and difficult to locate before sexual maturity. In bucks the testicles do not descend into the scrotal sac before 10 to 14 weeks of age. Neutering does helps in preventing pseudo pregnancy or unwanted pregnancy, reducing territorial aggression and in preventing neoplasia of the female reproductive tract or pyometra (Harcourt-Brown, 2003; Richardson 2008). Neoplasia of the reproductive tract in does is very common, therefore, neutering does has significant benefits in preventing disease. Neutering bucks helps in preventing testicular neoplasia and reducing behavioural problems like urine spraying (Sayers, 2010).
It is advisable to vaccinate companion rabbits every year against myxomatosis and rabbit haemorrhagic disease (RHD) (Schepers et al. 2009). The study of Schepers et al (2009) identified that in 2006 45% of their respondents in the Netherlands had not inoculated their rabbits in that year, identifying a serious risk for diseases and therefore an impairment in welfare.

Adjustments and improvements to the checklist as a result of the expert validation

After the first version of the checklist was developed four experts in the field of rabbit health and welfare were asked to validate the checklist. In this validation, the experts were asked to provide feedback on the checklist. Their feedback was received via e-mail and was subsequently processed. This led to the following additions and adjustments:

Additions

- Questions about the type(s) of vegetables, fruit, (garden)plants, sweets and treats that are fed were added.
- A question was added with regard to selective feeding: If selective feeding is present, what component(s) do the rabbit(s) prefer to eat?
- Questions about the method of ventilation in the enclosure and the presence or absence of draft were added.
- Questions about the slipperiness of the enclosure and the floor that the rabbit(s) walk on outside of the enclosure were added.
- A question about the presence of an ammonia and/or dull scent was added.
- The following clinical abnormalities were added:
    - Fur mites
    - Bald spots
    - Slanting head
    - Neck scabies
    - Pale ears
    - Paralyse
    - Tangles
    - Outstanding, dull coat
    - Ear scabies
    - Blue eyes
    - Urinary eczema
    - Ataxia
    - Lots of loose hair/molt
    - Crusts on the mucous membranes
    - Vibrating eyes (nystagmus)
    - Blue ears
    - Parese
- A question about the type of droppings was added, with the following options: normal droppings; small, hard, dark droppings; chain cord; moist, soft droppings and aceacotrophy.
- A question was added to determine if the rabbit(s) exhibit(s) signs of fear when the enclosure is not situated in a relatively quiet spot.
- At the end of the checklist explanations and pictures of the different grades of pododermatitis were added. This makes the determination of the grade of pododermatitis easier when filling in the checklist.
- Questions about a fungal treatment and a treatment for ear and fur mites were added: Where they carried out?
- A question about the presence or absence of lethargy/apathy was added.
- If the rabbits are housed socially the presence of positive and/or agonistic behaviour between the rabbits will be noted. Furthermore, there will be noted if there are wounds/scars, abscesses and/or pulled hairs visible as indicators for physical fights.
- Observation of positive and agonistic behaviour during the visit on a location was added.
- Observation of the reaction of the rabbit(s) to an unexpected noise was added.

Adjustments

- The table to check the type and amount of food was sorted more like a food pyramid. The most important things (like hay and grass followed by greens and (garden)plants) were put on top, followed by the other diet options. Drinking water additives (e.g. carrot juice) were added.
- If the enclosure exists out of multiple floors the way in which the floors are connected and the distance between the floors will be noted, with regards to the safety.
- The cleanness of the enclosure at the moment of observation was divided in: 1. Yes, 2. No, not completely clean, some faeces and urine are visible. and 3. No, stench and mould present.
- The cleanness of the food tray at the moment of observation was divided in: 1. Yes, 2. No, old feed residues are sticking to the tray. and 3. No, food tray is filled with faeces and urine.
- The cleanness of the water supply at the moment of observation was divided in: 1. Yes, 2. No, there is a bit of litter in the water supply, the water is clear. and 3. No, green scale visible/water is not clear.
- The cleanness of the section where faeces are deposited at the moment of observation was divided in: 1. Yes, 2. No, not quite spotless, some faeces and urine visible and 3. No, stench and mould present.
- Vaccination against RHDV2 was added to the questions about the vaccination status. Rabbits should be vaccinated yearly against myxomatosis and RHDV and half-yearly against RHDV2.
- Different types of stereotypic behaviour were added as an addition to the question about the presence or absence of stereotypic behaviour.
- The presence of possible predators was specified into ‘the direct presence of predators’, ‘no direct presence of predators but predators can be smelled and/or are audible’ and ‘complete absence of predators with no scent and sound of the predators present’.

Adjustments and improvements to the checklist as a result of the pilot study

A pilot study was conducted after the expert validation in order to test the feasibility of the checklist. During the pilot study two petting zoos, two garden centres, two commercial breeders, two pet shops, two animal shelters and two regular consumers were visited. On these locations the checklist was applied in order to reveal missing parts and improvements. After the pilot study, the missing parts and improvements were added to the checklist, making the checklist ready to be used.

Adjustments and improvements to the checklist as a result of the visits at two pet shops

- Options about the location of the enclosure that are more in accordance to a shop were added: in the walking route, in a separate space, in the shop-window and in the back of the store.
- More questions about the type of social behaviour that the rabbits are able to carry out was added: Can the rabbits carry out social behaviour through direct contact, through sight and scent, through sight and smell, or only through smell?

Adjustments and improvements to the checklist as a result of the visits at two petting zoos

- There are locations with more than one type of enclosure. Space was made in the checklist to fill in the sizes and specifics of different types of enclosures.

Adjustments and improvements to the checklist as a result of the visits at two animal shelters

- A question about the amount of food that is fed from the different foods present in grams or grams per kilogram bodyweight was added.

Adjustments and improvements to the checklist as a result of the visits at two consumers

- Different types of spaces that may function as a run were added: an outside run, an inside run, a fenced walking field or garden, a big area in the house (living room, kitchen, playroom etc.) and a big area in a shed/garage.

Adjustments and improvements to the checklist as a result of the visits at two garden centres

- The possibility of wooden pellets as bedding material was added.

Adjustments and improvements to the checklist as a result of the visits at two commercial breeders

- A question about the minimum age of the kittens before they leave the breeder was added.
- A question about the maximum amount of litters per doe per year was added.
- A question about the presence of tattooed rabbits was added.

Discussion and conclusion

The literature study, expert validation and pilot study have contributed to the development of the checklist and appendix to the checklist as shown in the appendix. The checklist is adequate to use for the assessment of the current health and welfare status of rabbits in the various segments of the companion animal sector in the Netherlands. The checklist covers the five freedoms as expressed by Ohl & Van der Staay (2012) and parameters suitable for assessing these five freedoms are included. These parameters are in the form of questions that can be asked the person responsible for the location about the present rabbit(s) and the environment of these rabbit(s). Furthermore, they are in the form of observations that can be seen by the researcher through examining the rabbit(s) and through checking the environment of the rabbit(s). The appendix included with the checklist describes if certain observations have a positive influence on the health and/or welfare, a negative influence on the health and/or welfare or no influence on the health and welfare of the rabbit(s).

However, not all the parameters that influence the health and welfare of rabbits can be assessed with this checklist. For some parameters it is not feasible in practice to measure them on location. This is especially true for parameters concerning the freedom of pain, injury and illness. This is mostly because not all processes concerning injury and illness are visible from the outside of the animal or are measurable from the outside. These processes may have a negative influence on the health and/or welfare but cannot be observed by using the checklist. An example is the examination of the teeth. Examination of the oral cavity in rabbits is very limited in non-sedated rabbits. As a result, only the incisors can be seen in the non-sedated rabbit (Rijnbeek et al. 2005). With otoscopic examination not only the incisors can be examined, but also the cheek teeth. The otoscope is inserted into the side of the mouth through the diastema (Varga, 2014). However, the examination with an otoscope is too invasive too use in practice on location. This means that with the use of this checklist only the incisors can be observed. The premolars and molars are unreachable for examination. Therefore, abnormalities on these teeth leading to pain and injury will go unnoticed. These cannot be taken into account when assessing the health and welfare status, even though dental problems are a very common reason of impaired welfare in companion rabbits (Sayers, 2010). Just like the teeth, present abnormalities in the thorax and/or abdomen may be missed by the use of this checklist because they are not measurable from the outside of the animal. Furthermore, the experience with performing a clinical examination may influence the observations. For example, when pododermatitis is present, an experienced researcher will be more capable to assign the correct grade to the pododermatitis than a researcher with less experience.

The appendix to the checklist now only indicates if the observation has a positive influence on the health and welfare, a negative influence on the health and welfare or no influence on the health and welfare at all, but it does not indicate how strong this influence is. This should be determined in further studies. In the expert validation stage of this study, it was attempted to have the experts assign a value between -1 and +1 to the observations. However, not enough experts assigned their values to get a reliable result. Only three of the ten consulted experts assigned values. In further studies the strength of the influence of certain observations concerning health and welfare in companion rabbits can be determined by consulting more experts to improve the changes of obtaining a reliable result.

In conclusion, the checklist created in this study is suitable for assessment of the current health and welfare status of rabbits in the various segments of the companion animal sector in the Netherlands. However, there is still space for adjustments and improvements. Further research should especially aim at developing methods to assess injury and illness problems that are at this point not determinable on location and at determining the strength of the influence of the observations. For now, this checklist can be used when visiting commercial breeders, traders, pet shops, garden centres, animal shelters, petting zoos and consumers to determine the current health and welfare status of companion rabbits in the Netherlands. The outcome of this determination can be used to develop measurements to improve the health and welfare of companion rabbits.

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Appendix

Welfare Quality Project

Criteria that underpin the Welfare Quality® assessment systems

1. Animals should not suffer from prolonged hunger, i.e. they should have a sufficient and appropriate diet.
2. Animals should not suffer from prolonged thirst, i.e. they should have a sufficient and accessible water supply.
3. Animals should have comfort around resting.
4. Animals should have thermal comfort, i.e. they should neither be too hot nor too cold.
5. Animals should have enough space to be able to move around freely.
6. Animals should be free of physical injuries.
7. Animals should be free of disease, i.e. farmers should maintain high standards of hygiene and care.
8. Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration, dehorning).
9. Animals should be able to express normal, non-harmful, social behaviours, e.g. grooming.
10. Animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging.
11. Animals should be handled well in all situations, i.e. handlers should promote good human-animal relationships.
12. Negative emotions such as fear, distress, frustration or apathy should be avoided whereas positive emotions such as security or contentment should be promoted.

Checklist

Checklist for an assessment of the current health and welfare state of rabbits in the various segments of the companion animal sector in the Netherlands

General information

Name of contact:
Date:
Location:
Segment:
Number of rabbits:

Breed[22,24]
☐Alaska ☐Angora ☐Chincilla ☐Colour dwarf ☐d'Argent de Champagne ☐Dutch
☐Dutch Dwarf Lop ☐Flemish Giant ☐French Lop ☐German lop
☐German Giant ☐Harlequin rabbit ☐Lotharinger ☐New Zealand ☐Polish
☐Red New Zealand ☐Rex ☐Russian ☐Silver ☐Silver Fox ☐Small Lotharinger
☐Tan ☐Teddy Dwarf ☐Thrianta ☐Mixed breed ☐Unknown ☐Other:

Category
Enclosure type 1
☐Big rabbit(s) ☐Medium sized rabbit(s) ☐Small rabbit(s) (dwarf(s))
Enclosure type 2
☐Big rabbit(s) ☐Medium sized rabbit(s) ☐Small rabbit(s) (dwarf(s))
Enclosure type 3
☐Big rabbit(s) ☐Medium sized rabbit(s) ☐Small rabbit(s) (dwarf(s))
Enclosure type 4
☐Big rabbit(s) ☐Medium sized rabbit(s) ☐Small rabbit(s) (dwarf(s))
Enclosure type 5
☐Big rabbit(s) ☐Medium sized rabbit(s) ☐Small rabbit(s) (dwarf(s))

Sex(es)
☐Only bucks
☐Only does
☐Bucks and does
Birth dates:

Questions

1. **<u>Do the rabbits/does the rabbit have the freedom to react adequately to hunger, thirst or incorrect food?</u>**

Measurable by the environment

Type and amount of food[4,5,7,14,20,21,22,23,26,29]

Type of food	Always/unlimited available	Daily in generous quantities	Daily, but in limited quantities	Limited to very small amounts and/or at most a few times a week	Is not fed
Hay					
Vegetables					
Fruit					
(Garden)plants					
Grass					
Pelleted food					
Cereal mix (muesli)					
Bread/toast					
Sweets and treats					
Drinking water additives (e.g. carrot juice)					
Salt lick/gnawing block					

Which type(s) of vegetables, fruit and (garden)plants are fed?:

Which type(s) of sweets and treats are fed?:

If information is available, how much is fed from the different foods? (e.g. in grams or grams per kilogram bodyweight):

Brand(s) of the food:

Access to water[1,6,22,32]

☐Ad libitum ☐Restricted

Type of water

☐Mineral water ☐Tap water ☐Other:

Measurable by the rabbits

Do the rabbits/does the rabbit exhibit selective feeding?[25]

☐Yes ☐No

If selective feeding is present, what component(s) do the rabbits/does the rabbit prefer to eat?

☐Soft components ☐Sweet/sugar rich components ☐Calorie rich components

☐Fresh food constituents ☐Fibre rich components ☐Other:

2. **Do the rabbits/does the rabbit have the freedom to react adequately to physical and thermal discomfort?**

Measurable by the environment

Does the location of the enclosure/enclosures vary with the season? [25]

☐Yes ☐No

If yes, what are the different locations during different seasons?:

How often is/are the enclosure/enclosures cleaned? [1,25,26,31]
☐< Once a week ☐Once a week ☐> Once a week ☐Every day

How often is the food tray cleaned? [1,25,26,31]
☐< Once a week ☐Once a week ☐> Once a week ☐Every day

How often is the water supply cleaned? [1,25,26,31]
☐< Once a week ☐Once a week ☐> Once a week ☐Every day

How often is the part of the enclosure where faeces are deposited cleaned? [1,5]
☐Daily ☐< Daily

Temperature in the enclosure/enclosures[,8,9,22,29]
☐Measurable (e.g. thermometer available)
☐Below 3 degrees Celsius with insufficient measures to prevent cold stress
☐Below 3 degrees Celsius with sufficient measures to prevent cold stress
☐Between 3 and 15 degrees Celsius (the rabbits can still adapt by physiological/behavioural adjustments)
☐Between 15 and 25 degrees Celsius (thermoneutral zone)
☐Between 25 and 28 degrees Celsius (the rabbits can still adapt by physiological/behavioural adjustments)
☐Above 28 degrees Celsius with sufficient measures to prevent heat stress/stroke
☐Above 28 degrees Celsius with insufficient measures to prevent heat stress/stroke

Do the rabbits/does the rabbit come outside of the enclosure?
☐Never ☐Yes, less than daily ☐Yes, daily

If there is a run available with restricted access for the rabbit(s), how often can the rabbit(s) access the run?:

If there is no freely accessible run available, how much free exercise time do the rabbits/does the rabbit get per day?[1,5,11,13,14,22]
☐None ☐<4 hours per day ☐4 hours a day or more

If neutered rabbits are present, neutered at which age(s)?[5]

If neutered rabbits are present, neutered by whom (breeder, pet store, consumer etc.)?:

Is reproduction desired with the rabbit(s)?
☐Yes ☐No

If reproduction is desired, maximum number of nests per doe per year:

How much time is passed between two nests of the same doe?:

Are the rabbits/is the rabbit tattooed?
☐Yes ☐No

3. Do the rabbits/does the rabbit have the freedom to react adequately to pain, injury and illness?

Measurable by the environment
Vaccinationstatus[30]
☐Vaccination for RHDV (annually) ☐Vaccination for RHDV2 (half-yearly)
☐Vaccination for myxomatosis (annually)

Has a coccidiosis treatment been performed? [4,33]
☐Yes, preventive ☐Yes, as therapy ☐No

Has a deworming treatment been performed? [35]
☐Yes, preventive ☐Yes, as therapy ☐No

Has a fungal treatment been performed?
☐Yes, preventive ☐Yes, as therapy ☐No

Has a treatment for ear and fur mites been performed?
☐Yes, preventive ☐Yes, as therapy ☐No

Measurable by the rabbits
Indication of weight according to the owner
Weight of rabbits in type of enclosure 1:

Weight of rabbits in type of enclosure 2:

Weight of rabbits in type of enclosure 3:

Weight of rabbits in type of enclosure 4:

Weight of rabbits in type of enclosure 5:

4. Do the rabbits/does the rabbit have the freedom to react adequately to fear and chronic stress?

Measurable by the environment
Are the rabbits/is the rabbit socially housed? [1,5,13,14,22,29,30]
☐No
☐Yes, all with other rabbits

☐Some with other rabbits, some solitary
☐Some with another species (e.g. guinea pig(s)), some solitary:
☐Some with other rabbits, some with another species:
☐Yes, with another species:

If socially housed with other rabbits (multiple answers possible):
☐Intact buck(s) housed with intact buck(s)
☐Intact buck(s) housed with neutered buck(s)
☐Neutered buck(s) housed with neutered buck(s)
☐Intact doe(s) housed with intact doe(s)
☐Intact doe(s) housed with neutered doe(s)
☐Neutered doe(s) housed with neutered doe(s)
☐Intact buck(s) housed with intact doe(s)
☐Intact buck(s) housed with neutered doe(s)
☐Neutered buck(s) housed with intact doe(s)
☐Neutered buck(s) housed with neutered doe(s)

If reproduction is desired, and the offspring is sold, from what age are the rabbits sold?:

Are the rabbits/is the rabbit protected from possible predators?[5,13,14]
☐Yes
☐Yes, but possible predators are audible and/or smellable (e.g. barking dogs audible)
☐No

If possible predators are present, do the rabbits/does the rabbit have the possibility to withdraw themselves/itself from them?[5,13,14]
☐Yes ☐No

Measurable by the rabbit(s)
Do the rabbits/does the rabbit exhibit stereotypes?[2,30]
☐Yes ☐No

If yes, what stereotypes are observed?[2,30]
☐Excessive grooming (licking, gnawing, scratching etc.) ☐Bar gnawing
☐Walking rounds/circling ☐Weaving ☐Other:

Is there any lethargy/apathy observed in the rabbit(s)?[2]
☐Regularly (daily) ☐Sometimes (weekly or less) ☐Never

If enrichment is available, do the rabbits/does the rabbit use it?
☐Yes, all available forms of enrichment are used
☐No, none of the enrichment is used
☐Yes, but not all the available forms of enrichment are used. The following forms are used:

5. Do the rabbits/does the rabbit have the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive?

Measurable by the rabbit(s)
How often do the rabbits/does the rabbit exhibit the following behaviours?

	Almost always	Often	Sometimes	Rarely/almost never	Never	n.a.
Binky's						
Running around						
Lying stretched out on the side						
Lying stretched out with the paws stretched backwards						
Hide in a corner or shelter						
Huddling						
Lying down or sitting against each other						
Licking/washing/cleaning each other						
Riding another rabbit						
Riding people, objects or another species						
Fighting with each other						
Marking spaces or objects with the chin						
Urine spraying						
Digging without a purpose						
Actually digging						
Gnawing on enclosure, furniture, carpet or interior						
Gnawing on offered gnawing material						
Growling						
Aggression to (hand of) human when entering enclosure						
Recalcitrate when being picked up						
Approaching people, showing interest in people						
Stamping with the hind legs						
Alertly elevating itself						

Observations

1. **<u>Do the rabbits/does the rabbit have the freedom to react adequately to hunger, thirst or incorrect food?</u>**

<u>Measurable by the environment</u>

Water supply[6,22,32]
☐Drinking bottle ☐Open bowl ☐Both ☐Other:

Are the water supplies at an appropriate height?[8]
☐Yes
☐The water supplies are too low
☐The water supplies are too high

How many (adult) rabbits share how many drinking spots in one enclosure?: [34]
Type of enclosure 1:

Type of enclosure 2:

Type of enclosure 3:

Type of enclosure 4:

Type of enclosure 5:

How many adult rabbits share how many feeding spots in one enclosure? (Multiple feeding spots that stand directly against each other count as one feeding spot)
Type of enclosure 1:

Type of enclosure 2:

Type of enclosure 3:

Type of enclosure 4:

Type of enclosure 5:

2. Do the rabbits/does the rabbit have the freedom to react adequately to physical and thermal discomfort?

Measurable by the environment
Location of the enclosure/enclosures (PET SHOP, GARDEN CENTER)
☐In the walking route ☐In a separate space
☐In the shop-window ☐In the back of the store ☐Other:

Location of the enclosure/enclosures [5,13,22]
☐Kitchen ☐Living room ☐Bedroom ☐Garage ☐In a separate indoor space ☐Barn
☐Outside ☐Outside on a porch ☐Other:

How is the enclosure/are the enclosures situated in the space? [5,13,22]
☐Detached/central in the space ☐Against a wall ☐Other:

How are the walls of the enclosure/the enclosures constructed?
☐Closed walls, not transparent ☐Partial wire/mesh ☐Completely wire/mesh
☐Partial transparent material (glass, plastic)
☐Complete transparent material (glass/plastic) ☐Other:

Floor of the enclosure/enclosures
☐Grass ☐Linoleum ☐Carpet ☐Wooden floor ☐Plastic ☐Plastic grate floor
☐Tiles or stone ☐Mesh bottom ☐Cardboard ☐Other:

Bedding material of the enclosure/enclosures[5,13,22]
☐Hay ☐Straw ☐(News)paper ☐Hemp fibre ☐Cotton ☐Flax ☐Earth
☐Wooden chips ☐Wooden pellets ☐Sawdust ☐Cardboard grains ☐Cat litter
☐No bedding ☐Other:

Floor/bedding material that the rabbit(s) walk(s) on outside of the enclosure
☐Hay ☐Straw ☐(News)paper ☐Hemp fibre ☐Cotton ☐Flax ☐Earth
☐Wooden chips ☐Wooden pellets ☐Sawdust ☐Cardboard grains ☐Cat litter
☐Grass ☐Linoleum ☐Carpet ☐Wooden floor ☐Plastic grate floor ☐Mesh bottom
☐Cardboard ☐No bedding ☐Other:

Is a large part of the surface where the rabbit(s) walk(s) on slippery?
☐Yes ☐No

Do the rabbits/does the rabbit have access to a freely accessible run?
☐Yes ☐No

If yes, what kind of run? (multiple answers possible)
☐An outside run ☐An inside run ☐A fenced walking field or garden
☐A big area in the house (living room, kitchen, playroom etc.)
☐A big area in a shed/garage ☐Other:

Size of the enclosure and possible run (in cm2)[1,11,26,27,28,30]
Measurements of type of enclosure 1:
If present, measurements of type of run 1:

Measurements of type of enclosure 2:
If present, measurements of type of run 2:

Measurements of type of enclosure 3:
If present, measurements of type of run 3:

Measurements of type of enclosure 4:
If present, measurements of type of run 4:

Measurements of type of enclosure 5:
If present, measurements of type of run 5:

Number of floors of the enclosure[14]
☐One ☐Two ☐Three ☐Four

If multiple floors are present in the enclosure, is it safe (think of the distance between the floors and how they are connected)?
☐Way of connecting floors:
☐Distance between floors:
☐Safe
☐Not safe

Is there a lookout spot available for the rabbit(s) in the enclosure?
☐Yes ☐No

Do the rabbits/does the rabbit have the possibility to withdraw themselves from direct sunlight? [5,22,28]
☐Yes ☐No

Do the rabbits/does the rabbit have the possibility to withdraw themselves from rain? [5,22,28]
☐Yes ☐No

Do the rabbits have the possibility to withdraw themselves from wind? [5,22,28]
☐Yes ☐No

Do the rabbits/does the rabbit have the possibility to come in contact with natural daylight?[5]
☐Yes ☐No

Is there ammonia and/or a dull smell smellable in/near the enclosure/enclosures as a sign of bad ventilation?[5]
☐Yes ☐No

Is there a draft sensible?
☐Yes ☐No

If a draft is sensible, do the rabbits/does the rabbit have the possibility to withdraw themselves from the draft?
☐Yes ☐No

How is the enclosure/are the enclosures ventilated (mechanical or natural, overpressure or under pressure)?:

Is the enclosure clean at the moment of observation?

☐Yes
☐No, not completely clean, some faces and urine are visible
☐No, stench and mould present

Is the food tray clean at the moment of observation?
☐Yes
☐No, old feed residues are sticking to the tray
☐No, food tray is filled with faeces and urine

Is the water supply clean at the moment of observation?[8]
☐Yes
☐No, there is a bit of litter in the water supply, the water is clear
☐No, green scale visible/water is not clear

Is the section where faeces are deposited clean at the moment of observation?
☐Yes
☐No, not quite spotless, some faeces and urine visible
☐No, stench and mould present

Is there a litter box available in the enclosure? [1,5,11]
☐Yes ☐No

If yes, what material is used in the litter box?[5]
☐Hay ☐Straw ☐Cat litter ☐Cardboard grains ☐Sawdust ☐Peat
☐Wood shavings ☐Earth ☐Clay ☐Other:

Measurable by the rabbit(s)
Red ears, panting and/or lying extremely stretched visible (as indicators of heat stress)?[19]
☐Yes ☐No

Sitting huddled, shivering and/or huddling together visible (as indicators of cold stress)?
☐Yes ☐No

3. Do the rabbits/does the rabbit have the freedom to react adequately to pain, injury and illness?

Measurable by the environment
Are there sharp edges/irregularities in the enclosure that may cause injuries to the rabbits?[23]
☐Yes ☐No

Measurable by the rabbits

Which of the following points associated with pain in rabbits are noticeable?[2]
☐Half-closed/dull eyes
☐Strained facial expression with bulging eyes
☐Holding the head in an elevated and extended position
☐Pressing abdomen to the floor ☐Immobility, lethargy, or reluctance to move
☐Overgrooming ☐Lack of grooming ☐Hair pulling ☐Squealing
☐Stretching with back arched ☐Stinting/splinting on palpation ☐Teeth grinding
☐Tucked appearance to abdomen ☐Self-mutilation

Breathing
☐Lowered ☐Normal ☐Elevated

Weight[9,15,16,17,27]
☐Underweight ☐Slight underweight ☐Normal weight ☐Slightly overweight
☐Real obesity ☐Morbid obesity with secondary diseases

Fur
☐No abnormalities ☐Fur mites ☐Tangles ☐Lots of loose hair/molt ☐Bald spots
☐Outstanding, dull coat ☐Wet fur around mouth and chest (drooling)
☐Other abnormalities:

Are there wounds/scars, abscesses and/or pulled hairs visible (as indicators for physical fights)?
☐Yes: ☐No

Mucous membranes
☐No abnormalities ☐Red/irritated eyes ☐Thickened mucous membranes ☐Crusts
☐Bleedings ☐Other abnormalities:

Head
Position of head, eyes, ears and nares
☐No abnormalities ☐Slanting head ☐Nystagmus ☐Other abnormalities:

Eye outflow visible?[25]
☐No ☐Yes, serous ☐Yes, mucous ☐Yes, mucopurulent ☐Yes, purulent

Nose outflow visible (also check the inside of the forepaws)?[23]
☐No ☐Yes, serous ☐Yes, mucous ☐Yes, mucopurulent ☐Yes, purulent

Ear scabies visible (visible by brown crusts in the ears)?[24]
☐Yes ☐No

Neck scabies visible?
☐Yes ☐No
Blue eyes and/or ears visible as indicator(s) of disease?
☐Yes ☐No

Pale ears visible as an indicator of anaemia or VHD infection?
☐Yes ☐No

Teeth
☐No abnormalities ☐Teeth are too long ☐Teeth are too short

☐Marks visible on the teeth that may be painful for the oral mucosa
☐Irritated oral mucosa visible ☐Other abnormalities:

Abdomen
Digestive organs (palpation)
☐No abnormalities ☐Thickenings palpable ☐Other abnormalities:

Urinary eczema?
☐Yes ☐No

Assessment of droppings[20,23]
☐Normal droppings ☐Small, hard, dark droppings ☐Chain cord
☐Moist, soft droppings ☐Acaecotrophy

Limbs
Pododermatitis (pictures at end of checklist)[12]
☐No ☐Yes, grade 1 ☐Yes, grade 2 ☐Yes, grade 3 ☐Yes, grade 4 ☐Yes, grade 5
☐Yes, grade 6

Are the nails too long?
☐Yes ☐No

Lame/problems with moving?[25]
☐No abnormalities ☐Parese ☐Paralyse ☐Ataxia ☐Lame

4. Do the rabbits/does the rabbit have the freedom to react adequately to fear and chronic stress?

Measurable by the environment
Is the enclosure situated in a relatively quiet spot?[22]
☐Yes ☐No
If no, do the rabbits/does the rabbit exhibit signs of fear?
☐Yes ☐No

Rest/retreat area available? [13,14,22,25]
☐Yes ☐No
If socially housed, is there at least one rest/retreat space per rabbit available?
Type of enclosure 1:
☐Yes ☐No ☐No, but all the rabbits can fit in the available resting spaces together
Type of enclosure 2:
☐Yes ☐No ☐No, but all the rabbits can fit in the available resting spaces together
Type of enclosure 3:
☐Yes ☐No ☐No, but all the rabbits can fit in the available resting spaces together
Type of enclosure 4:
☐Yes ☐No ☐No, but all the rabbits can fit in the available resting spaces together
Type of enclosure 5:
☐Yes ☐No ☐No, but all the rabbits can fit in the available resting spaces together

Is enrichment available? [1,5,13,22]
☐Yes ☐No
If yes, what type(s) of enrichment?:
☐Food enrichment (food puzzles, hanging food, hidden food, etc.)
☐Sensory enrichment (sounds, smells, flavours, etc.)
☐Exploration possibilities (novel objects, etc.)
☐Gnawing possibilities (branches, logs, gnawing blocks, cardboard, etc.)
☐Tunnels/pipes
☐Digging possibilities (bedding, sandpit, etc.)

Are there signs of gnawing on the enclosure visible?
☐Yes ☐No

Measurable by the rabbit(s)
If socially housed with other rabbits, what kind of behaviour is being observed (are there signs of positive interaction and/or agonistic behaviour)?:

Reaction of the rabbit(s) when making an unexpected noise
☐Response as expected ☐Extreme startle reaction

Reaction to an approaching hand[3,13,15,25,30]
☐Aggression ☐Trying to bite ☐Trampling ☐Fear/fright ☐Flight
☐No reaction ☐Seeks approachment to the hand without expressions of negative behaviour

Reaction to being handled[3,13,15,25,30]
☐Aggression ☐Trying to bite ☐Trampling ☐Fear/fright ☐Flight
☐No reaction ☐Seeks approachment to handler without expressions of negative behaviour

5. Do the rabbits/does the rabbit have the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive?

Measurable by the environment
The rabbits have/the rabbit has the possibility to hide themselves in the enclosure[13,22]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to exhibit resting behaviour[,22]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to stand fully stretched on their hind legs in the enclosure[13,22,29]
☐Yes ☐No

The rabbits have/the rabbit has the possibility to perform hopping behaviour[29]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to dig[13,14]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to exhibit exploratory behaviour[13,22]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to exhibit foraging behaviour[13,21,29]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to eat in a natural grazing posture[13,21]
☐Yes ☐At a minimum ☐No

The rabbits have/the rabbit has the possibility to exhibit social behaviour[1,5,13,14,22,29,30]
☐Yes, by direct contact, sight and smell ☐Yes, but only by sight and smell
☐Yes, but only by smell ☐No

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Extra information of checklist

Gradations of pododermatitis[12]

TABLE 1: The Pet Rabbit Pododermatitis Scoring System (PRPSS) developed for clinical assessment of hock lesions

Grading scale	Macroscopic description
Grade 0	No lesions
Grade 1	A small, circular area on the plantar aspect of the metatarsal bone-calcaneus (mono or bilateral lesions), with minimal alopecia, minimal epidermal hyperaemia and/or hyperkeratosis of the skin, but with no evidence of infection or bleeding of underlying tissues
Grade 2	Circumscribed area of varying sizelocalised at the caudal plantar aspect of the metatarsal-calcaneal area or extending linearly along the plantar aspect of the cranial metatarsal area with alopecia, erythema and scaling of surrounding tissues
Grade 3	Area of varying size focally ulcerated and with varying degree of keratinisation abnormalities. Infection of subcutaneous tissue present
Grade 4	Full-thickness skin loss with swelling and necrotic debris may be present with infection of underlying tissues. Purulent exudates may be adherent to the lesions
Grade 5	Severe infections with involvement of deep structures including bones and tendons with tenosynovitis, osteomyelitis and arthritis
Grade 6	End-stage disease with loss of pedal function

Fig. 1. No macroscopic evidence of pododermatitis (Grade 0)

Fig 2. Small, circumscribed circular area on the plantar aspect of the metatarsal bone, deprived of hair, with minimal epidermal hyperaemia, but with no evidence of infection or bleeding (Grade 1)

Fig. 3. There is a lesion visible, extending linearly along the plantar aspect of the cranial metatarsal area, with evident alopecia, eythema and scaling of surrounding tissues (Grade 2)

Fig. 4. An extensive lesion is present, extending linearly along the plantar aspect of the cranial metatarsal area, focally ulcerated and with keratinisation abnormalities. Infection of subcutaneous tissue is also present (Grade 3)

Fig 5. There is full-thickness skin loss present, extending linearly along the plantar aspect of the cranial metatarsal area, with extensive swelling, necrotic debris and infection of underlying tissues (Grade 4)

Fig. 6. Complete skin loss. End stage pododermatitis with swelling and infection of underlying tissue (Grade 6)

Appendix to the checklist

Appendix to 'Checklist for an assessment of the current health and welfare state of rabbits in the various segments of the companion animal sector in the Netherlands'

+ Indicates a positive influence on health/welfare
- Indicates a negative influence on health/welfare
0 Indicates that health/welfare is not influenced
~ Indicates that the influence on health/welfare is unknown

Questions

1. Do the rabbits/does the rabbit have the freedom to react adequately to hunger, thirst or incorrect food?

Measurable by the environment
Type and amount of food
A companion rabbit should have ad libitum access to hay.
Feed intake in rabbits should consist of:
- Good quality grass and/or hay (fibre): 80-85%
- Fresh greens/dark leafy greens: 10-15%
- Restricted amount of concentrate: 3%

Access to water
☐Ad libitum: **+** ☐Restricted: **-**

Type of water
☐Mineral water: **0** ☐Tap water: **0**

Measurable by the rabbit(s)
Do the rabbits exhibit selective feeding?
☐Yes: **-** ☐No: **+**

If selective feeding is present, what component(s) do the rabbits/does the rabbit prefer to eat?
☐Soft components: **- (This may be an indication of dental problems)**
☐Sweet/sugar rich components: **-** ☐Calorie rich components: **-**
☐Fresh food constituents: **-** ☐Fibre rich components: **-**

2. Do the rabbits/does the rabbit have the freedom to react adequately to physical and thermal discomfort?

Measurable by the environment

Does the location of the enclosure/enclosures vary with the season?

☐Yes: **0** ☐No: **0**

If yes, what are the different locations during different seasons?: Look at 'Observations, 2. Are the rabbits free of physical and thermal discomfort?' for the influences.

How often is/are the enclosure/enclosures cleaned?

☐< Once a week: **-** ☐Once a week: **+** ☐> Once a week: **+** ☐Every day: **+**

How often is the food tray cleaned?

☐< Once a week: **-** ☐Once a week: **+** ☐> Once a week: **+** ☐Every day: **+**

How often is the water supply cleaned?

☐< Once a week: **-** ☐Once a week: **+** ☐> Once a week: **+** ☐Every day: **+**

How often is the part of the enclosure where faces are deposited cleaned?

☐Daily: **+** ☐<Daily: **-**

Temperature in the enclosure/enclosures

☐Measurable (e.g. thermometer available): **0**
☐Below 3 degrees Celsius with insufficient measures to prevent cold stress: **-**
☐Below 3 degrees Celsius with sufficient measures to prevent cold stress: **+**
☐Between 3 and 15 degrees Celsius (the rabbits can still adapt by physiological/behavioural adjustments): **+**
☐Between 15 and 25 degrees Celsius (thermoneutral zone): **+**
☐Between 25 and 28 degrees Celsius (the rabbits can still adapt by physiological/behavioural adjustments): **+**
☐Above 28 degrees Celsius with sufficient measures to prevent heat stress/stroke: **+**
☐Above 28 degrees Celsius with insufficient measures to prevent heat stress/stroke: **-**

Do the rabbits/does the rabbit come outside of the enclosure?

☐Never ☐Yes, less than daily ☐Yes, daily

Very dependent on the enclosure. When, for example, a free accessible run is attached to the enclosure there is no negative influence on the health or welfare when the rabbits are not allowed out of the enclosure. When the rabbits are in a small enclosure without a free accessible run it has a negative effect on the welfare when the rabbits are not allowed out of the enclosure.

If there is no freely accessible run available, how much free exercise time do the rabbits/does the rabbit get per day?

☐None: **-** ☐<4 hours per day: **-** ☐4 hours a day or more: **+**

If neutered rabbits are present, neutered at which age(s)?
Does at five months of age or older: +
Does younger than five months of age : -
Bucks at three months of age or older: +
Bucks younger than three months of age: -

Is reproduction desired with the rabbit(s)?
☐Yes: **~** ☐No: **~**

If reproduction is desired, maximum number of nests per doe per year: ~

How much time is passed between two nests of the same doe?: ~

Are the rabbits/is the rabbit tattooed?
☐Yes: **-** ☐No: **+**

3. Do the rabbits/does the rabbit have the freedom to react adequately to pain, injury and illness?

Measurable by the environment

Vaccination status

☐Vaccination for RHDV (annually): **When given annually: +. If not given or less than annually: -**
☐Vaccination for RHDV2 (half-yearly): **When given half-yearly: +. If not given or less than half-yearly:-**
☐Vaccination for myxomatosis (annually): **When given annually: +. If not given or less than annually:-**

Has a coccidiosis treatment been performed?

☐Yes, preventive: **~** ☐Yes, as therapy: **+** ☐No: **~**

Has a deworming treatment been performed?

☐Yes, preventive: **~** ☐Yes, as therapy: **+** ☐No: **~**

Has a fungal treatment been performed?

☐Yes, preventive: **~** ☐Yes, as therapy: **+** ☐No: **~**

Has a treatment for ear and fur mites been performed?

☐Yes, preventive: **~** ☐Yes, as therapy: **+** ☐No: **~**

4. Do the rabbits/does the rabbit have the freedom to react adequately to fear and chronic stress?

Measurable by the environment

Are the rabbits/is the rabbit socially housed?

Rabbits are social animals and in principle the best option is social housing. Solitary housing leads to welfare problems. However, the relationship between the rabbits that are housed together should be "good". When agonistic behaviour is shown it can be a sign of reduced welfare. Positive interaction should be visible for a good welfare. The best option to prevent agonistic behaviour is to house neutered bucks with neutered does. When reproduction is desired an intact doe can be placed temporarily in the enclosure of an intact buck.

Young bucks in puberty can be very aggressive towards each other and therefore should not be housed together. Aggression is minimal in groups of does who have been housed together from a young age.

Housing rabbits with guinea pigs is not recommended. Rabbits can be carrier of Bordetella bronchiseptica, which is pathogenic to guinea pigs. Conversely, guinea pigs can carry Pasteurella and therefore be a source of infection for rabbits.

If reproduction is desired, and the offspring is sold, from what age are the rabbits sold?:

Younger than 6 weeks of age: - **6 weeks of age or older: +**

Are the rabbits/is the rabbit protected from possible predators?

☐Yes: **+**

☐Yes, but possible predators are audible or smellable (e.g. barking dogs audible): **-**

☐No: **-**

If possible predators are present, do the rabbits/does the rabbit have to possibility to withdraw themselves/itself from them?

☐Yes: **+** ☐No: **-**

Measurable by the rabbits

Do the rabbits/does the rabbit exhibit stereotypes?

☐Yes: **-** ☐No: **0**

If yes, what stereotypes are observed?

☐Excessive grooming (licking, gnawing, scratching etc.) ☐Bar gnawing

☐Walking rounds/circling ☐Weaving ☐Other:

All -

Is any lethargy/apathy observed in the rabbit(s)?

☐Regularly (daily): **-** ☐Sometimes (weekly or less): **-** ☐Never: **0**

If enrichment is available, do the rabbits/does the rabbit use it?

☐ Yes, all available forms of enrichment are used: **+**

☐No, none of the enrichment is used: **-**

☐Yes, but not all the available forms of enrichment are used. The following forms are used: **+**

5. Do the rabbits/does the rabbit have the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive?

Measurable by the rabbit(s)

How often do the rabbits/does the rabbit exhibit the following behaviours?

Positive behaviours:

- **Binky's**
- **Lying stretched out on the side**
- **Lying stretched out with the paws stretched backwards**
- **Hide in a corner or shelter**
- **Lying down or sitting against each other**
- **Licking/washing/cleaning each other**
- **Riding another rabbit**
- **Riding people, objects or another species**
- **Marking spaces or objects with the chin**
- **Urine spraying**
- **Actually digging**
- **Gnawing on offered gnawing material**
- **Approaching people, showing interest in people**
- **Stamping with the hind legs**
- **Alertly elevating itself**

Negative behaviours:

- **Huddling**
- **Fighting with each other**
- **Digging without a purpose**
- **Gnawing on enclosure, furniture, carpet or interior**
- **Growling**
- **Aggression to (hand of) human when entering the enclosure**
- **Recalcitrate when being picked up**

Observations

1. Do the rabbits/does the rabbit have the freedom to react adequately to hunger, thirst or incorrect food?

Measurable by the environment

Water supply

☐Drinking bottle: **-** ☐Open bowl: **+, if kept clean**

☐Both: **+, if kept clean**

Are the water supplies at an appropriate height?

☐Yes: **+**

☐The water supplies are too low: **-**

☐The water supplies are too high: **-**

How many (adult) rabbits share how many drinking spots in one enclosure?:

There should at least be one drinking spot per 10 rabbits.

How many adult rabbits share how many feeding spots in one enclosure? (Multiple feeding spots that stand directly against each other count as one feeding spot: ~

2. Do the rabbits/does the rabbit have the freedom to react adequately to physical and thermal discomfort?

Measurable by the environment

Location of the enclosure/enclosures (PET SHOP, GARDEN CENTER)

☐In the walking route: - ☐In a separate space/out of the walking route: +
☐In the shop-window: - ☐In the back of the store: + Other:

Location of the enclosure/enclosures

☐Kitchen: - ☐Living room: + ☐Bedroom: + ☐Garage: **- Rabbits do not like the smell of gasoline**
☐Barn: - ☐Outside: + ☐Outside on a porch: + ☐Other:

How is the enclosure/are the enclosures situated in the space?

☐Detached/central in the space ☐Against a wall ☐Other:
The assessment depends on several factors. For example, a freestanding enclosure outside could mean an increased risk of exposure to rain, wind and draft. However, when the rabbits have the possibility to withdraw themselves from the rain, wind and draft it is a lesser problem.

How are the walls of the enclosure/the enclosures constructed?

☐Closed walls, not transparent: ~ ☐Partial wire/mesh: ~ ☐Completely wire/mesh: ~
☐Partial transparent material (glass/plastic): ~ ☐Complete transparent material (glass/plastic): ~
☐Other:

Floor of the enclosure/enclosures

☐Grass: + ☐Linoleum: - ☐Carpet: + ☐Wooden floor: **Slippery wood: - Not slippery wood: +**
☐Plastic: **Slippery plastic: - Not slippery plastic: +** ☐Plastic grate floor: +
☐Tiles or stone: + ☐Mesh bottom: ~ ☐Cardboard: + ☐Other:

Bedding material of the enclosure/enclosures

☐Hay: + ☐Straw: + ☐(News)paper: + ☐Hemp fibre: + ☐Cotton: + ☐Flax: + ☐Earth: +
☐Wooden chips: + ☐Wooden pellets: + ☐Sawdust: + ☐Cardboard grains: +
☐Cat litter: - ☐No bedding: - ☐Other:

Floor/bedding material that the rabbit(s) walk(s) on outside of the enclosure

☐Hay: + ☐Straw: + ☐(News)paper: + ☐Hemp fibre: + ☐Cotton: + ☐Flax: + ☐Earth: +
☐Wooden chips: + ☐Wooden pellets: + ☐Sawdust: + ☐Cardboard grains: + ☐Cat litter: -
☐Grass: + ☐Linoleum: - ☐Carpet: + ☐Wooden floor: **Slippery wood: - Not slippery wood: +**
☐Plastic: **Slippery plastic: - Not slippery plastic: +** Plastic grate floor: + ☐Mesh bottom: ~
☐Cardboard: + ☐Other:

Is a large part of the surface where the rabbit(s) walk(s) on slippery?

☐Yes: - ☐No: +

Do the rabbits/does the rabbit have access to a freely accessible run?

☐Yes: + ☐No: -

If yes, what kind of run? (multiple answers possible)
☐An outside run ☐An inside run ☐A fenced walking field or garden
☐A big area in the house (living room, kitchen, playroom etc.)
☐A big area in a shed/garage ☐Other:
All +

Size of the enclosure and possible run (in cm2)
When there is no freely accessible run at an outdoor enclosure use the minimum dimensions that are given for an indoor enclosure.

Outdoor enclosures:
Rabbits that are kept outdoors should have a freely accessible run. It must be ensured that no predators such as cats and foxes can enter the run from above.
The size of the outside enclosure depends on the size of the rabbits and their amount. Two dwarf rabbits must have a minimum enclosure of 150cm x 60cm x 60cm. A suitable size of the run is at least 3-4m^2 for two dwarf rabbits. For two rabbits of 5 kg or more the enclosure should be at least 200cm x 80cm x 80cm and the run at least 5m^2.

Indoor enclosures:
The enclosure should allow the rabbits to stand fully stretched on their hind legs.
For two dwarf rabbits the enclosure should be at least 80cm x 150 cm. For two rabbits of 2 kg the enclosure should be at least 80 x 200 cm. For rabbits between 2,5 and 5 kg the enclosure should be at least 0,3m^2 per k.g. bodyweight. For rabbits heavier than 5 kg at least 0,25m^2 per kg bodyweight should be available.

Number of floors of the enclosure
☐One: - ☐Two: + ☐Three: + ☐Four: +

If multiple floors are present in the enclosure, is it safe (think of the distance between the floors and how they are connected)?
☐Way of connecting floors:
☐Distance between floors:
☐Safe: **0**
☐Not safe: -

Is there a lookout spot available for the rabbit(s) in the enclosure?
☐Yes: + ☐No: -

Do the rabbits/does the rabbit have the possibility to withdraw themselves from direct sunlight?
☐Yes: + ☐No: -

Do the rabbits/does the rabbit have the possibility to withdraw themselves from rain?
☐Yes: + ☐No: -

Do the rabbits have the possibility to withdraw themselves from wind?
☐Yes: + ☐No: -

Do the rabbits/does the rabbit have the possibility to come in contact with natural daylight?
☐Yes: + ☐No: -
Is there ammonia and/or a dull smell smellable in/near the enclosure/enclosures as a sign of bad ventilation?
☐Yes: - ☐No: +

Is there a draft sensible?
☐**Yes: - if the rabbits cannot withdraw themselves from the draft. 0 if the rabbits can withdraw themselves from the draft**
☐No: **0**

If a draft is sensible, do the rabbits/does the rabbit have the possibility to withdraw themselves from the draft?
☐Yes: + ☐No: -

Is the enclosure clean at the moment of observation?
☐Yes: +
☐No not completely clean, some faeces and urine are visible: **0**
☐No, stench and mold present: -

Is the food tray clean at the moment of observation?
☐Yes: +
☐No, old feed residues are sticking to the tray: **0**
☐Nee, food tray is filled with faeces and urine: -

Is the water supply clean at the moment of observation?
☐Yes: +
☐ No, there is a bit of litter in the water supply, the water is clear: **0**
☐ No, green scale visible/water is not clear: -

Is the section where faeces are deposited clean at the moment of observation?
☐Yes: +
☐ No, not quite spotless, some faeces and urine visible: **0**
☐ No, stench and mold present: -

Is there a litter box available in the enclosure?
☐Yes: + ☐No: -
If yes, what material is used in the litter box?
☐Hay ☐Straw ☐Cat litter ☐Cardboard grains ☐Sawdust ☐Peat
☐Wood shavings ☐Earth ☐Clay ☐Other:
All +, except for clay, clay: -

<u>Measurable by the rabbit(s)</u>
Red ears, panting and/or lying extremely stretched visible (as indicators of heat stress)?
☐Yes: - ☐No: **0**

Sitting huddled, shivering and/or huddling together visible (as indicators of cold stress)?
☐Yes: - ☐No: **0**

3. Do the rabbits/does the rabbit have the freedom to react adequately to pain, injury and illness?

Measurable by the environment

Are there sharp edges/irregularities in the enclosure that may cause injuries to the rabbits?

☐Yes: - ☐No: **0**

Measurable by the rabbits

Which of the following points associated with pain in rabbits are noticeable?

All -

Breathing

☐Lowered: - ☐Normal: **0** ☐Elevated: -

Weight

☐Underweight: - ☐Slight underweight: - ☐Normal weight: **0** ☐Slightly overweight: -
☐Real obesity: - ☐Morbid obesity with secondary diseases: -

Fur

No abnormalities: 0
All other options: -

Are there wounds/scars, abscesses or pulled hairs visible (as indicators for physical fights)?

☐Yes: - ☐No: **+**

Mucous membranes

No abnormalities: 0
All other options: -

Head

Position of head, eyes, ears and nares

No abnormalities: 0
All other options: -

Eye outflow visible?

No: 0
All other options: -

Nose outflow visible (also check the inside of the forepaws)?

No: 0
All other options: -

Ear scabies visible (visible by brown crusts in the ears)?

☐ Yes: - ☐No: **0**

Neck scabies visible?

☐Yes: - ☐No: **0**

Blue eyes and/or ears visible as indicator(s) of disease?
☐Yes : - ☐No: **0**

Pale ears visible as an indicator of anaemia or VHD infection?
☐Yes : - ☐No: **0**

Teeth
No abnormalities: 0
All other options: -

Abdomen
Digestive organs (palpation)
☐No abnormalities: **0** ☐Thickenings palpable: - ☐Other abnormalities: -

Urinary eczema?
☐Yes: - ☐No: **0**

Assessment of droppings
☐Normal droppings: **0. These are light coloured, hard, round droppings with a high raw fibre content.**
☐Small, hard, dark droppings: **-. These are an indication for reduced feed intake (mostly hay).**
☐Chain cord: **-. These droppings can indicate that the rabbits ingest a lot of fur.**
☐Moist, soft droppings: **-. These droppings indicate too much intake of sugar and/or proteins (too much concentrate and/or of insufficient quality) or indicate the presence of a parasitic infection (e.g. coccidiosis, ass maggots).**
☐Acaecotrophy: **-. In acaecotrophy clusters of caecotrophs are often found in the cage or adhered to the anus.**

Limbs
Pododermatitis
☐No: **0** ☐Yes, grade 1: - ☐Yes, grade 2: - ☐Yes, grade 3: - ☐Yes, grade 4: - ☐Yes, grade 5: - ☐Yes, grade 6: -

Are the nails too long?
☐Yes: - ☐No: **0**

Lame/problems with moving?
☐No abnormalities: **0** ☐Parese: - ☐Paralyse: - ☐Ataxia: - ☐Lame: -

4. Do the rabbits/does the rabbit have the freedom to react adequately to fear and chronic stress?

Measurable by the environment

Is the enclosure situated in a relatively quiet spot?

☐Yes: **+** ☐No: **When the rabbit(s) exhibit(s) signs of fear: -. When the rabbits do/rabbit does not exhibit signals of fear: 0**

If no, do the rabbits/does the rabbit exhibit signs of fear?

☐Yes: **-** ☐No: **0**

Rest/retreat area available?

☐Yes: **+** ☐No: **0**

If socially housed, is there at least one rest/retreat space per rabbit available?

☐Yes: **+** ☐No, and all the rabbits do not fit in the available resting spaces together: **-**

☐ No, but all the rabbits do fit in the available resting spaces together: **-**

Is enrichment available?

☐Yes: **+** ☐No: **-**

If yes, what type(s) of enrichment?:

Everything +

Are there signs of gnawing on the enclosure visible?

☐Yes: **-** ☐No: **0**

Measurable by the rabbit(s)

If socially housed with other rabbits, what kind of behaviour is being observed (are there signs of positive interaction and/or agonistic behaviour)?:

Positive interaction: + **Agonistic behaviour: -**

Reaction of the rabbit(s) when making an unexpected noise

☐Response as expected: **0** ☐Extreme startle reaction: **-**

Reaction to an approaching hand

☐Aggression: **-** ☐Trying to bite: **-** ☐Trampling: **-** ☐Fear/fright: **-** ☐Flight: **-** ☐No reaction: **0** ☐Seeks approachment to the hand without expressions of negative behaviour: **+**

Reaction to being handled

☐Aggression: **-** ☐Trying to bite: **-** ☐Trampling: **-** ☐Fear/fright: **-** ☐Flight: **-** ☐No reaction: **0** ☐Seeks approachment to the hand without expressions of negative behaviour: **+**

5. Do the rabbits/does the rabbit have the freedom to display normal behavioural patterns that allow the animal to adapt to the demands of the prevailing environmental circumstances and enable it to reach a state that it perceives as positive?

Measurable by the environment

The rabbits have/the rabbit has the possibility to hide themselves in the enclosure

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to exhibit resting behaviour

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to stand fully stretched on their hind legs in the enclosure

☐Yes: + ☐No: -

The rabbits have/the rabbit has the possibility to perform hopping behaviour

☐Yes: + ☐At a minimum: - ☐No: -

The rabbits have/the rabbit has the possibility to dig

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to exhibit exploratory behaviour

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to exhibit foraging behaviour

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to eat in a natural grazing posture

☐Yes: + ☐At a minimum: 0 ☐No: -

The rabbits have/the rabbit has the possibility to exhibit social behaviour

☐Yes, by direct contact, sight and smell: + ☐Yes, but only by sight and smell: -
☐Yes, but only by smell: - ☐No: -