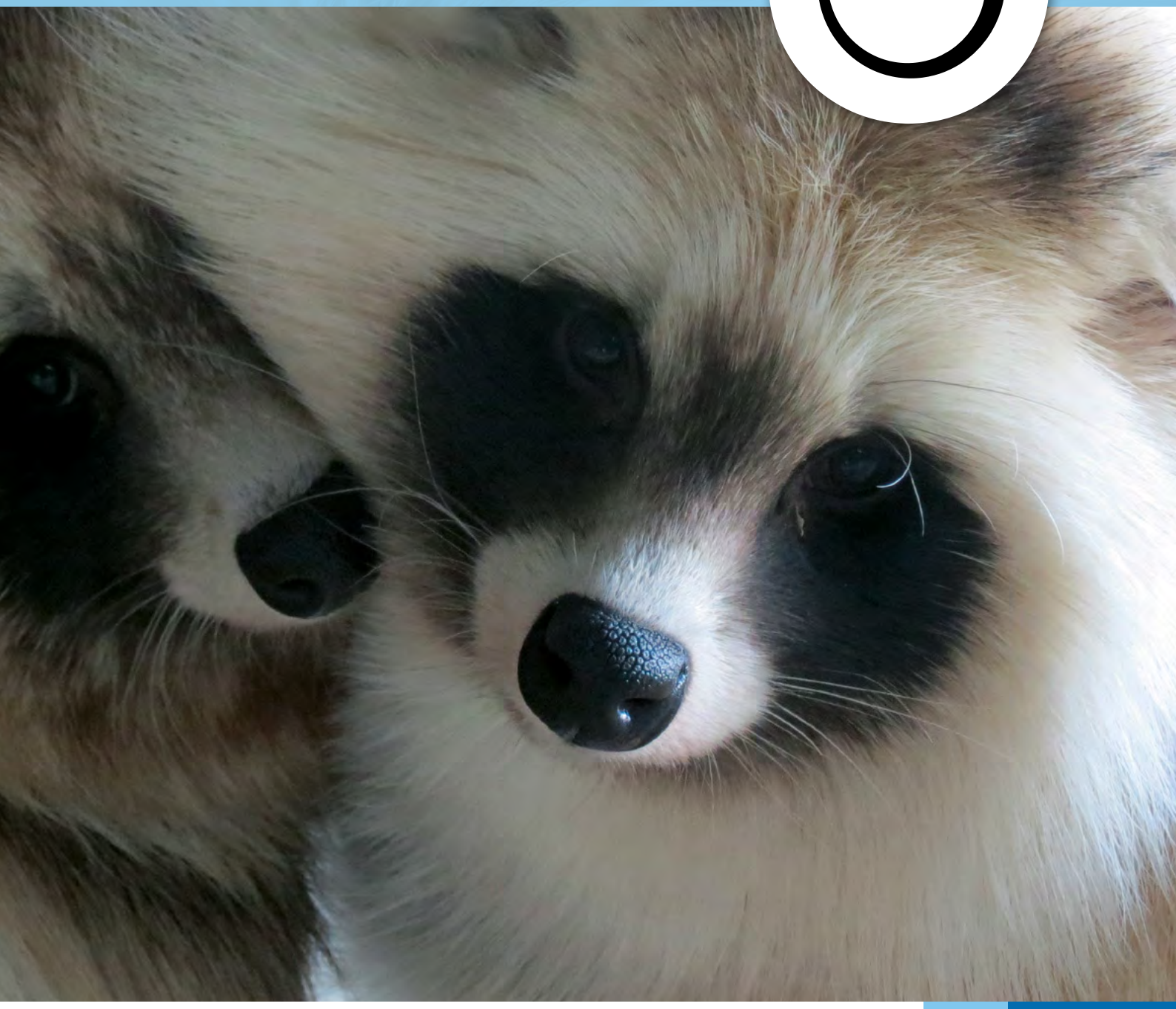

# WELFUR

## Welfare Assessment Protocol for Finnraccoon

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# Acknowledgements

The present document originates from the WelFur project which has been co-ordinated by Fur Europe. This WelFur protocol (logo, content, calculations, web-site, etc.) is the intellectual property of Fur Europe and cannot be used by a third-party for advertising or commercial use. Any other use is subject to the prior consent of Fur Europe. The consortium of experts, and universities involved are listed in Annex A 'Contributors to WelFur'. This document presents version 1 of the assessment protocol for Finnraccoons dated 20th October 2020. Please use the following citation when referring to this document: WelFur 2020. WelFur Welfare Assessment Protocol for Finnraccons. WelFur Consortium, Brussels, Belgium.

# WELFUR

# WELFARE ASSESSMENT PROTOCOL FOR FINNRACCOON

# Foreword

Animal welfare is a societal issue many citizens and consumers are concerned about. For the same reason animal welfare is a key priority in the European fur community. Animal welfare is however also a difficult concept to pin down in our societies of moral plurality; people have different values, and some of these values are contradictory.

To the extent animal welfare can be assessed by use of scientific measures, WelFur is a tool that works to improve animal welfare, and to help to support an informed and fact-based fur debate. As a part of the global consumer labelling scheme FurMark, that includes environmental- and human rights standards, WelFur also offers consumer transparency.

Animal welfare standards are not fixed objectives, but the result of a dynamic process in which new knowledge and technologies must be considered as they appear. In the preparation of the WelFur protocols for fur-farmed species (mink, fox, Finnraccoon), existing scientific knowledge developed over the last 40 years has been reviewed. As a dynamic programme, the WelFur protocols can be updated to reflect new knowledge.

Overall, WelFur has three objectives:

1. To provide a reliable and feasible system for animal welfare assessment based on scientific measurements.
2. To ensure transparency about animal welfare in the fur production.
3. To work as a strategic tool for the individual fur farmer to identify any areas of the fur farm where animal welfare can potentially be improved.

**Background**

To promote a more objective and transparent view of animal welfare in European fur farms, the European Fur Breeders' Association (EFBA – now Fur Europe) initiated the WelFur project in 2009, focusing on mink and fox to begin with. WelFur is based on the principles and methodology of the European Commission's Welfare Quality® project that addresses welfare assessment in pigs, poultry and cattle. The welfare assessment relies on a sequential evaluation process, in which measurements are collected on farms to assess the welfare status of the farm within 12 criteria. These criteria are then aggregated into four main welfare principles, and finally an overall welfare classification is produced.

This forms the basis of a science-based certification programme covering 97 percent of the European mink, fox and Finnraccoon farms, in a scheme where membership is voluntary. The high participation rate is due to the programme's built-in market access restrictions: non-certified fur farms are not allowed to sell at the international fur auction houses, which are the only marketplaces for natural fur pelts.

The implementation of the WelFur certification programme took place in the period 2017-2020. Individual fur farms from outside of Europe are also being enrolled in the WelFur programme.

**Independency and credibility**

The WelFur protocols have been developed by independent scientists from various European universities (see annex). The primary work of the scientists was to identify and evaluate the possible welfare indicators and measurements that ultimately would be included in the protocols. These were selected on the basis of scientific validity, reliability and feasibility. In order to secure the validity of the research and the alignment with the original Welfare Quality® project, additional external experts were appointed to review the WelFur protocols.

On-farm-assessments are undertaken by the independent third-party, Baltic Control, an ISO/IEC 17021 accredited, international certification body. Only Baltic Control can issue WelFur certificates to fur farmers. Baltic Control's fur farm assessors are trained by the scientists responsible for the relevant species protocol.

While the on-farm assessments can provide a realistic image of the animal welfare status on fur farms, the collected data is the basis for ongoing improvements in animal welfare through analysis and subsequent actions, for example by changes in farm management procedures. All fur producing countries in Europe have a WelFur advisor associated with the farm, in order to make sure that WelFur data analysis expertise is available to the fur farmers.

In 2019, WelFur was adopted in the European Commission's Database for Self- and Co-regulation Initiatives. No other animal welfare programmes have currently been endorsed in the database - which requires testing against the principles Openness, Good Faith, Monitoring, Continuous Improvement, Inclusiveness and Legal Compliance.

**Continuous improvement**

The WelFur data collected during farm assessments provide unique opportunities for animal welfare improvements at both farm, and societal levels. Individual farm data directly support on-farm animal welfare improvements, and the total WelFur data set is accessible to universities for research purposes. Data access may also be relevant for national authorities and lawmakers.

Once a year, WelFur data is analysed by scientists and industry representatives in order to identify best farm practices, shape new industry projects on animal welfare, and initiate new research. New animal welfare initiatives may be regional if the data analysis suggests that certain animal welfare issues are associated with certain countries or geographic areas. This procedure ensures that animal welfare improvements are pursued and gained in a systematic way.

For transparency purposes this work, including policies and projects designed to improve animal welfare, is published by Fur Europe in an annual WelFur report together with key data.

# Contents

# Terms and definitions

| | |
|---|---|
| **Adult:** | A Finnraccoon, which has been born in an earlier year than the assessment is done. |
| **Animal-based measurement (ABM):** | A welfare measurement taken directly from the animal. |
| **Assessor:** | Person collecting data on the farm by using the protocol. |
| **Barn:** | A solid walled building used for raising Finnraccoons. |
| **Breeding animals:** | Breeding females and males. |
| **Breeding female:** | An adult female that is kept for breeding purposes. |
| **Breeding male:** | An adult male that is kept for breeding purposes. |
| **Cage:** | The enclosed area where the Finnraccoon is living. |
| **Cub:** | Young Finnraccoon nursed by the mother, or a Finnraccoon younger than eight weeks staying without the mother. |
| **Farm:** | Designates the animal unit - and means the whole, or a part or section of a farm, that deals with a certain type of animal, with distance of minimum of 1 km from any other animal unit belonging to the farmer. |
| **Farm manager:** | Person responsible for the farm, or a person who is able to communicate all the information needed for the assessment of the farm. |
| **Individual cage:** | Cages that stand on their own outdoors, and are not attached to other cages. |
| **Juvenile:** | Young Finnraccoon, born in the same year, but already weaned from its mother, or a Finnraccoon older than three months staying with its mother. |
| **Killing method:** | Techniques that lead to the death of the animal. |
| **Management-based measurement:** | Measurement that refers to how the farm and/or the Finnraccoons are managed. |
| **Open shed:** | A fur animal building, including solid structure with cage rows, but without solid walls on the sides of the building. |
| **Pelting:** | The humane killing of animals to harvest mature winter pelts. Pelting takes place from late November to early January. |
| **Resource-based measurement (RBM):** | Measurement that is taken from the environment, for example provision of space, or objects in the area, in which the animals are kept. |
| **Weaning:** | The process where the mother is separated from her cubs, or the cubs are separated from their mother. |
| **WMA (WelFur Mobile Application):** | The electronic application (App) used for on-farm data collection. |

# 1. Introduction to the WelFur protocol

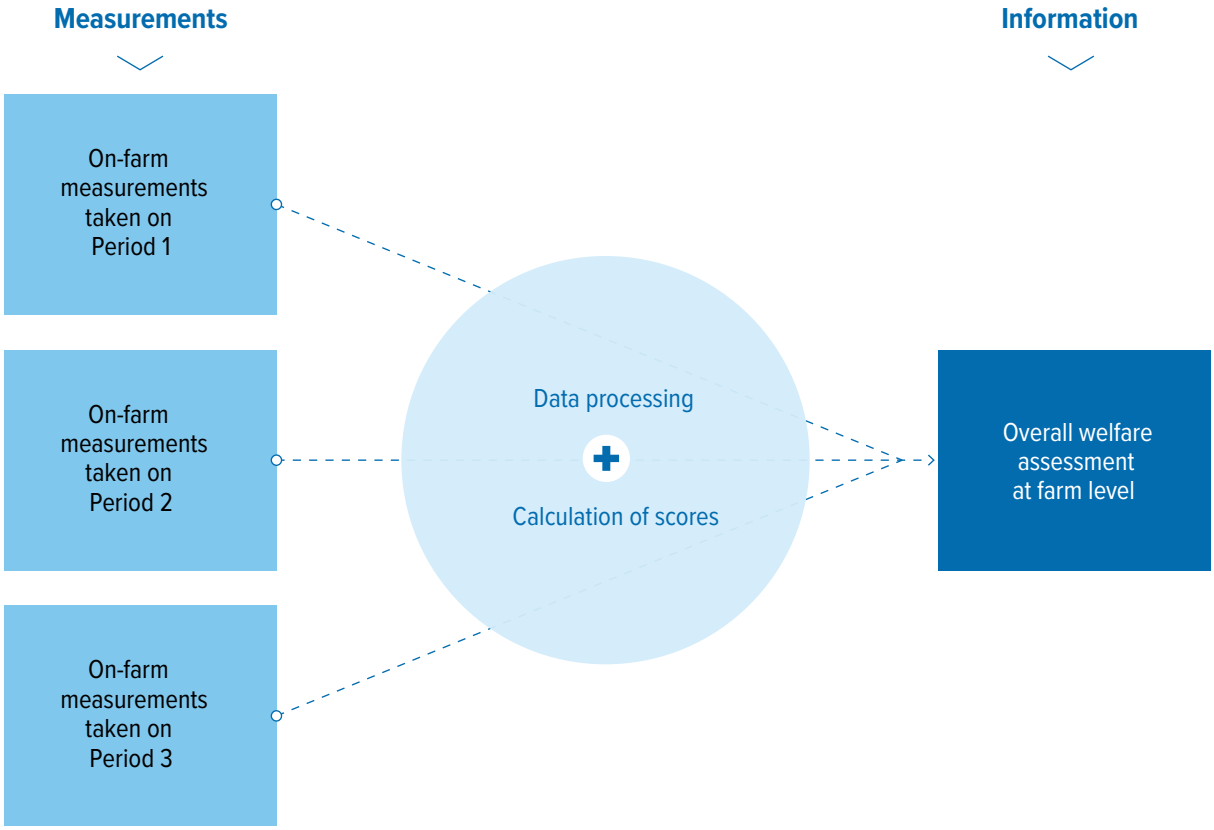
## 1.1 Overall structure of the WelFur assessment

The objective of the WelFur project was to develop farm-level welfare assessment protocols for the four main fur animal species farmed in Europe (the mink, blue fox, silver fox and Finnraccoon). As in the Welfare Quality® project, the aim was to build an overall assessment of welfare. The results obtained from measurements are synthesised to form an overall assessment.

The welfare assessment related to a given farm is based on the calculation of welfare scores from the information collected on that farm (Figure 1). An advisor can use the welfare assessment to highlight any points requiring the farm manager's attention. The information can also be used to inform consumers about the welfare status of the animals whose fur they buy.

This document contains the protocol for Finnraccoon. It presents the measurements relevant for the farm and an explanation of what data should be collected, and in what way. Also the score calculation system is described in the document.

*Figure 1. Structure of the WelFur assessment including the different sources of information.*




## 1.2 Basic principles

### 1.2.1 Defining welfare principles and criteria

The WelFur project used the welfare principles and criteria defined in Welfare Quality® (Table 1).

*Table 1. The principles and criteria that are the basis for the Welfare Quality® and WelFur assessment protocols*

| Welfare principles | Criterion number | Welfare criteria |
|---|---|---|
| Good feeding | 1 | Absence of prolonged hunger |
| | 2 | Absence of prolonged thirst |
| Good housing | 3 | Comfort around resting |
| | 4 | Thermal comfort |
| | 5 | Ease of movement |
| Good health | 6 | Absence of injuries |
| | 7 | Absence of disease |
| | 8 | Absence of pain induced by management procedures |
| Appropriate behaviour | 9 | Expression of social behaviours |
| | 10 | Expression of other behaviours |
| | 11 | Good human-animal relationship |
| | 12 | Positive emotional state |

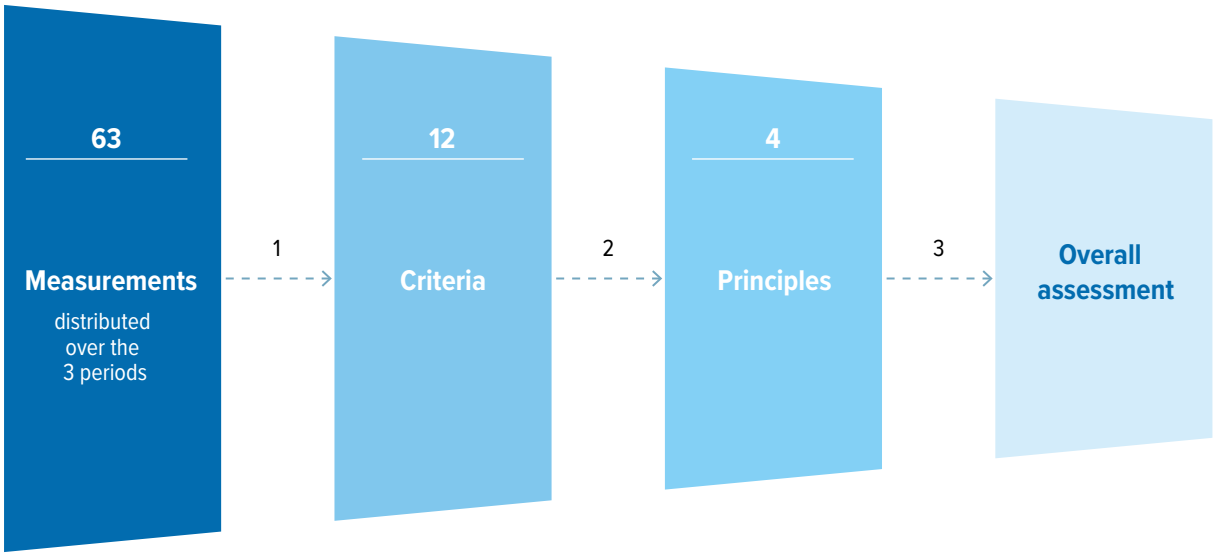
The criteria are detailed as follows in the Welfare Quality® protocols:

1. Animals should not suffer from prolonged hunger, i.e. they should have a suitable 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 when they are 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 injuries, e.g. skin damage and locomotory disorders.
7. Animals should be free from diseases, i.e. farm managers should maintain high standards of hygiene and care.
8. Animals should not suffer from pain induced by inappropriate management, handling, killing or surgical procedures (e.g. castration).
9. Animals should be able to express normal, nonharmful, 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.

### 1.2.2 Structure of scoring process

As in the Welfare Quality® protocols, once all the measurements have been recorded on a farm, a bottom-up approach is followed to produce an overall assessment of animal welfare on that particular farm. First the data collected (i.e. the values obtained for the different measurements) on the farm are combined to calculate criterion-scores; then criterion scores are combined to calculate principle-scores, and finally the farm is assigned to a welfare category according to the principle-scores attained (Figure 2). A mathematical model has been designed to obtain the criteria and principle scores.

*Figure 2. Approach defined in Welfare Quality® and therefore in WelFur, to produce an overall assessment of animal welfare*




As in Welfare Quality®, animal scientists, including those who developed the measurements, were consulted to define formulae to compute data from individual measurements, into criterion-scores (Step 1 in Figure 2). Several methods were used to compute data from measurements into criterion-scores: spline-functions, weighted sums, and decision tables. Experts from the area of animal sciences were consulted to interpret the data in terms of welfare. When a criterion was composed of very different measurements which experts found difficult to consider together, data were aggregated using weighted sums, and a penalty procedure was applied to reduce the compensation effect of the higher scores on lower scores. In Welfare Quality®, these consultations helped to define principle-scores from criterion-scores and to create a procedure to synthesise principle-scores into an overall assessment (Steps 2 and 3 in Figure 2). In the WelFur protocol, these two steps were extrapolated from Welfare Quality® with no further consultation.

The data produced by the measurements, relevant to a given criterion, are interpreted and synthesized to produce a criterion-score that reflects the compliance of the farm with this criterion. As in Welfare Quality® assessment protocols, this compliance is expressed on a 0 to 100 value scale, in which:

1. '0' corresponds to the worst situation one can find on a farm (i.e. the situation below which it is considered there cannot be further decrements in welfare).
2. '50' corresponds to a neutral situation, the level of welfare is 'not too bad' but 'is not very good'.
3. '100' corresponds to the best situation one can find on a farm (i.e. the situation above which it is considered there cannot be further improvements in welfare).

For the calculation of principle-scores from criteria, the WelFur protocol averages the parameters set in Welfare Quality® for the various species (cattle, pigs and poultry) to determine the Choquet integral parameters to be used for fur animals. WelFur transposed the rules used in Welfare Quality® to produce an overall welfare assessment of farms. Contrary to Welfare Quality® in WelFur the key reference point is current practice, and the naming of the four overall categories has been changed accordingly.

See section 4 for the details and examples of the calculation system.

# 2. An introduction to Finnraccoon farming

## 2.1 The origin of the Finnraccoon

The Finnraccoon is one of the six subspecies of the *Nyctereutes procyonoides*. The species is endemic in Asia. The wild conspecifics of Finnraccoons (*Nyctereutes procyonoides ussuriensis*), found living all around Europe, are called raccoon dogs.

The history of the species in Europe starts from approximately 9 000 raccoon dogs introduced from the Far East to areas of the former Soviet Union between 1929 and 1955. The animals were raised in captivity at the beginning, but some animals were deliberately released into the wild. Due to the high plasticity of the species, they easily colonised new areas and started to spread towards the west. Today the raccoon dog is widespread across the European continent, despite eradication programmes.

In the wild, raccoon dogs mate for life. The pair typically roams close to each other. The home ranges overlap highly, and may also partially overlap with the home ranges of neighbouring animals/pairs. Raccoon dogs are socially tolerant. They do not actively defend their home ranges. Latrines, situated in the core area of the home range, form an important part of the social communication within the pair, family, and neighbouring animals.

Wild raccoon dogs follow a crepuscular activity pattern. They typically move inside dense vegetation, and avoid moving in open areas. Due to their short legs, moving in the deep snow is difficult in winter. Raccoon dogs do not climb trees. In lake and archipelago areas, they may swim. They retreat to a den, hollow, or other natural shelter for resting.

The raccoon dog is the only canid species with a facultative passive wintering strategy. Autumnal fattening and adiposity precede the passive wintering. During winter, raccoon dogs may spend periods, lasting from days to weeks, hibernating superficially. During these periods, raccoon dogs remain inside a den or other natural shelter and do not eat. A shallow hypothermia may occur. Raccoon dogs can tolerate total food deprivation for weeks in mid-winter.

Raccoon dogs are omnivorous. They forage for small food items. They eat plant food, like seeds, berries and fruits, but also small animals, like invertebrates, amphibians, birds, eggs, small mammals and carrion. Raccoon dogs do not hunt themselves for large prey. They readily visit gardens and garbage dumps to eat human leftovers. The diet varies much depending on the local food availability and season. The raccoon dog metabolism is adapted to seasonal variation in abundance of food and subsequent body weight changes. Raccoon dogs do not carry food into the den for the cubs during the cub nursing period.

Raccoon dogs breed in spring or early summer. Both parents participate in cub nursing. Paternal behaviour is evident, especially during the early cub nursing period while the female is foraging outside the den to supply the energy demands of lactation. Raccoon dogs do not typically dig their own breeding nest, but use natural caves and the abandonded nests of other species. The juveniles disperse from the natal home range within the first year of life, typically during the autumn. Various dispersion patterns have been described, and there is no systematic difference in dispersion patterns between males and females.

## 2.2 Finnraccoon farming and the annual cycle

The captive Finnraccoon originates from wild captured animals. First trials of raising these animals in captivity were carried out in the early 1970s in several European countries. Thereafter, intensive and selective breeding has produced a domesticated captive stock. Selection has resulted in reduced fear of humans, larger body size and better fur quality in comparison to the wild raccoon dog. In the 2010s, annual production has remained around 150 000 Finnraccoon pelts in Europe.

European recommendations and national legislations lay down the minimum requirements for the housing conditions and management of Finnraccoons. These documents stipulate the minimum cage dimensions, guidelines for enrichment, and other requirements for the care and handling of the animals. Under production conditions, Finnraccoons are typically raised in wire mesh cages situated in outdoor sheds or in unheated barns under natural light conditions. Breeding animals are typically raised singly outside the cub nursing period, whereas juveniles are housed in pairs or groups, due to their high social tolerance. Resting platforms are typically provided, and activity objects, like wooden blocks, bones and plastic tubes, are used to enrich the housing conditions. A nest box with bedding material (typically straw) is provided during the breeding season for nest building, undisturbed parturition and nursing of the newborn cubs.

Finnraccoon farming follows an annual cycle due to the annual breeding season being synchronised by light conditions. The breeding season starts in February-March. Both natural mating and artificial insemination methods are used on farms. The gestation last for a mean of 60 days. The cubs are then born in April-May. The newborn cubs weigh approximately 90g, are blind and have poor thermoregulatory capacity. There are typically 6-12 cubs in a litter.

The cubs start to move outside the nest box when they start to eat solid food, at the age of 3-4 weeks. Lactation may continue at least until the cubs' age of 6 weeks. The female nurses the cubs until the age of 7-8 weeks or longer. Separation of the cubs from the mother can be carried out flexibly according to the condition and size of the litter, the condition of the female, social tolerance amongst the litter, and other routines on the farm.

After maturation of the winter fur, in late November or early December, the production animals are humanely killed on the farm by using head-to-body electrocution. The pelting, typically, takes place immediately after killing.

Finnraccoons are fed once or twice a day, depending on the season and requirements of the animals. The feed consists mainly of slaughterhouse offal, fish and cereals. Feed is often supplemented with a source of fibre, like straw or hay. Water is provided through automatic watering systems, or is provided manually.

Finnraccoons are generally healthy animals and the mortality rate is typically low. The housing conditions readily allow daily inspection of the health and behaviour of the Finnraccoons. Finnraccoons are left intact, i.e. they are not marked and they are not subject to any physical mutilations of the body or surgical procedures (no castration, clipping or trimming) at any stage of their life.

Finnraccoons are handled by hand or with the aid of neck tongs. Small cubs are handled by hand. Production animals are seldom handled, whereas breeding animals are exposed to repeated handling during the breeding season (detection of heat, mating, and collection of semen and/or insemination). Finnraccoons typically live for their entire life on one farm, the one where they were born, i.e. there is no need for systematic transportation of animals at any stage of life.

## 2.3 The welfare of the Finnraccoon during the annual production cycle

After the pelting season, only breeding animals remain on the farm in mid-winter. Typically 75-80 % of these animals are breeding females, and 20-25 % of the animals are breeding males. The first timer breeding animals, typically remain relatively inactive and passive throughout their first winter until the start of the mating season in late February-March. The older breeding animals, which typically have been fed more restrictively, may remain more active during the winter, and their breeding season typically starts earlier (mid-February). Due to the low activity level, the observation of some animal-based measurements of behaviour (e.g. temperament and stereotypic behaviour) and health (e.g. moving difficulties) is somewhat challenging in winter. Therefore, the assessment methods used in winter have been adjusted to the activity level of the animals. Regardless of the inactivity, some behavioural signs of impaired welfare can be assessed, for example fur chewing. The health of the breeding animals is typically very good during the winter.

Resource and management based measurements can be easily assessed during the winter. In winter there may, for example, be a risk that the watering system freezes if not frost-protected.

During gestation and parturition and early cub nursing period, there is an increased risk of mortality in females. The primiparous females typically have more welfare challenges during this period than the multiparous females. The early cub nursing period also places high demands on the female due to the energy requirements of lactation. Therefore management of feeding and watering are of high importance during the lactation and also at the time when the cubs start eating solid feed. Otherwise, the health and welfare of females and cubs typically remain good during the latter part of the cub nursing period. However, separation of the mother from the litter is a critical event; too early or too late separation may pose health and welfare risks to both the female and cubs. For this reason, welfare assessment at the end of the lactation period and start of the separation process is carried out.

The requirements for the housing conditions of females are more demanding during the cub nursing period than in other periods, since the needs of both, the female and litter must be considered. After separation from the mother, the cubs should not be singly housed. The resource based measurements used in this protocol at the end of the cub nursing period and start of the separation from mothers can be used to help ensure sufficient availability of the important resources for the breeding females and litter during the cub nursing period (e.g. available area), and also after the separation for the females and newly separated juveniles (e.g. social housing of juveniles, availability of activity objects).

The early autumn is characterised by recovery of females from breeding, and fast growth of the juveniles. The juvenile Finnraccoons are fully grown in length at the end of September or early October. Simultaneously at the end of the fast growing period, the activity level of juvenile animals starts declining towards the wintertime inactivity. Due to very high appetite and increasing inactivity, Finnraccoons can achieve a heavy body condition, or even obesity, during the autumn. Although, obesity is not likely to be a direct welfare problem in itself, and the species is adapted to significant annual body weight changes, there may be consequences for health (e.g. bent feet, moving difficulties). Also, the risk for health problems and outbreaks of diseases (e.g. FENP - Fur Animal Epidemic Necrotic Pyoderma) typically increase as the autumn proceeds towards the maturation of the winter fur. Therefore, the later part of the growing season is an optimal time window for assessing animal-based measurements of behaviour (e.g. fur chewing) and health (e.g. diseases) and resource-based measurements (e.g. social housing of juveniles, availability of straw).

# 3. Welfare assessment protocol for Finnraccoon

The instructions on collecting data presented in this document apply to Finnraccoon (*Nyctereutes procyonoides*) farmed for its fur in Europe.

## 3.1 Definitions of the Periods, data collection windows and assessed animals

In order to have an overall view of the whole farm, the production cycle is covered by using three periods. Animal welfare is measured within a shorter data collection window in each period.

The data collection window within each period is selected so that comparable data, as far as is practical, can be collected from all farms.

Period 1: Assessment of the welfare of breeding animals in the winter, from after the pelting season, until the end of the mating season - from December 1st to March 31st. On-farm data collection is recommended to be done within a period from January 5th to February 15th, i.e. within a period before mating/insemination starts. The sample of assessed animals may include:

- Breeding females
- Breeding males

Period 2: Assessment of the welfare of breeding animals, cubs and recently weaned juveniles in the spring and summer, during the pregnancy, parturition, nursing period and weaning from April 1st to July 31st. On-farm data collection is recommended to be done from June 1st to July 31st, when the females are nursing their cubs and some of the cubs have been weaned from their mother (maximum of 50% of cubs have been weaned), at the cubs' age of four weeks to 12 weeks (main population of the cubs). The sample of assessed animals may include:

- Breeding females and their cubs older than four weeks
- Breeding females without cubs (barren females or the cubs have been already weaned)
- Breeding males
- Recently weaned juveniles

The sample of assessed animals does not include

- Pregnant breeding females
- Breeding females with cubs younger than four weeks

Period 3: Assessment of the welfare of adult breeding animals and juveniles in the autumn, during the growing season August 1st to November 30th. On farm data collection is done from October 1st to November 30th, but before the harvesting for pelting (maximum of 10% of animals have been euthanized and pelted). The sample of assessed animals may include:

- Breeding females
- Breeding males
- Juveniles

The phases of the production cycle, which occur during very short periods of time in all farms, for example mating/insemination and harvesting for pelting, are not included. To avoid disturbing the animals during the most sensitive periods, data collection is not carried out during the late pregnancy, parturition and early cub nursing periods.

## 3.2 Guidelines for an assessment on a Finnraccoon farm

The objective of this section is to provide the information required to organise the farm visit, to take a stratified sample for the assessment, and to collect reliable and useful data on the farm. The welfare indicators are described in section 3.4.

### 3.2.1 Before the assessment

First, the farm manager is contacted. The assessor and farm manager should discuss and agree on the purpose of the assessment, how the assessment will be conducted, and the date for the assessment. The farm manager must be informed that the daily routines on the farm are disturbed as little as possible, except the possibility that the feeding may need to be delayed (due to the observation of stereotypic behaviour) on the assessment day. The farm manager must be informed that the measurements taken by the assessor are non-invasive and there is no need to touch the Finnraccoons during the assessment. The farm manager must be informed about the short interview at the beginning of the assessment day, and that otherwise the presence of the farm manager is not required during the assessment. During the

interview, the mortality recordings and documents related to the killing will be required to be available for assessment. The farm manager must also be informed what biosecurity measures are taken by the visiting assessor against the spread of disease. The farm manager must further state if there are any contagious diseases on the farm and/or any specific security or biosecurity rules on the farm which the assessor must consider while on the farm.

The assessment is planned to start in the morning (at or after sunrise) and usually it takes several hours to complete the assessment. However in Period 1, the walking assessment enables assessment of two (small) farms located near to each other during the same day.

#### The equipment needed on the farm

For the assessment of a Finnraccoon farm the following equipment are needed:

- Data collection instructions
- Tablet with the WMA (WelFur Mobile Application) installed
- Equipment to test the functioning of the water nipples
- Shoe covers, overalls and disinfectants

### 3.2.2 General guidelines

Understanding the behaviour of Finnraccoons is crucial for the assessment. For the assessment of most of the animal based measurements, the Finnraccoons being assessed must be active and on their feet in Periods 2 and 3, and preferably also in Period 1. The assessor must use his/her body language and other techniques to make the Finnraccoon move voluntarily. The Finnraccoons are not touched in any part of the assessment. It should be avoided to leave any equipment accessible to the Finnraccoons; they are very curious and easily destroy any object they can reach.

Whenever moving on the farm, the assessor must be discreet and respect the animals and people working on the farm; for example, the assessor must always get out of the way of the feeding machine. The assessor must also follow the security and biosecurity instructions given by the farm manager.

### 3.2.3 Interview of the farm manager

There are three parts to the assessment: interview of the farm manager, observation of stereotypic behaviours, and the assessment of animal-based measurements (ABM) and resource-based measurements (RBM). In all Periods, the assessment is started with a short interview with the farm manager, including the inspection of the killing device. At this stage, input from the farm manager is required. The content of the interview varies slightly between the assessment Periods. The measurements included in the interview in each period are presented in Table 2.

*Table 2. The measurements to be discussed with the farm manager in each Period.*

| Measurement | Period 1 | Period 2 | Period 3 |
|---|---|---|---|
| **Availability of nutritional fibre** | | | |
| Nutritional quality of feed | yes | yes | yes |
| **Type of the watering system** | | | |
| Type of watering system | yes | yes | yes |
| Protection from freezing* | yes | - | yes |
| Operational hours* | yes | yes | yes |
| Frequency of water provisions* | yes | yes | yes |
| **Protection from exceptionally hot weather** | | | |
| Sprinkling of the air or roofs of the sheds | - | yes | - |
| **Mortality** | | | |
| Quality of the mortality data | yes | yes | yes |
| Total mortality | yes | yes | yes |
| Percentage of humanely killed animals out of total mortality | yes | yes | yes |
| Number of animals on the farm | yes | yes | yes |

*Table continued over page*

*Table continued from previous page*

| Measurement | Period 1 | Period 2 | Period 3 |
|---|---|---|---|
| **Emergency killing** | | | |
| Killing device | yes | yes | - |
| Certificate of the inspection of the killing device | yes | yes | - |
| Killing method of cubs | - | yes | - |
| **Killing at farm at the end of Period 3** | | | |
| Species specific SOP for killing | - | - | yes |
| Certification of competence for killing | - | - | yes |
| Killing device | - | - | yes |
| Certificate of the inspection of the killing device* | - | - | yes |

* Depending on the answers to other questions within the measurement

### 3.2.4 Sampling of the animals for the assessment

After the interview with the farm manager, the assessor should become familiar with the number of sheds and barns occupied by Finnraccoons and the numbers of different types of Finnraccoons present in these sheds and barns. In the case of pair or group housing, a record of the number of animals per cage is needed. This information is used to create the stratified sample for assessment of stereotypic behaviour and assessment of ABM and RBMs.

There may be three types of Finnraccoons, i.e. adults, juveniles and unweaned cubs on the farm (Table 3). Adults may be present on the farm in all Periods. Juveniles can be present on the farm in Periods 2 and 3, and unweaned cubs can be present on the farm only in Period 2. Note that unweaned cubs are not included when calculating the number of animals on the farm for sampling, since typically no reliable record of the numbers of new born and unweaned cubs is available on the farm and the cubs are assessed "via their mother". To avoid disturbing the animals, neither pregnant females nor females with cubs younger than four weeks are included in the population to be sampled and assessed in Period 2.

*Table 3. The different types of animals present on the farm during the three periods.*

| Type of animal | Period 1 | Period 2 | Period 3 |
|---|---|---|---|
| Adult female | A | A | A |
| Adult female with cubs older than 4 weeks | - | A | - |
| Adult, pregnant or recently delivered female with cubs less than four weeks old | - | (A) | - |
| Adult male | A | A | A |
| Juvenile | - | J | J |
| Cub | - | C | - |

A = Adults, J = Juveniles, C = Cubs. The letter also refers of the type of the animal in Table 4.

The natural activity rhythm of Finnraccoons affects the data collection on farm. Therefore, the sampling, data collection method and categorisation of measurements for ABM and RBMs (Table 4) differs in Period 1 from those in Periods 2 and 3. These two sampling methods and data collection methods are separately described below. The differences in the categorisation are described within each measurement.

#### 3.2.4.1 Sampling in Period 1

Due to the voluntary passive wintering strategy of the species, many Finnraccoons will remain resting despite attempts to encourage the animals to their feet in Period 1. Therefore, no detailed inspection of the animals for ABMs is done in Period 1. Instead, a transect walk, or a walking assessment, is performed. Walking assessment differs from the detailed assessment of

individuals carried out in Periods 2 and 3. Differences in the sampling method for ABMs also affect the observation of stereotypic behaviour in Period 1.

To ease the observations in Period 1, the sheds are further divided into rows of cages. There are typically two rows of cages in one shed. A random sample of 12 rows of cages is selected from the farm. The rows may be situated in the same sheds (in 6 sheds) or in different sheds. If Finnraccoons are raised in less than 6 two-row sheds on the farm, all of the animals are assessed.

During **the observation of stereotypic behaviour**, the assessor counts the number of stereotyping animals observed while walking through a shed and records the total number of stereotyping animals from all animals in the row of cages. The assessor checks at the same time that the number of animals in the shed corresponds approximately to the number of animals given by the farm manager, and edits in the WMA the number of animals if needed. All cages in the sample rows are assessed.

**In the assessment of ABMs** (Table 4), the assessor walks through the shed, and observes the ABMs (except diarrhoea) from all the animals in the row of cages. All cages in the sampled rows are assessed.

**In the assessment of RBMs and Diarrhoea** (Table 4), a block of 10 cages is randomly selected from each row of cages included in the sample. Only those cages of the block that have at least one animal are assessed for the RBMs (empty cages are not assessed). The assessor stops the walking assessment (ABM) for a moment to assess the RBMs and diarrhoea in front of the selected cages. After assessing the RBMs and diarrhoea, the walking assessment of ABM is continued in the row of cages.

In a very small farm raising Finnraccoons in a maximum of two sheds, the sheds are artificially divided into two parts, to increase the sample size of RBMs. The minimum number of cages assessed for RBMs is 40 cages or all cages of the farm. Thus, e.g. in the case of one shed only, there will be two blocks of ten cages to be observed for RBMs in both rows of cages in the shed.

*Table 4. The ABM and RBMs in the three periods and the animals included in the measurement sample. The presented order of the measurements can be considered as a recommended assessment order.*

| Measurement | Type | Period 1 | Period 2 | Period 3 |
|---|---|---|---|---|
| Voluntary approach test | ABM | A[a] | - | A, J |
| Body condition | ABM | A | A | A, J |
| Cleanliness of the fur | ABM | A[a] | - | A, J |
| Fur chewing | ABM | A[a] | - | A, J |
| Difficulties in moving | ABM | A[a] | A, J | A, J |
| Skin lesions and other injuries to the body | ABM | A[a] | A, J, C | A, J |
| Bent feet | ABM | - | A | A, J |
| Other disease | ABM | A[a] | A, J, C | A, J |
| Diarrhoea | ABM | A[b] | A, J, C | A, J |
| Continuous water availability | | | | |
| Type of watering system | RBM | A[b] | A, J, C | A, J |
| Availability of water | RBM | A[b] | A, J, C | A, J |
| Cleanliness of water | RBM | A[b] | A, J, C | A, J |
| Availability of straw | RBM | A[b] | A, J | A, J |
| Availability of nutritional fibre | | | | |
| Source of additional nutritional fibre | RBM | A[b] | A, J | A, J |
| Opportunity to use activity object | RBM | A[b] | A, J, C | A, J |
| Complexity of the available area | RBM | A[b] | A, J | A, J |
| Resting shelter | RBM | A[b] | A, J, C | A, J |
| Opportunity for horizontal movement | | | | |
| Width of cage | RBM | A[b] | A, J | A, J |
| Length of the cage | RBM | A[b] | A, J | A, J |

*Table continued over page*

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| Measurement | Type | Period 1 | Period 2 | Period 3 |
|---|---|---|---|---|
| Opportunity for vertical movement | RBM | A[b] | A, J | A, J |
| Protection from exceptionally hot weather | | | | |
| Sprinkling | RBM | - | FARM | - |
| Ventilation | RBM | - | A, J, C | - |
| Protection from direct sunlight | RBM | - | A, J, C | - |
| Protection from wind | | | | |
| Environmental and inbuilt protection | RBM | A[b] | - | A, J |
| Wind shield | RBM | A[b] | - | A, J |
| Social housing of juveniles | RBM | - | J | J |
| Opportunity for allohuddling | RBM | - | J, C | J |

A = Adults, J = Juveniles, C = Cubs.

[a] *Not all categories are used in the assessment, see description of the measurement for details*
[b] *Separate sample of RBM*

### 3.2.4.2 Sampling in Periods 2 and 3

In Periods 2 and 3, Finnraccoons are typically active or they can be easily encouraged to stand on their feet. Therefore, a detailed inspection of the ABM in front of the cage of the Finnraccoon is a feasible observation method in those periods.

**In the observation of stereotypic behaviour**, the size of the farm affects the sampling method. The sample for observing the stereotypic behaviour is the whole farm or a sub-farm. All Finnraccoons are observed on the small and medium size farms raising less than 120, and 120 – 1 800 Finnraccoons, respectively. On the very large farms raising more than 1 800 Finnraccoons, a stratified (in relation to the type of Finnraccoons and if possible, type of housing system) sub-farm of 1 600 – 1 800 Finnraccoons is taken, and thereafter this sub-farm is treated like the medium size farm.

The assessor counts the number of stereotyping animals while walking through a shed and records the total number of stereotyping animals from each shed in the farm or sub-farm. The assessor checks at the same time that the number of animals in the shed corresponds to the number of animals given by the farm manager is correct, and edits the number of animals if needed.

**In the case of ABM and RBM** (Table 4), there are three methods for sampling, depending on the size of the farm. Again, on the small farms raising less than 120 Finnraccoons, all Finnraccoons and their cages are assessed. On the medium size farms raising 120 – 1 800 Finnraccoons, a stratified sample of individual animals/cages is taken for the ABM and RBM. On the very large farms raising more than 1 800 Finnraccoons, the sample is taken from the Finnraccoons in the sub-farm.

Since the aim is to optimise the number of animals (for the assessment of ABM) and cages (for the assessment of RBM) in the sample based on the average number of animals per cage, the sampling for ABM and RBM is based on both, the number of Finnraccoons on the farm and the number of cages used for raising the Finnraccoons on the farm. Thus, the number of cages in the sample is dependent on the average number of animals per cage. The minimum number of Finnraccoons to be assessed is 120, and the minimum number of cages to be assessed is 50 (except in the case of farms raising less than 120 Finnraccoons and/or using less than 50 cages). All animals raised in the same cage are always assessed.

On medium and large size farms the following formula is used to determine the number of cages in the sample from the farm or sub-farm:

$CS = 134 - 14 \times AC$

where CS is the number of cages in the sample and AC is the average number of animals per cage on the farm or sub-farm.

Thus, if the average number of animals per cage is one, the number of cages (and animals) to be sampled is 120. If the average number of animals per cage is five, the number of cages needed for a sample of 120 Finnraccoons would be only 24 cages. However, since the minimum number of cages to be assessed is 50, this means that (50 cages and) 250 animals are assessed on the farm.

## 3.3 Data collection application

On-farm data is collected by using the WelFur Mobile Application (WMA), which guides the assessor through the assessment on the farm. The application creates the random sample of cage rows and animals/cages to be assessed, to minimize the effect of the assessor on the sample taken. In each Period the data collection section includes only those measurements and categories that are used in that particular Period. The application ensures that suitable data is collected from the farm, relative to the number of cages and animals present, and that the data is collected in the correct (Tables 2 and 4), but somewhat flexible order. The application has been designed to be as 'user friendly' as is possible.

## 3.4 Welfare indicators of Finnraccoons

### 3.4.1 Good feeding

#### 3.4.1.1 Absence of prolonged hunger

The criterion of *Absence of prolonged hunger* assesses that animals should not suffer from prolonged hunger, i.e. they should have a suitable and appropriate diet.

| Title | Body condition |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Body condition scoring is a commonly used method to estimate the fat in the animal's body. Body condition describes the intake and expenditure of energy, and therefore can be used to evaluate the quantitative aspects of prolonged hunger, although the quality of the feed and various diseases may affect body condition in the Finnraccoon. If the Finnraccoon cannot maintain balanced body condition, i.e. it is very lean, it can be interpreted to have suffered from prolonged hunger. |
| Method description | The animal is observed, but must not be touched. View the animal from all sides of the body. Pay attention to the flanks, abdominal line and dorsal area. The animal is scored with regards to its body condition by using three categories (see photographic illustration).<br>**NB: Natural adiposity in Period 3 (and 1).** Finnraccoons overcome natural adiposity in autumn. Therefore, the animals look heavy by nature, which is not interpreted as obesity.<br>**NB: Summer and winter fur.** The Finnraccoon have a thick winter fur, which makes them to look round. The fur of the Finnraccoon is long also in summer (Period 2), but without massive underfur.<br>**NB: Cubs and juveniles in period 2.** Cubs and juveniles are not included in the measurement in Period 2, since the body condition scoring was developed for adult animals.<br>**Individual level:**<br>**0 - The body condition of the animal is balanced:** The General appearance of the animal is well-balanced. Ribs, shoulder and pelvic bones are covered with at least a thin fat layer.<br>**1 - The animal is very lean:** The general appearance of the animal is pinched and bony. When viewed from above, the waist is narrower than the pelvis. Ribs, shoulder and pelvic bones are easily visible.<br>**2 - The animal is obese:** The general appearance of the animal is massive. Ribs, shoulders and pelvic area are covered with massive fat deposits. There are loose fat reserves in the abdominal area and face. |
| Classification | **Farm level:** Percentage of very lean animals (Score 1) |
| Additional information | Information concerning the percentage of obese animals (Score 2) is collected only for advisory purposes in Periods 2 and 3. |

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Score 0: summer fur

Score 0: summer fur

Score 0: winter fur

| Title | Availability of nutritional fibre |
|---|---|
| Scope | Resource and management-based measurement: Periods 1, 2 and 3 |
| Sample size | Farm, and according to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | According to the current practice, many Finnraccoons are fed with a feed designed to meet primarily the nutritional requirements of foxes and/or mink. Since Finnraccoons are 'more omnivorous' than foxes and mink, the feed of other fur animal species must be balanced with an extra source of good quality nutritional fibre. If Finnraccoons are not fed with the feed designed to meet their nutritional requirements, or are not provided with an additional source of good quality nutritional fibre besides the feed of foxes and/or mink, they can be interpreted to be suffering qualitative aspects of prolonged hunger. |
| | Consult the farm manager about the feed provided to the Finnraccoons during the period. Ask whether the farm manager purchases or prepares feed that is designed according to the nutritional requirements of the Finnraccoons. The farm manager may also additionally add fibre to the commercially available mink or fox feed to supplement the feed quality for Finnraccoons. If two different types of feed are used during the period, then scoring is done according to the lowest quality feed.<br>Check the cage for the availability of good quality hay, straw or other edible plant material. This material may be available inside the cage, or can be pulled through the net, i.e. the straw may be placed in an inbuilt rack outside the cage, in between the cages or on the top of the cage. If the material is placed inside the cage, and it is fully soiled with faeces, it cannot be considered available as a nutritional fibre. If the material is inside the nest box and mixed only with the animals' own hair, then it is considered as being available as a source of nutritional fibre. The fibre must also be of good quality.<br>**Farm level:**<br>**Nutritional quality of feed:**<br>**0** – The Finnraccoons are fed with a feed designed to meet the nutritional requirements of the species<br>**1** – The Finnraccoons are not fed with a feed designed to meet the nutritional requirements of the species<br>**Cage level:**<br>**Source of additional nutritional fibre:**<br>**0** – There is an additional source of nutritional fibre available in the cage.<br>**1** – There is no additional source of nutritional fibre available in the cage. |
| Classification | **Farm level:** Percentage of animals without Source of additional nutritional fibre (Score 1) in relation to the Nutritional quality of the feed (Score 0 or 1) |

### 3.4.1.2 Absence of prolonged thirst

The criterion of *Absence of prolonged thirst* assesses the requirement that animals should not suffer from prolonged thirst, i.e. they should have a sufficient and accessible water supply.

Two sub-measurements are taken and combined into the measurement *Continuous water availability* to assess the criterion of *Absence of prolonged thirst*. Each sub-measurement leads to a classification at a cage level. The classification at farm level results from the combination of these sub-measurements.

| Subtitle | Type of watering system |
|---|---|
| Scope | Resource and management-based measurement: Periods 1, 2 and 3 |
| Sample size | Farm and according to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | The type of the watering system affects the availability of drinking water. Automatic watering systems enable drinking at will, whereas manual watering may enable drinking only after filling the cup with water. In the latter case, the number of water provisions per day may determine the Finnraccoons opportunities to drink, e.g. due to freezing of the drinking water. However, in this case ice may be available in the cup in between the water provisions. In the case of automatic watering systems, the possible protection from freezing of the system in winter may also affect the animal's opportunity to drink. The animal may be suffering prolonged thirst if the access to the drinking water is limited due to low daily number of water provisions into the cup, freezing tendency of the automatic watering system, and/or limited daily operational hours of the automatic watering system. |
| Method description | Consult the farm manager as to whether the animals are provided water through an automatic watering system or manually. If an automatic watering system is used, consult the farm manager as to whether this is protected from freezing in sub-zero temperatures, and whether the system (including heating) is operational 24 hours a day. If water is provided manually, ask how many times a day water is provided. During all periods, only water supply systems in use at the time of assessment are taken into account.<br>**NB:** Note that there may be various watering systems on a farm. In this case, check the watering system at the cage level for all of the cages in the sample.<br>**Cage level:**<br>**The type of the watering system:**<br>**0** – Watering system with automatic water flow (nipple) throughout the year. The system does not freeze in sub-zero temperatures.<br>**1** – Watering system with automatic water flow (e.g. a nipple or a cup with a float valve). The system freezes, tends to freeze or is not working in sub-zero temperatures. When the system is not working, then water is supplied manually.<br>**2** – No automatic watering system. Water is provided manually throughout the year.<br>OR<br>Automatic watering system is not operational 24 hours a day.<br>**NB: in Period 2**, all automatic systems, which are in operation 24 hours a day, are scored 0, since the climatic conditions prevent watering systems from freezing.<br>**Then, if 1 (watering systems not protected from freezing) or 2 (manual watering or automatic watering system not operational for 24 hours a day): Frequency of water provision:**<br>**0** – Water is provided manually at least twice a day, or the automatic watering system is in operation for at least 12 hours a day.<br>**1** – Water is provided manually once a day or automatic watering system is in operation 4-12 hours a day.<br>**2** – Water is provided manually less than once a day, or the automatic watering system is in operation less than 4 hours a day. |

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| Subtitle | Type of watering system |
|---|---|
| Classification | Cage level:<br>**In Periods 1 and 3**: Each cage is scored either 0, 1 or 2 in The type of the watering system and when relevant 0, 1 or 2 in Frequency of water provision.<br>**In Period 2**: Each cage is scored either 0 or 2 in The type of the watering system and when relevant 0, 1 or 2 in Frequency of water provision. |

Automatic, protected from freezing

Automatic, not frost protected

Manual water provision

| Subtitle | Availability of potable water |
|---|---|
| Scope | Resource and management-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | The availability of potable water is determined by ensuring that the automatic water point is functioning (not broken) and that the available water is sufficiently clean to be potable. Broken or dirty water points or soiled water in the cup may limit free access to potable drinking water and cause prolonged thirst. In winter, the availability of ice may replace liquid water to some extent. |
| Method description | Check the functioning of the water point (cup/nipple) by activating the float valve or nipple, and the cleanliness of the water point. During all periods, only cups/nipples in use are considered.<br>Potable water is not available if the water point cannot be activated, or if no water comes out from the water point when activated, or the water is dirty or the water point is dirty, because of faeces or algae that prevent access to potable water. If the water point cannot be activated due to ice cover, there is ice available to the animal, but no water.<br>NB. If the automatic watering system is frozen and water is provided manually (i.e. 1 in the sub-measurement Type of watering system) in Periods 1 and 3, availability of potable water is assessed from the water point that is in use (i.e. from the cup).<br>**Availability of water**<br>Cage level:<br>**0** – Liquid water available<br>**1** – Only ice available<br>**2** – No liquid water or ice available<br>**NB: in Period 2**, availability of liquid water cannot be scored 1 (Only ice available), since the climatic conditions prevent water from freezing.<br>**Cleanliness of water**<br>Cage level:<br>**0** – Clean water (or ice) available<br>**1** – No clean water (or ice) available |

| Subtitle | Availability of potable water |
|---|---|
| Classification | Cage level:<br>**In Periods 1 and 3:** Each cage is scored either 0, 1 or 2 in Availability of water and 0 or 1 in Cleanliness of water.<br>**In Period 2:** Each cage is scored either 0 or 2 in Availability of water and 0 or 1 in Cleanliness of water. |

Liquid water, clean

Liquid water, clean

Liquid water, clean

Liquid water, dirty

Only ice, clean

Liquid water, dirty

| Title | Continuous water availability |
|---|---|
| Classification | **Farm level:**<br>The percentage of animals in each of the situations resulting from the combination of the two sub-measurements described above: Type of watering system (Type and Times) and Availability of potable water (Availability and Cleanliness). The number of situations differs from period to another.<br>**Periods 1 and 3:** 42 different situations are relevant |

| Periods 1 and 3 | Type? | Times? | Availability? | Cleanliness? | % of Finnraccoons |
|---|---|---|---|---|---|
| Situation 1 | 0 | - | 0 | 0 | P1 |
| Situation 2 | 0 | - | 0 | 1 | P2 |
| Situation 3 | 0 | - | 1 | 0 | P3 |
| Situation 4 | 0 | - | 1 | 1 | P4 |
| Situation 5 | 0 | - | 2 | 0 | P5 |
| Situation 6 | 0 | - | 2 | 1 | P6 |
| Situation 7 | 1 | 0 | 0 | 0 | P7 |
| Situation 8 | 1 | 0 | 0 | 1 | P8 |
| Situation 9 | 1 | 0 | 1 | 0 | P9 |

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| Title | Continuous water availability | | | | | |
|---|---|---|---|---|---|---|
| | Situation 10 | 1 | 0 | 1 | 1 | P10 |
| | Situation 11 | 1 | 0 | 2 | 0 | P11 |
| | Situation 12 | 1 | 0 | 2 | 1 | P12 |
| | Situation 13 | 1 | 1 | 0 | 0 | P13 |
| | Situation 14 | 1 | 1 | 0 | 1 | P14 |
| | Situation 15 | 1 | 1 | 1 | 0 | P15 |
| | Situation 16 | 1 | 1 | 1 | 1 | P16 |
| | Situation 17 | 1 | 1 | 2 | 0 | P17 |
| | Situation 18 | 1 | 1 | 2 | 1 | P18 |
| | Situation 19 | 1 | 2 | 0 | 0 | P19 |
| | Situation 20 | 1 | 2 | 0 | 1 | P20 |
| | Situation 21 | 1 | 2 | 1 | 0 | P21 |
| | Situation 22 | 1 | 2 | 1 | 1 | P22 |
| | Situation 23 | 1 | 2 | 2 | 0 | P23 |
| | Situation 24 | 1 | 2 | 2 | 1 | P24 |
| | Situation 25 | 2 | 0 | 0 | 0 | P25 |
| | Situation 26 | 2 | 0 | 0 | 1 | P26 |
| | Situation 27 | 2 | 0 | 1 | 0 | P27 |
| | Situation 28 | 2 | 0 | 1 | 1 | P28 |
| | Situation 29 | 2 | 0 | 2 | 0 | P29 |
| | Situation 30 | 2 | 0 | 2 | 1 | P30 |
| | Situation 31 | 2 | 1 | 0 | 0 | P31 |
| | Situation 32 | 2 | 1 | 0 | 1 | P32 |
| | Situation 33 | 2 | 1 | 1 | 0 | P33 |
| | Situation 34 | 2 | 1 | 1 | 1 | P34 |
| | Situation 35 | 2 | 1 | 2 | 0 | P35 |
| | Situation 36 | 2 | 1 | 2 | 1 | P36 |
| | Situation 37 | 2 | 2 | 0 | 0 | P37 |
| | Situation 38 | 2 | 2 | 0 | 1 | P38 |
| | Situation 39 | 2 | 2 | 1 | 0 | P39 |
| | Situation 40 | 2 | 2 | 1 | 1 | P40 |
| | Situation 41 | 2 | 2 | 2 | 0 | P41 |
| | Situation 42 | 2 | 2 | 2 | 1 | P42 |
| | **Period 2:** 16 different situations are relevant | | | | | |
| | Period 2 | Type? | Times? | Availability? | Cleanliness? | % of Finnraccoons |
| | Situation 1 | 0 | - | 0 | 0 | P1 |
| | Situation 2 | 0 | - | 0 | 1 | P2 |

| Title | Continuous water availability | | | | | |
|---|---|---|---|---|---|---|
| | Situation 3 | 0 | - | 2 | 0 | P3 |
| | Situation 4 | 0 | - | 2 | 1 | P4 |
| | Situation 5 | 2 | 0 | 0 | 0 | P5 |
| | Situation 6 | 2 | 0 | 0 | 1 | P6 |
| | Situation 7 | 2 | 0 | 2 | 0 | P7 |
| | Situation 8 | 2 | 0 | 2 | 1 | P8 |
| | Situation 9 | 2 | 1 | 0 | 0 | P9 |
| | Situation 10 | 2 | 1 | 0 | 1 | P10 |
| | Situation 11 | 2 | 1 | 2 | 0 | P11 |
| | Situation 12 | 2 | 1 | 2 | 1 | P12 |
| | Situation 13 | 2 | 2 | 0 | 0 | P13 |
| | Situation 14 | 2 | 2 | 0 | 1 | P14 |
| | Situation 15 | 2 | 2 | 2 | 0 | P15 |
| | Situation 16 | 2 | 2 | 2 | 1 | P16 |

## 3.4.2 Good housing

### 3.4.2.1 Comfort around resting

The criterion of *Comfort around resting* assesses the requirement that animals should have comfort when they are resting.

| Title | Opportunity for allohuddling |
|---|---|
| Scope | Management-based measurement: Periods 2 and 3 |
| Sample size | According to section 3.2.4.2 |
| Framing information | Young Finnraccoons prefer resting in physical contact with conspecifics (allohuddling) in summer and autumn. Therefore, allohuddling is considered as a species specific resting behaviour in young Finnraccoons in summer and autumn. |
| Method description | Opportunity for allohuddling is defined as whether juvenile Finnraccoon can rest in physical contact with at least one animal of the same species. A Finnraccoon can allohuddle with another Finnraccoon in social housing units, with more than one Finnraccoon raised in the same cage. It is also interpreted that Finnraccoon can allohuddle through a single cage wall net with the Finnraccoon in the neighbouring cage.<br>**NB:** Only cubs and juveniles are considered.<br>The Finnraccoon is scored according to its opportunity for allohuddling:<br>**Cage level:**<br>**0** – The Finnraccoon can allohuddle with another Finnraccoon.<br>**1** – The Finnraccoon cannot allohuddle with another Finnraccoon |
| Classification | **Farm level:**<br>Percentage of animals without opportunity for allohuddling (Score 1) |

| Title | Resting shelter |
|---|---|
| Scope | Management-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Finnraccoons use various solid structures as shelter while resting. Based on the behaviour of wild conspecifics, the use of various shelters while resting is a natural behaviour of the species. It is interpreted that, the more cover the shelter provides, the more valuable the shelter is. A construction with at least three solid walls is interpreted as providing most comfort around resting. |
| Method description | A resting shelter is a construction with solid wall/walls. The solid wall can be of any material, e.g. wood, plywood or metal. The size of the solid wall must be at least 25 x 25 cm (width × length). The Finnraccoon must be able to rest against (touch) the wall. In the case of two walls or more, the distance of the walls from each other must be such that the Finnraccoon can touch all the walls simultaneously while resting (except in the case of cubs). Consequently, in the case of (at least) three-wall shelters, the walls must be so close to each other that the Finnraccoon can rest "inside" the shelter. There is no need for a solid floor or roof (a roof may be provided on the whole barn or house) in the construction to be considered as a resting shelter.<br>The resting shelter can be situated in any part of the cage, which is accessible to the animal, including the platform. At the maximum, two of the solid walls can be situated immediately behind the mesh wall of the cage, or fixed into the mesh.<br>In social housing units, a resting shelter is accepted although not all Finnraccoons can use the shelter simultaneously, except in the case of best category.<br>Check the cage for the availability of a resting shelter.<br>**Cage level:**<br>**0** – There is a resting shelter with at least three solid walls in the cage, and all the animals in the cage can utilize the shelter simultaneously.<br>**1** – There is a resting shelter with two solid walls in the cage.<br>**2** – There is a resting shelter with one solid wall in the cage.<br>**3** – There is no resting shelter in the cage.<br>**NB**. If there is more than one type of resting shelters in the cage, the cage is scored according to the best category of shelter present. |
| Classification | **Farm level:**<br>Percentage of animals with diverse resting shelters (Score 0, 1, 2 and 3) |

Score 0: four-wall shelter

Score 1: two-wall shelter

Score 2: one-wall shelter

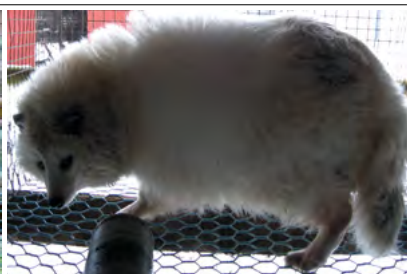
### 3.4.2.2 Thermal comfort

The criterion of *Thermal comfort* assesses the requirement that animals should have thermal comfort, i.e. they should neither be too hot nor too cold.

| Title | Cleanliness of the fur |
|---|---|
| Scope | Animal-based measurement: Periods 1 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Finnraccoons have insulative winter fur. The insulative capacity of the fur is decreased if the fur is dirty or wet across a large part of the body. In this situation, the Finnraccoon may have difficulties in maintaining thermal comfort in autumn and winter in cold temperatures. The animal may get wet due to rain, snowfall or broken watering system. |
| Method description | Deviation from clean fur, i.e. dirty or wet fur, is defined as urine, faeces or feed stains through the underfur and/or throughout tangled fur, as well as wet fur.<br>The animal is observed but must not be touched. View the animal from all sides of its body. Pay attention to the abdominal area, rear parts of the animal and tail. Search for urine, faeces or feed stains which continue through the underfur or tangled fur. Do not pay attention to the face, paws and legs. Finnraccoons tend to soil their face and paws while eating. Since this is natural behaviour of the species and is not considered as threat to the thermal comfort, a dirty face and paws are not considered as dirty fur.<br>Note that in pair and group housed animals, the fur is not considered dirty, if the fur is slightly wet because of obvious allogrooming (typically in head and/or neck regions) or if there are drops of water condensed from the breathing of the cage mate due to allohuddling.<br>The animal is scored with regard to the cleanliness of its fur (see photographic illustration):<br>Individual level:<br>0 – Clean: The fur coat of the animal is clean and dry. No urine, faeces or feed stains are observed in any part of the animal.<br>1 – Slightly dirty: The fur coat of the animal is dirty, wet and/or tangled in some parts of the body, but the underfur is dirty, wet or tangled in a smaller area than 10×10 cm. If more than one dirty area is found, these are summed (combined by addition) and the total dirty area is evaluated.<br>2 – Obviously dirty: The fur coat of the animal is dirty, wet or tangled throughout the underfur in an area clearly larger than 10×10 cm. If more than one dirty, wet or tangled area is found, these are summed (combined by addition) and the total affected area is evaluated. |
| Classification | Farm level:<br>In period 1: Percentage of dirty animals (Scores 1 and 2 combined)<br>In period 3: Percentage of slightly dirty (Score 1) and obviously dirty animals (Score 2) |

Score 0

Score 1



Score 2

| Title | Protection from exceptionally hot weather |
|---|---|
| Scope | Resource and management-based measurement: Period 2 |
| Sample size | Farm and according to section 3.2.4.2 |

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| Title | Protection from exceptionally hot weather |
|---|---|
| Framing information | Due to outdoor housing, Finnraccoons are vulnerable to the climatic conditions of the area and daily temperature conditions. The farm should be built and managed so that the Finnraccoons have some protection from exceptionally hot weather and so be able to maintain thermal comfort in the outdoor environment. This is best obtained by providing the animal choice, e.g. ability to choose between shadow and sunshine. |
| Method description | Consult the farm manager to identify whether sprinkling of the air inside the shed (spray misting), animals or roofs of the sheds is used during ambient temperatures above 30 °C. Ask which barns/sheds/cages are sprinkled. Sprinkling must cover at least 50% of the Finnraccoons to be considered.<br>Check the sheds and barns for ventilation. Pay attention to the ridge of the roof in the open shed and to the potential for ventilation in the closed barn. In the open shed, ventilation capacity is sufficient when the ridge of the roof is open so that air can circulate freely in the shed (under the roof). The opening between the sides of the roof must be approximately 5 cm, depending on the shape and type of materials used. In a barn, ventilation can be increased by opening windows, and/or opening part of the roof, or walls of the barn. In individual cages, with mesh walls, the air can always circulate freely, and no other ventilation is needed.<br>Check the farm and cages for environmental and inbuilt protection against direct sunlight. In open sheds, there may be some protection against direct sunlight, sufficient long eaves or sun blinds in the cage, or stands of trees or buildings which protect the animals from direct sunlight. In open sheds, the cages with outer walls facing north are typically protected from direct sunlight. In a closed barn, the animals are typically sufficiently protected from direct sunlight by the roof and walls of the barn. In individual cages, the sun blind must be at least the size of the roof of the cage.<br>There is no need to have the whole cage in the shadow from sunlight. In the best possible situation, the animal can select whether to stay in shadow or bask in sunshine.<br>The cage is scored with regard to protection from exceptionally hot weather:<br>Farm level:<br>Sprinkling of the air inside the shed/cage or roofs of the sheds/cages:<br>0 – The air inside the sheds (barns) or the roofs of the sheds are sprinkled with water during ambient temperatures above 30 °C.<br>1 – The air inside the sheds (barns) and the roofs of the sheds are not sprinkled with water during ambient temperatures above 30°C.<br>Shed/barn/cage level:<br>Ventilation in the sheds and barns:<br>0 – The Finnraccoons are raised in an open shed, where the ridge of the roof is open so that air can circulate freely in the shed. The Finnraccoons are raised in individual cages.<br>1 – The Finnraccoons are raised in an open shed, where the ridge of the roof is closed so that it prevents air flow in the shed; or the Finnraccoons are raised in a solid walled barn, where there is the possibility to increase the ventilation.<br>2 – The Finnraccoons are raised in solid walled barn without the possibility to increase the ventilation.<br>Shed/barn/cage level:<br>Protection from direct sunlight:<br>0 – The Finnraccoon is raised in the open shed or individual cages with protection against direct sunlight or the cage in the open shed is facing towards north. The animals are raised in closed barns.<br>1 – The animals are housed in cages facing to south in open sheds and there is no protection from direct sunlight; or the animals are raised in individual cages without a sunblind. |

| Title | Protection from exceptionally hot weather |
|---|---|
| Classification | Farm level:<br>Percentage of animals in each of the situations resulting from the combination of the Sprinkling of the air inside the shed/cages or roofs of the sheds/cages, Ventilation in the sheds and barns and Protection from direct sunshine. Twelve situations are relevant: |

| Period 2 | Sprinkling? | Ventilation? | Protection from sunlight? | % of Finnraccoons |
|---|---|---|---|---|
| Situation 1 | 0 | 0 | 0 | P1 |
| Situation 2 | 0 | 0 | 1 | P2 |
| Situation 3 | 0 | 1 | 0 | P3 |
| Situation 4 | 0 | 1 | 1 | P4 |
| Situation 5 | 0 | 2 | 0 | P5 |
| Situation 6 | 0 | 2 | 1 | P6 |
| Situation 7 | 1 | 0 | 0 | P7 |
| Situation 8 | 1 | 0 | 1 | P8 |
| Situation 9 | 1 | 1 | 0 | P9 |
| Situation 10 | 1 | 1 | 1 | P10 |
| Situation 11 | 1 | 2 | 0 | P11 |
| Situation 12 | 1 | 2 | 1 | P12 |

Ventilation: Score 1

Ventilation: Score 0

Protection from sunlight: Score 0

| Title | Protection from wind |
|---|---|
| Scope | Resource and management-based measurement: Periods 1 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Due to outdoor housing, Finnraccoons are vulnerable to the climatic conditions of the area and daily temperature and wind conditions. The farm should be built and managed so that the Finnraccoons have some protection from the wind, to have better abilities to maintain thermal comfort in the outdoor environment in autumn and winter. |
| Method description | Environmental and inbuilt protection from wind is sufficient when there are some buildings, a solid fence or stand of trees at a distance no more than 30 meters from the cage. The animals, housed in a closed barn are typically protected from wind.<br>The windshield in the cage can be any solid walled construction that protects the animal from wind. The wind shield can be made of any material. The size of the small wind shield must be such that the Finnraccoon in that cage can rest behind it (width and height approximately 25 cm). |

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| Title | Protection from wind |
|---|---|
| | The large wind shield must be at least 1 m long or of the whole length of the wall of the cage and approximately 25 cm high. A nest box functions as a large wind shield. The wind shield can be situated in any part of the cage which is accessible to the animal, including the platform. A wind shield can be situated outside the actual housing structure, but at a maximum distance of 1 m from the cage wall.<br>Check the farm and cage for environmental and inbuilt protection from wind and for the presence of a wind shield in the cage. The cage is scored with regard to the extent of protection from wind:<br>**Cage level:**<br>**Environmental and inbuilt protection from wind:**<br>**0** – The animal is housed in a closed barn or there is environmental or inbuilt protection from wind in the immediate vicinity of the outdoor cage.<br>**1** – The animal is housed in an open shed and the surroundings of the cage are bare, with no trees, bushes, solid fences or buildings in the immediate vicinity of the cage.<br>**Wind shield in the cage:**<br>**0** – The animal is housed in a barn or there is a large wind shield in the outdoor cage.<br>**1** – There is a small wind shield in the outdoor cage.<br>**2** – The animal is housed in an outdoor cage without a wind shield. |
| Classification | **Farm level:**<br>Percentage of animals in each of the situations resulting from the combination of the *Environmental and inbuilt protection from wind* and *Wind shield* in the cage. Six different situations are relevant: |

| | Environment/buildings? | Wind shield? | % of Finnraccoons |
|---|---|---|---|
| Situation 1 | 0 | 0 | P1 |
| Situation 2 | 0 | 1 | P2 |
| Situation 3 | 0 | 2 | P3 |
| Situation 4 | 1 | 0 | P4 |
| Situation 5 | 1 | 1 | P5 |
| Situation 6 | 1 | 2 | P6 |

Wind shield: Score 0

Wind shield: Score 0

Wind shield: Score 1

Wind shield: Score 2

Inbuilt protection from wind: Score 0

### 3.4.2.3 Ease of movement

The criterion of *Ease of movement* assesses the requirement that animals should have enough space to be able to move around freely.

| Title | Opportunity for horizontal movement |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | The rationale has been taken, that the larger the available area, the larger the behavioural repertoire enabled by the area. Therefore, housing conditions, with length and/or width not much longer than the length of the animal enable lying down, rising, turning around and taking a few steps. Housing conditions, with the length and/or width significantly longer than the length of the animal, enable locomotion, like walking and running, and other behaviours, like play. The length of the full-grown Finnraccoon from the head to the base of the tail is typically 70 cm or less. |
| Method description | Observe the Finnraccoon in its cage. Evaluate how easy it is for the Finnraccoon to move in the cage horizontally, considering the size of the animal. Finnraccoons are typically slightly less than 70 cm long from the head to the base of the tail. Evaluate the width and length of the housing environment separately.<br>Note that the Finnraccoon needs approximately 50 cm of free height in the cage to be able to move freely on the cage floor. However, the areas under some constructions within the cage, e.g. under the regular platform or a tunnel between separate cage sections, although lower than 50 cm, are considered usable areas for horizontal movement. Furthermore, if there is access to an approximately 50 cm high nest box, which is situated outside the actual cage, the area of the nest box can be considered available for horizontal movement. If there are two separate floors in the cage, the length and width of these two floors are summed (combined by addition).<br>The animal is scored according to the opportunity for horizontal movement:<br>**Individual level:**<br>**Width of the cage:**<br>**0** – The animal can walk straight ahead without obstruction a longer distance than its own body length<br>**1** – The animal can walk straight ahead a distance corresponding approximately to the body length of the animal<br>**2** – The animal can lay down and stand up, turn around and take only a few steps ahead (walk shorter than its own body length)<br>**Length of the cage:**<br>**0** – The animal can walk straight ahead without obstruction a longer distance than its own body length<br>**1** – The animal can walk straight ahead a distance corresponding approximately to the body length of the animal<br>**2** – The animal can lay down and stand up, turn around and take only a few steps ahead (walk shorter than its own body length) |
| Classification | **Farm level:**<br>Percentage of animals in each of the situations resulting from the combination of the Width of the cage and Length of the cage. Nine different situations are relevant: |

| | Width? | Length? | % of Finnraccoons |
|---|---|---|---|
| Situation 1 | 0 | 0 | P1 |
| Situation 2 | 0 | 1 | P2 |

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| Title | Opportunity for horizontal movement | | | |
|---|---|---|---|---|
| | | Width? | Length? | % of Finnraccoons |
| | Situation 3 | 0 | 2 | P3 |
| | Situation 4 | 1 | 0 | P4 |
| | Situation 5 | 1 | 1 | P5 |
| | Situation 6 | 1 | 2 | P6 |
| | Situation 7 | 2 | 0 | P7 |
| | Situation 8 | 2 | 1 | P8 |
| | Situation 9 | 2 | 2 | P9 |

| Title | Opportunity for vertical movement |
|---|---|
| Scope | Resource-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Since Finnraccoons do not typically climb, the rationale has been taken that the Finnraccoon has enough space to be able to move vertically when it can stretch upwards against the cage wall. The length of the Finnraccoon from the head to the base of the tail is typically 70 cm or less. Therefore, housing conditions with a minimum free height of approximately 70 cm are sufficient for full stretching behaviour. |
| Method description | Observe how easy it is for the Finnraccoon to move in its cage vertically. The Finnraccoon has the opportunity for vertical movement, when it can rise against the cage wall with its forefeet, and stretch. For this behaviour, Finnraccoons typically need approximately 70 cm of free height.<br>The animal is scored according to the opportunity for vertical movement:<br>**Individual level:**<br>**0** – Yes opportunity for vertical movement<br>**1** – No opportunity for vertical movement |
| Classification | **Farm level:** Percentage of Finnraccoons with Score 1 |

## 3.4.3 Good health

### 3.4.3.1 Absence of injuries

The criterion of *Absence of injuries* assesses the requirement that animals should be free of injuries, e.g. skin damage and locomotor disorders.

| Title | Difficulties in moving |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | The Finnraccoon may have difficulties in moving when it cannot move normally or cannot use one or more of the limbs due to injury or for other reasons. Difficulties in moving may limit daily activities and indicate that the animal is experiencing discomfort and/or pain. |

| Title | Difficulties in moving |
|---|---|
| Method description | The animal is observed to detect difficulties in moving. If necessary, the animal can be encouraged to move in the cage. Pay attention to the use of the limbs and the animal's willingness to move around. Observe the possible use of the platform; is the animal able to climb the platform. If the Finnraccoon is mainly sitting, or tends to sit down after a few steps, it may have difficulty in moving. If the animal cannot stand up, it is unable to move.<br>Note that an animal which has been resting for some time and stands up, moving may look somehow impaired at the beginning, but the animal will soon move normally. This kind of numbness is not recorded as difficulty in moving.<br>**NB**. The cubs are not observed in Period 2.<br>The animal is scored with regard to difficulty in moving:<br>**Individual level:**<br>**0 – No moving difficulties:** The animal moves in the cage actively, and uses all four feet evenly while moving.<br>**1 – Difficulty in moving**: The animal moves in the cage but the locomotion is somehow impaired and/or the animal does not use all four feet evenly while moving.<br>**2 – Unable to move**. The animal is unable to move. This does not include animals that refuse to move due to an obvious defensive or withdrawal response, or due to winter-time passivity, or due to cub nursing (e.g. stays inside the nest box). |
| Classification | **Farm level:**<br>**In Period 1**: Percentage of animals with difficulties in moving (Scores 1 and 2 combined)<br>**In periods 2 and 3**: Percentage of animals with difficulties in moving (Score 1) and unable to move (Score 2) |

| Title | Skin lesions and other injuries to the body |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Skin lesions and injuries to the body may be painful. They are typically caused by the housing conditions (e.g. sharp edges), the animal itself (e.g. excessive grooming, self-biting) or cage mate (biting). Skin lesions and injuries can be interpreted as causing pain and/or discomfort. |
| Method description | The animal is observed but must not be touched. View the animal from all sides of its body. Pay special attention to the tail, neck, chest, legs and face of the animal.<br>Skin lesions are defined as dermatitis and/or any evident bleeding or damage to the skin. Skin lesions and injuries are not categorised according to the size of the injury, instead fresh and already healed skin lesions and injuries are recorded separately. If the injury is caused by disease e.g. FENP, then this is not recorded as an injury.<br>Note that areas with broken hair are not interpreted as skin lesions.<br>The animal is scored with regard to the skin lesions and other injuries to the body (see photographic illustration):<br>**Individual level:**<br>**0 – No evidence of skin lesions or injuries to the body**<br>**1 – Evidence of old lesions or injuries to the body, already healed**, e.g. notch in the ear or part of the tail is missing.<br>**2 – Evidence of fresh skin lesions or injuries to the body** |
| Classification | **Farm level:**<br>**In Period 1**: Percentage of animals with different severity skin lesions and other injuries to the body (Scores 1 and 2 combined)<br>**In Periods 2 and 3**: Percentage of animals with old skin lesions and injuries to the body (Score 1) and fresh skin lesions and injuries to the body (Score 2). |

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Score 1 : ears are missing

Score 2: bleeding tail

Score 2: injury in the leg

### 3.4.3.2 Absence of diseases

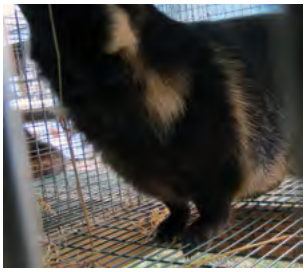
The criterion of *Absence of disease* assesses the requirement that animals should be free of disease, i.e. farm managers should maintain high standards of hygiene and care.

| Title | Bent feet |
|---|---|
| Scope | Animal-based measurement: Periods 2 and 3 |
| Sample size | According to section 3.2.4.1 |
| Framing information | Bent feet means carpal joint hyperflexion. Although the aetiology of bent feet is not fully understood in fur animals and there is no published information as to whether this condition is painful to the animal, it is considered unnatural and unwanted. Animals with bent feet or any other unnatural foreleg confrontation are considered to have their health compromised. |
| | Bent feet are defined as carpal joint hyperflexion or any other forelimb or carpal joint deformation. Forefoot confrontation is divided into three categories according to the extent of carpal joint angulation. In severely bent feet, the angle of the carpal joint is close to 90°. Abduction or adduction may be included. The feet are considered slightly bent, when carpal laxity is evident, but the angle is clearly above 90°.<br>The animal is observed but must not be touched. If necessary, the animal is encouraged to stand up and move. Encourage the animal to stretch up (but still remain standing on four feet) while assessing e.g. by leaving a glove on the roof of the cage. Never assess bent feet while the animal is resting.<br>**NB**. The cubs and juveniles are not observed in Period 2.<br>The animal is scored with regard to bent feet (see photographic illustration):<br>**Individual level:**<br>**0 – No bent feet**<br>**1 – Slightly bent feet**<br>**2 – Severely bent feet, may include abduction or adduction** |
| Classification | **Farm level:**<br>Percentage of animals with slightly bent feet (Score 1) and severely bent feet (Score 2) |

Score 0

Score 1: Slightly bent

Score 2: Severely bent


Score 2: Severely bent


Score 2: Severely bent and abducted/adducted

| Title | Diarrhoea |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to the sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Observation of diarrhoea can be used to evaluate the health of the alimentary tract. Diarrhoea is caused by illness, whereas loose faeces are more typically caused by poor feed quality or unsuccessful management of feeding. |
| Method description | Diarrhoea is defined as grey, green, red or yellowish mucoid stools, in or under the cage. Loose faeces are defined as brown or brownish stools that lack firm structure.<br>Observe the cage floor and area underneath the cage. Try to find fresh stools or observe the stools on the top of the pile of stools. Diarrhoea can also be observed directly while the animal is defecating.<br>Note that Finnraccoons typically urinate into the same place where they defecate, and they may also play with the water point/cup. Therefore, there may be some urine and/or water under the cage, which can make it look like watery feaces.<br>Also, the side of the house may affect the feaces under the cage: typically the whole area underneath the cage is drier in the side facing towards south in an open shed (in sunshine), whereas the side facing towards north may be wet (in shadow).<br>In social housing units, not all animals in a cage with signs of diarrhoea are considered affected. If there is more than one animal in the cage and there is clear evidence of diarrhoea, the number of affected animals in the cage is calculated as "0.5 x the number of animals in the cage".<br>The cage is scored with regard to evidence of diarrhoea (see photographic illustration):<br>Cage level:<br>0 – No evidence of loose faeces or diarrhoea<br>1 – Loose faeces in or under the cage<br>2 – Diarrhoea in or under the cage |
| Classification | Farm level:<br>Percentage of animals with loose faeces (Score 1) and diarrhoea (Score 2) |


Score 0


Score 1


Score 1

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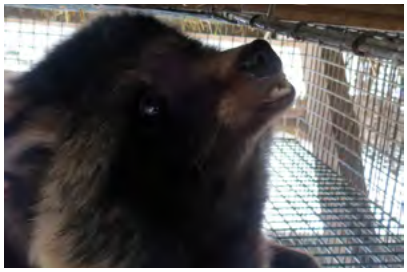
Score 2

Score 2

Score 2

| Title | Other disease |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Any disease condition, structural defect and developmental disturbance may potentially cause discomfort and/or pain. Therefore, all conditions deviating from a normal, healthy animal are recorded as being potential threats to the welfare of the animal. |
| Method description | 'Other disease' is defined as obvious signs of poor or reduced health due to disease or disorders not included in the other measurements of the criterion of *Absence of diseases*. These may be e.g. a dwarf animal, impaired ear or eye health, breathing difficulties, unusual head posture, convulsions, FENP (not an exclusive list). Obvious disease can be seen also in the housing environment of the animal, e.g. blood in or under the cage, which may be sign of urinary tract infection.<br>The animal and its housing environment is observed. The animal or the cage is scored with regard to (the worst) signs of poor or reduced health:<br>**Individual level:**<br>**0 – No evidence of other obvious disease, structural defect or developmental disturbance**<br>**1** – Obvious signs of structural defect or developmental disturbance<br>**2 – Obvious signs of disease**, poor or reduced health<br>**3 – Seriously compromised welfare of the animal**: the animal should have been euthanized |
| Classification | **Farm level:**<br>**In Period 1**: Percentage of animals with obvious signs of diseases (Scores 1, 2 and 3 combined)<br>**In Periods 2 and 3**: Percentage of animals with structural defects or developmental disorders (Score 1), obvious signs of diseases (Score 2) and seriously compromised welfare (Score 3) |



Score 1: Underbite

Score 1: dwarf growing cub

Score 1: Abduction of hind paw

Score 2: Impaired paw health

Score 2: Eye disease

Score 2: Eye disease

Score 2: Urinary tract infection

Score 2: Infection in a paw

| Title | Mortality |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 (recorded from the farm records) |
| Sample | Farm records |
| Framing information | Mortality on the farm consists of uncontrolled deaths (animals found dead), and sick animals detected by the farm manager and thereafter humanely killed. The reasoning behind this is, that suffering of an individual animal is reduced if the farm manager takes the decision and humanely kills the sick animal, and does not leave it to die.<br>Mortality of unweaned cubs is not included, since the actual number of cubs born is not typically known. The number of cubs is calculated at the latest at weaning, and only thereafter can reliable mortality data be collected. Therefore the cubs before weaning are not included in mortality data. |
| Method description | Total mortality is defined as uncontrolled deaths (animals that are found dead) and humanely killed animals. Humanely killed is defined as animals detected by the farm manager and decision is made by the farm manager to humanely kill the animal due to serious disease or injury.<br>Consult the farm manager about the number of animals which were found dead or which were detected by the farm manager and humanely killed due to disease or injuries. Carry out the recording month-wise in each Period until the month of assessment. If there is no clear information whether the Finnraccoon was found dead or humanely killed, mark this animal as found dead.<br>The quality of the mortality recordings is evaluated. Look at the mortality recordings, and evaluate whether the mortality recordings have been systematically collected on the farm. Do the recordings seem reliable and credible?<br>**In Period 1**: Record the mortality from the Period 1 (December 1st to March 31st) until the month of assessment. Record the total number of adult animals on the farm at the end of the pelting season. Record also the mortality from the previous Period 1, starting from the month of assessment (January or February) to the end of the period (March 31st) and the number of animals at the end of the pelting season a year ago in order to assess missing data in the current period. The females which were euthanized at the end of the mating season due to unclear heat or otherwise unsuccessful mating are not included in the mortality. Neither are the males, which were euthanized at the end of the mating season in order to decrease the number of breeding males summering on the farm. |

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<table>
<tr><th>Title</th><th>Mortality</th></tr>
<tr><td>Method description</td><td>In Period 2: Record the mortality from the Period 2 (April 1st to July 31st) until the month of assessment. Record the total number of adult animals on the farm at the beginning of the Period 2 (April 1st). Record also the mortality from the previous Period 2, starting from the month of assessment (June or July) to the end of the period (August 31st) and the number of animals at the start of the breeding season previous year in order to assess missing data in the current period. Note that the number of unweaned cubs and the mortality of unweaned cubs are not included.<br><br>In Period 3: Record the mortality from the Period 3 (August 1st to November 30th) until the month of assessment. Record also the total number of adult and juvenile animals on the farm during the growing season. If needed, record also the mortality from the previous Period 3, starting from the month of assessment (October or November) to the end of the period (November 30th) and the number of animals during the growing season previous year in order to assess the missing data in the current period. Those animals that were pelted because they were found dead or humanely killed due to diseases or injuries close to the pelting season must also be included.<br><br>Farm level:<br><br>Quality of the mortality data:<br><br>0 – Mortality data has been collected systematically on farm. The data seems credible.<br><br>1 – There are mortality recordings on the farm, but the data does not seem to be collected systematically.<br><br>2 – No mortality recordings available or the recordings are unclear, so that the data collection cannot be done.<br><br>Total mortality (per Period):<br><br>0 – Total mortality < 1 % of Finnraccoons on the farm<br><br>1 – 1 % ≤ total mortality < 2 % of Finnraccoons on the farm<br><br>2 – 2 % ≤ total mortality < 5 % of Finnraccoons on the farm<br><br>3 – Total mortality ≥ 5 %<br><br>Percentage of humanely killed animals out of total mortality:<br><br>0 – Humanely killed ≥ 50 % of total mortality<br><br>1 – 25 % ≤ humanely killed < 50 % of total mortality<br><br>2 – Humanely killed < 25 % of total mortality<br><br>NB. If the total number of Finnraccoons on the farm, during the data collection period is less than 100, the number of animals found dead and humanely killed is recorded from all data collection periods from the last three years (to smoothen the effect of chance).</td></tr>
<tr><td>Classification</td><td>Farm level:<br><br>The farm level classification result from the combination of Quality of the mortality data, Total mortality and Percentage of humanely killed animals out of total mortality. Twenty five situations are relevant:<br><br>
<table>
<tr><th></th><th>Quality?</th><th>Total mortality?</th><th>Percentage of humanely killed?</th></tr>
<tr><td>Situation 1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Situation 2</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>Situation 3</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>Situation 4</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>Situation 5</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>Situation 6</td><td>0</td><td>1</td><td>2</td></tr>
<tr><td>Situation 7</td><td>0</td><td>2</td><td>0</td></tr>
<tr><td>Situation 8</td><td>0</td><td>2</td><td>1</td></tr>
</table></td></tr>
</table>

| Title | Mortality | | | |
|---|---|---|---|---|
| | Situation 9 | 0 | 2 | 2 |
| | Situation 10 | 0 | 3 | 0 |
| | Situation 11 | 0 | 3 | 1 |
| | Situation 12 | 0 | 3 | 2 |
| | Situation 13 | 1 | 0 | 0 |
| | Situation 14 | 1 | 0 | 1 |
| | Situation 15 | 1 | 0 | 2 |
| | Situation 16 | 1 | 1 | 0 |
| | Situation 17 | 1 | 1 | 1 |
| | Situation 18 | 1 | 1 | 2 |
| | Situation 19 | 1 | 2 | 0 |
| | Situation 20 | 1 | 2 | 1 |
| | Situation 21 | 1 | 2 | 2 |
| | Situation 22 | 1 | 3 | 0 |
| | Situation 23 | 1 | 3 | 1 |
| | Situation 24 | 1 | 3 | 2 |
| | Situation 25 | 2 | - | - |

#### 3.4.3.3 Absence of pain induced by management procedures

The criterion of *Absence of pain induced by management procedures* assesses the requirement that animals should not suffer from pain induced by inappropriate management, handling, killing or surgical procedures (e.g. castration).

Finnraccoons are not routinely subjected to any kinds of mutilations of their body or surgical procedures. Therefore, the possible discomfort caused by management procedures is measured only by assessing the killing method.

| Title | Emergency killing |
|---|---|
| Scope | Resource and management-based measurement: Periods 1 and 2 |
| Sample | Killing device |
| Framing information | European regulations state the allowed killing methods for Finnraccoons. According to the current understanding, head-to-body electrocution is considered the best killing method for adult or juvenile Finnraccoons.<br>Sick or injured Finnraccoons should be humanely killed whenever there is a risk that they are suffering. |
| Method description | Consult the farm manager about the killing methods used for adult animals on the farm. If the animals are killed by head-to-body electrocution, consult the farm manager about the type and functionality of the device/devices. Ask the manager to show you the killing device used in the case of emergency euthanasia. Inspect the functionality of the device (care should be taken with electrical stunning devices as they are potentially hazardous to humans).<br>**In Period 2**: Consult the farm manager also about the euthanasia of the newborn and very small cubs. |

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| Title | Emergency killing |
|---|---|
| Method description | **Farm level:**<br>**Killing device:**<br>**0** – Head-to-body electrocution, and the device is in a functional state<br>**1** – Other allowed humane killing method than head-to-body electrocution and the device is in a functional state<br>**2** – Absence of a device to kill the animals humanely, or the functionality of the device is not acceptable<br>If 0, then:<br>**Certificate of the inspection of the killing device:**<br>**0** – Certificate of the inspection of the killing device, not older than one year, or the qualification of the device (presence of a sufficient check light or sound indicating functioning of the device, current at least 0.3 A) is presented/tested during the assessment<br>**1** – No certificate of the inspection of the killing device, or a certificate, older than one year<br>**Killing method of cubs (Period 2)**<br>**0** – Allowed humane killing method for cubs<br>**1** – Absence of the device or method to kill the cubs humanely |
| Classification | **Farm level:**<br>The farm level classification result from the combination of the two or three questions described above: Killing device, Certificate of the inspection of the device and Killing method of cubs. The number of situations differs from period to another: |

| Period 1 | Device? | Certificate? | |
|---|---|---|---|
| Situation 1 | 0 | 0 | |
| Situation 2 | 0 | 1 | |
| Situation 3 | 1 | - | |
| Situation 4 | 2 | - | |
| **Period 2** | **Device?** | **Certificate?** | **Method for cubs?** |
| Situation 1 | 0 | 0 | 0 |
| Situation 2 | 0 | 0 | 1 |
| Situation 3 | 0 | 1 | 0 |
| Situation 4 | 0 | 1 | 1 |
| Situation 5 | 1 | - | 0 |
| Situation 6 | 1 | - | 1 |
| Situation 7 | 2 | - | 0 |
| Situation 8 | 2 | - | 1 |

| Title | Killing at farm at the end of Period 3 |
|---|---|
| Scope | Resource- and management-based measurement: Period 3 |
| Sample | Killing equipment and killing related documents of the farm |
| Framing information | Finnraccoons are typically killed at the same farm where they have been born. They are not transported for killing, but killed just outside their cages. European regulations state the allowed killing methods. According to current understanding, head-to-body electrocution is considered the best killing method for full-grown Finnraccoons.<br>The killing method and procedure are of importance especially in late autumn, when the production animals are harvested for pelting. In other seasons, only sick or injured animals may be occasionally humanely killed. |
| Method description | Consult the farm manager about the species specific SOP (Standard Operating Procedure) for killing Finnraccoons and the personnel's' certification of competence for killing Finnraccoons. The farm manager should have a detailed SOP for killing Finnraccoons on the farm. Pay special attention to combination farms where the same killing methods are used both in Finnraccoons and foxes. The management of killing should be specified to Finnraccoons, e.g. exposure time differs between the species. The minimum requirement is that the species is mentioned and/or that testing of the functioning of the device has been done separately for the species.<br>As a minimum, the person responsible for the killing should have a licence for killing in that species. In the case that the harvesting for pelting is outsourced, the contractor or outsourced personnel should have certification of competence for killing the species. If a veterinarian is working on the farms and is responsible of the killing of animals it is interpreted that she/he has the required training for killing by virtue of holding a veterinary degree.<br>Consult the farm manager about the killing methods used on the farm for the juvenile and adult animals and the certificate of the killing device. If the animals are killed by head-to-body electrocution, consult the farm manager about the type and the functionality of the device/ devices. Ask the manager to show you the killing devices in use on the farm.<br>Inspect all killing devices in use. Since different killing devices may be used on the farm, the farm is scored according to the 'lowest quality' device in use.<br>Farm level:<br>Species specific Standard Operating Procedure (SOP) for killing procedure:<br>0 - There is a species specific SOP present on farm for killing Finnraccoons<br>1 - No species specific SOP is present on farm for killing Finnraccoons<br>Certification of competence for killing:<br>0 - Certification of competence for killing<br>1 - No certification of competence for killing<br>Killing device:<br>0 - Head-to-body electrocution, and the device is in a functional state<br>1 - Other allowed humane killing method than head-to-body electrocution and the device is in a functional state<br>2 - Absence of a device to kill the animals humanely or the functionality of the device is not acceptable<br>If 0, then:<br>Certificate of the inspection of the killing device:<br>0 - Certificate of the inspection of the killing device, not older than one year or the calibration/ test of the device (presence of a sufficient check light or sound indicating functioning of the device, current at least 0.3 A), is presented/tested during the assessment<br>1 - No certificate of the inspection of the killing device, or a certificate, which is older than one year |

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| Title | Killing at farm at the end of Period 3 |
|---|---|
| Classification | Farm level:<br>The farm level classification result from the combination of the four questions described above: Species specific SOP for killing procedure, Certification of competence for killing, Killing device and Certificate of the inspection of the device. Sixteen situations are relevant: |

| | SOP for killing? | Certification of competence? | Device? | Certificate of device? |
|---|---|---|---|---|
| Situation 1 | 0 | 0 | 0 | 0 |
| Situation 2 | 0 | 0 | 0 | 1 |
| Situation 3 | 0 | 0 | 1 | - |
| Situation 4 | 0 | 0 | 2 | - |
| Situation 5 | 0 | 1 | 0 | 0 |
| Situation 6 | 0 | 1 | 0 | 1 |
| Situation 7 | 0 | 1 | 1 | - |
| Situation 8 | 0 | 1 | 2 | - |
| Situation 9 | 1 | 0 | 0 | 0 |
| Situation 10 | 1 | 0 | 0 | 1 |
| Situation 11 | 1 | 0 | 1 | - |
| Situation 12 | 1 | 0 | 2 | - |
| Situation 13 | 1 | 1 | 0 | 0 |
| Situation 14 | 1 | 1 | 0 | 1 |
| Situation 15 | 1 | 1 | 1 | - |
| Situation 16 | 1 | 1 | 2 | - |

## 3.4.4 Appropriate behaviour

### 3.4.4.1 Expression of social behaviours

The criterion of *Expression of social behaviour* assesses the requirement that animals should be able to express normal, non-harmful, social behaviours (e.g. grooming).

| Title | Social housing of juveniles |
|---|---|
| Scope | Resource and management-based measurement: Periods 2 and 3 |
| Sample size | According to section 3.2.4.2 |
| Framing information | Finnraccoons are social animals. Social housing enables active social behaviours, whereas single housing limits the potential to express social behaviours like allogrooming, greeting rituals and play. High social motivations have been shown in juvenile Finnraccoons in farming conditions.<br>It is recognised that there is insufficient information regarding the social needs of adult Finnraccoons, and therefore, social behaviour of adult Finnraccoons is not included in the current measurement. |
| Method description | Social housing is defined as whether a juvenile Finnraccoon can physically interact with at least one animal of the same species. Physical interaction means being enabled to take part in active behaviours, including (but not an exhaustive list) allogrooming, greeting rituals and play. In practice, Finnraccoons must be raised in the same cage to be able to have physical interaction with animals of the same species.<br>Social housing conditions are scored with regard to the number of animals in the same cage or cage system:<br>Cage level:<br>0 – There are two or more Finnraccoons in the same cage or cage system.<br>1 – There is only one Finnraccoon in the cage or cage system. |
| Classification | Farm level:<br>Percentage of juveniles housed singly (Score 1) |

### 3.4.4.2 Expression of other behaviours

The criterion of *Expression of other behaviours* assesses the requirement that animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging. Inappropriate housing environment may lead to various forms of abnormal behaviour.

| Title | Stereotypic behaviour |
|---|---|
| Scope | Animal-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Stereotypic behaviour is considered to indicate ongoing or past challenges in the welfare of the animal. Locomotor stereotypies, like pacing and circling are observed in Finnraccoons. These behavioural patterns may include head twirling-like movement against the (front) wall of the cage. Other stereotypies like scrabbling (digging-like movements) and oral stereotypies can also be observed. Stereotypic behaviour is linked to the diurnal activity rhythm of the species, and possibly also to the feeding regimen. |
| Method description | Stereotypic behaviour is defined as unvarying, repetitive behaviour, without an obvious goal, that is repeated three or more times in a row. Stereotypic behaviour can, for example, include, walking along the side of the cage (pacing), circling the cage, head twirling against the cage wall or ceiling.<br>Observation of stereotypic behaviour is done first in the morning, preferably at sunrise, and before the morning feeding. If this is not possible (e.g. if the animals were already fed early in the morning), observe stereotypic behaviour as the last thing before leaving the farm, i.e. close to sunset and as far as possible from the time of feeding. Avoid observing stereotypic behaviour during feeding (while the feeding machine is on) |

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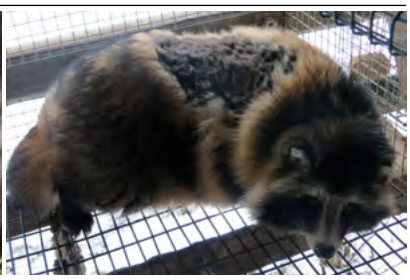
| Title | Stereotypic behaviour |
|---|---|
| Method description | Walk slowly (50 cm/sec) through the shed and observe the behaviour of the animals in front of you. Remain quiet. Divide the shed into naturally occurring blocks (typically two 1.2 $m^2$ – size cages on each side of the corridor or three 0.8 $m^2$ – size cages on each side of the corridor). Observe the animals in the blocks ahead of you, and not those in the block around you. When you arrive at the end of the block, stop observing the block right ahead of you and start observing the next blocks.<br>A practical example: Let us label the blocks of a shed A, B, C, D etc. When you arrive at the shed and walk in between the cages in the block A, observe the animals in the blocks B, C and D. When you arrive at the end of the block A (and enter the block B), start observing the animals in the blocks C, D and F. Since the length of a block is typically approximately 2 - 2.5 m, you will spend 4 - 5 seconds passing each block, and thus the time spent on observing each block/animal is around 12-15 sec. Count the number of animals passed by, and the number of animals performing stereotypic behaviour.<br>**NB**. In period 2, cubs are not included in the observation.<br>Assess the occurrence of stereotypic behaviour:<br>**Individual level:**<br>**0** – The animal does not express stereotypic behaviour<br>**1** – The animal expresses stereotypic behaviour. |
| Classification | **Farm level:**<br>Percentage of animals expressing stereotypic behaviour (Score 1) |

| Title | Fur chewing |
|---|---|
| Scope | Animal-based measurement: Periods 1 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Finnraccoons may chew or pull their fur. Although the aetiology of the fur chewing behaviour is not well known, it is considered as self-injurious behaviour, i.e. abnormal behaviour. Therefore, signs of fur chewing are interpreted as the outcome of compromised welfare of the animal.<br>Fur chewing must be observed in growing or full grown fur, and it cannot be observed during the moulting period. Therefore, fur chewing is not observed in Period 2, since the data collection window partly coincides with the shedding of the winter fur (moult). |
| Method description | The consequences of fur chewing can be seen on the body, as broken or missing cover hairs in a certain area, so that the underfur remains visible. In a serious case, the underfur may also be affected, and then, the skin may even be visible through the short or missing hair. Fur is typically chewed from the flanks, above the legs, back and the tail of the animal. Fur chewing may also be seen on the head, where it is then caused by a cage mate. This is not differentiated in the measurement.<br>The animal is observed but must not be touched. View the animal from all sides of its body and tail. Search for areas where the hair is broken.<br>The animal is scored with regard to the observed signs of chewed fur (see photographic illustration):<br>**Individual level:**<br>**0 – No fur chewing**<br>**1 – Mild fur chewing** in an area smaller than 10 × 10 cm or at a shorter length than 5 cm in the tail. If more than one area with broken hair is found, these are summed (combined by addition) and the total affected area is evaluated.<br>**2 – Severe fur chewing** in a larger area than 10 × 10 cm or at a longer length than 5 cm in the tail. If more than one area with broken hair is found, these are summed (combined by addition) and the total affected area is evaluated. |

| Title | Fur chewing |
|---|---|
| Classification | Farm level:<br>In Period 1: Percentage of animals with signs of fur chewing (Scores 1 and 2 combined)<br>In Periods 2 and 3: Percentage of animals with mild (Score 1) and severe fur chewing (Score 2) |

Score 0

Score 1



Score 2

| Title | Availability of straw |
|---|---|
| Scope | Resource-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Straw is considered a very important activity material for the Finnraccoons. They can use straw for various manipulation activities and for eating, as Finnraccoon are omnivores. |
| Method description | Check the cage for the availability of straw, hay or other corresponding material.<br>Straw or hay may be available inside the cage, or on the cage roof, in between the cages, in the nest box or in an inbuilt rack outside the cage, as long as the material can be pulled through the mesh and is available to the animal. The minimum amount of the straw to be accepted is a handful.<br>Cage is scored according to the availability of straw:<br>Cage level:<br>0 – There is straw available in the cage.<br>1 – There is no straw available in the cage. |
| Classification | Farm level:<br>Percentage of animals without straw available (Score 1) |

Score 0

Score 0

Score 0

| Title | Opportunity to use activity object |
|---|---|
| Scope | Resource-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Movable activity objects provide occupation. It has been shown that Finnraccoons readily interact with various activity objects.<br>Due to limited information on the welfare effects of various different activity objects, none of the safe activity objects is given priority over any other. |
| Method description | Check the cage for the availability of any kind of activity objects. An activity object is defined as an object or material inside the cage which allows species-specific manipulation and/or interaction with it, e.g. gnawing, poking, carrying or play. Activity objects can be, for example, a wooden block, bone, rope, ball, digging substrate (e.g. sand) or any other manipulatable object or material (other than straw, hay or any other source of fibre) that is not harmful to the animals.<br>The cage is scored with regard to the availability of the activity object:<br>Cage level:<br>0 – There are at least two different types (different material) of activity objects in the cage, and at least one object per animal (regardless of the type)<br>1 – There are at least two different types (different material) of activity objects in the cage, but less than one object per animal (regardless of the type)<br>2 – There is one type of object in the cage and at least one object per animal<br>3 – There is one type of object in the cage, and less than one object per animal<br>4 – There are no activity objects in the cage |
| Classification | Farm level:<br>Percentage of animals in various situations in regards to availability of activity objects (Scores 0, 1, 2, 3 and 4) |

Bone

Small plastic tube

Two wooden blocks and ball

| Title | Complexity of the available area |
|---|---|
| Scope | Resource-based measurement: Periods 1, 2 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Wild raccoon dogs tend to roam inside dense vegetation, and so provision of all cage furniture, and constructions that make the cage a more complex environment are considered to potentially increase the value of the available area. Finnraccoons utilise the opportunity to use these areas e.g. a resting platform, nest box, or a large tube. Due to limited information on the welfare effects of various constructions, none of them is given priority over any other. |
| Method description | Inspect the cage for the complexity of the available area and record whether the cage includes the following constructions: |

| Title | Complexity of the available area |
|---|---|
| Method description | • Platform, i.e. a location higher than the cage floor level. Note that in the case of a second platform, it is considered to further increase the complexity of the cage if it is mounted at a different height, or in a different part of the cage than the first one. In this case, these are marked as two constructions, increasing the complexity of the cage.<br>• Partition wall, e.g. cage system united from two or more separate sections: The partition wall must be longer than half of the length of the cage wall. If the animal is able to sit down in the opening, then it is considered as one area, and there is no partition wall.<br>• Other kind of construction that increases the complexity of the available area (e.g. a design that allows going through or around).<br><br>The cage is scored according to the number of constructions which increase the complexity of the available area:<br>Cage level:<br>**0 – There are at least two constructions** in the cage that increase the complexity of the available area.<br>**1 – There is one construction** in the cage that increases the complexity of the available area.<br>**2 – There are no constructions** in the cage that increase the complexity of the available area. |
| Classification | Farm level:<br>Percentage of animals in various situations in regards to complexity of the available area (Scores 0, 1 and 2) |

Score 0: Platform, partition wall

Score 1: Partition wall

Score 1: Other construction

### 3.4.4.3 Good human-animal relationship and Positive emotional state

The criterion of *Good human-animal relationship* assesses the requirement that the animals should be handled well in all situations, i.e. handlers should promote good human-animal relationship.

The criterion of *Positive emotional state* assesses the requirement that negative emotions such as fear, distress, frustration or apathy should be avoided whereas positive emotions such as security or contentment should be promoted.

The two criteria are combined, and described with one measurement, the *Voluntary approach test*.

| Title | Voluntary approach test |
|---|---|
| Scope | Animal-based measurement: Periods 1 and 3 |
| Sample size | According to sections 3.2.4.1 and 3.2.4.2 |
| Framing information | Finnraccoons are typically curious towards humans. A rationale has been taken that an animal that approaches an unknown human (for example, the assessor) voluntarily shows a positive expectation of a human contact, which in turn, shows some aspects of a good human-animal relationship and positive experiences of previous human contact (including handling). An animal with negative expectations of human contact does not voluntarily approach an unknown human. |

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| Title | Voluntary approach test |
|---|---|
| Framing information | The voluntary approach test is not carried out in Period 2, since it cannot be expected that females nursing their cubs (the majority of the sample in this period), will behave with curiosity towards an unknown human. The females may protect their young, and therefore, the outcome of the test would not show the true longer term temperament of the animal. |
| Method description | In Period 1: While passing by the Finnraccoon in the walking assessment, observe the behaviour of the Finnraccoons, record any fearful and/or aggressive reactions of the animals. Do not look the animal directly in the eyes.<br>In Period 3: Start the assessment of the animal-based and resource-based measurements by performing the voluntary approach test. Raise your hand towards the cage of the Finnraccoon so that your fingers are approximately at the height of eyes of the animal. Approach the cage, so that your hand finally touches the cage front wall. Do not, however, place your hand or fingers inside the cage. Do not look the animal directly in the eyes. Observe the reaction of the Finnraccoon towards your hand for a maximum of 15 seconds. The test can be stopped earlier, if a clear reaction to the hand has been observed, e.g. the animal sniffs the hand. Make sure that the animal is aware of your presence while you do the test. Note that Finnraccoons may react slowly, and they may need some time to respond to the presence of a human. If the animal has access to a nest box, wait until it exits the nest box voluntarily before you do the test.<br>Animal is scored according to its behaviour:<br>Individual level:<br>0 – The animal is curious and confident in the presence of the assessor. The animal approaches and sniffs the hand of the assessor through the front mesh from a maximum distance of 10 cm. The animal may also be standing against the front wall and pay attention to the assessor in another way than looking at the hand. In this case, you may move the hand a little, so that the animal pays attention to the hand. In general, the animal is positively interested in the presence of the human.<br>1 – The animal is active in the presence of the assessor, but does not specifically pay attention to the assessor, or hand, and does not approach the hand.<br>2 – The animal is inactive in the presence of the assessor. The animal does not pay attention to the assessor or hand, but instead remains resting or sitting during the testing.<br>3 – The animal is aggressive. It may be growling with the back arched and fur erected from the back. The aggressive animal may perform mock attacks towards the assessor and/or bite the mesh simultaneously.<br>4 – The animal is reserved or freezes (stops the behaviour that it was doing, and remains immobile) in the presence of the assessor. The animal pays attention to the assessor and to the hand. The animal is fearful, but it does not show an active escape reaction.<br>5 – The animal is fearful in the presence of the assessor and/or towards the hand. The animal withdraws to the back part of the cage and actively tries to avoid contact with the assessor. Also stereotypic behaviour (escape stereotypy) in the back part of the cage may be observed. |
| Classification | Farm level:<br>In Period 1: Percentage of aggressive and fearful animals showing Scores 3 and 5, respectively.<br>In Period 3: Percentage of animals with reactions towards human seen in Scores 0, 1, 2, 3, 4 and 5. |

# 4. Calculation of scores for Finnraccoons

This section presents the conversion of the assessment measure data from the prevalence percentages describing the severity of welfare issues, as well as other kinds of information on the welfare of the Finnraccoons on a farm, to the welfare scores at the measurement, criterion, principle and overall level. In the sub-sections below the details of this process are presented in four steps:

- From the original measures to the criterion scores: section 4.1
- From the criterion scores to the period-wise principle scores: section 4.2
- From the principle scores to the period-wise overall scores: section 4.3
- From the period-wise principle scores to the final overall scores: section 4.4

Through the sections 4.1 - 4.4 the following colour codes are employed to indicate the verbal meaning of the scores ranging from 0 to 100:

| | | |
|---|---|---|
| **80 ≤ Score ≤ 100** | Best current practice | The welfare of the animals is considered to represent best current farming practice. |
| **50 ≤ Score < 80** | Good current practice | The welfare of the animals is considered to represent good current farming practice. |
| **20 ≤ Score < 50** | Acceptable current practice | The welfare of the animals is considered to represent acceptable current farming practice. |
| **Score < 20** | Unacceptable current practice | The welfare of the animals is considered to be on unacceptable level. |

## 4.1 From the original measurements to the criterion scores

The original on-farm measurement data are converted to measurement scores using five types of tools that are presented in Table 5.

*Table 5. The types of tools used in determining the scores at the measurement level.*

| | |
|---|---|
| Curve | • The percentage of animals in an impaired welfare state is transformed into the final measurement score using up to third-degree polynomial functions (or curves, e.g. % of very lean Finnraccoons in P2: see page 57 for a third-order polynomial)<br>– A third degree polynomial function is determined by its constant ($C_0$) and coefficients ($C_1$, $C_2$ and $C_3$): $y = C_0 + C_1x + C_2x^2 + C_3x^3$.<br>• In this protocol: x = percentage, y = score.<br>• Note that if $C_3$ is zero or $C_2$ and $C_3$ are zero, the polynomials are of second-degree and first-degree, respectively.<br>– All the curves are descending, i.e. the welfare score for a measurement (y) decreases as the severity of the problem (% on x-axis) increases.<br>• The descending parts of the curves are presented also as graphs, but for clarity the constant part of each function, where the welfare score (y) is zero (i.e. the 'right flat tail of the curve'), are omitted from the graphs.<br>– In many cases a spline function is used, i.e. the polynomial applied changes at points (x,y) called knots.<br>• In this protocol: the number of knots varies from 1 to 2.<br>• In addition, in all the curves the right flat tail starts from a 'knot' where the curve has reached the y value zero. |

| | |
|---|---|
| Curve | • In some cases the percentage (on x axis) can be calculated as a weighted sum of percentages of animals in impaired welfare states of varying severity (e.g. % of Finnraccoons with moderately and severely dirty fur: see page 65). |
| Weighted sum | • Percentages of animals in varying welfare states (% Finnraccoons with a resting shelter with zero, one, two or three walls: see page 64) or percentages of animals showing certain behaviour patterns (Voluntary approach test: see page 87) is transformed into the final measurement score by calculating a weighted sum of the percentages. |
| Decision table: farm level only | • Construction of a decision table leading to S possible situations, i.e. combinations of two or more kinds of categorical data, with assigned scores.<br>• The score corresponding to the situation prevailing on the whole farm, is considered as the final measurement score (e.g. Emergency killing: see page 78) |
| Decision table: individual level and a % rule | • Construction of a decision table leading to S possible situations, i.e. combinations of two or more kinds of categorical data, with assigned scores.<br>• The score for the worst situation observed on at least a pre-determined percentage of the Finnraccoons is considered as the final measurement score for the farm (e.g. Continuous water availability: see page 60). |
| Decision table: individual level and calculating a mean | • Construction of a decision table leading to S possible situations, i.e. combinations of two or more kinds of categorical data, with assigned scores.<br>• The mean of the scores of the individual animals is the final measurement score for the farm (Opportunity to use activity object: see page 85). |

If the criterion has only one measurement, its score is the criterion score. If a criterion has more than one measurement, the measurements scores are aggregated to the criterion score by calculating their weighted sum.

If, and only if, any of the individual measurement scores to be aggregated has a value lower than 50, a penalty procedure is applied to reduce the compensation effect of the higher scores onto the lower scores. The penalty is subtracted from the weighted sum to get the final criterion score. The penalty calculation is based on the lowest score (z) to be aggregated and takes place in two steps. First, a raw penalty is calculated using a formula that is common for all measurements: raw penalty = $50 - 0.402z - 0.0431z^2 + 0.0006228z^3$ (Figure 3). Then this raw penalty is weighted with the weight (w) of the measurement with the lowest score of the scores to be aggregated to get the final penalty. If two or more measurements have the same lowest score, the weights of the measurement with the highest weight is is used. There is a restriction that the penalty cannot lead to a negative criterion score , i.e. if weighted sum minus final penalty is below zero, the final criterion score is 0.

*Figure 3.* The raw penalty (w = 1) and examples of the final penalties

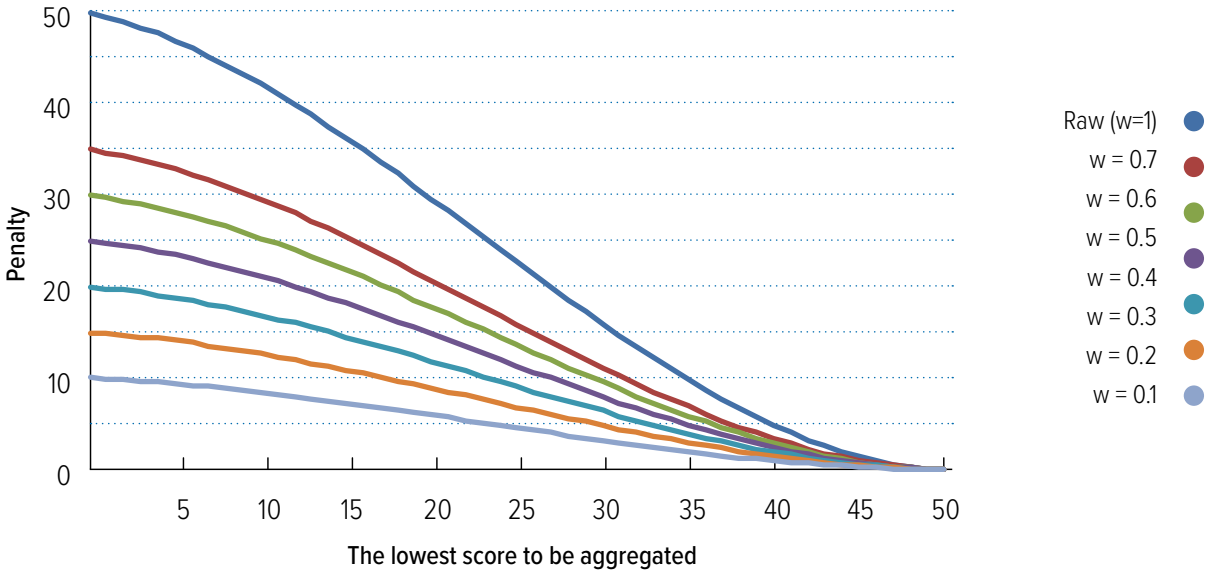


*Table 6. Aggregation example with scores of 90 and 20 with weights 0.3 and 0.7, respectively*

| Score 1 | Weight 1 | Score 2 | Weight 2 |
|---|---|---|---|
| 90 | 0.3 | 20 | 0.7 |
| **Step A:** Weighted sum = 90 x 0.3 + 20 x 0.7 = 27 + 14 =41 | | | |
| **Step B:** Penalty = 0.7 x (50 - 0.402 x 20 - 0.0431 x 400 + 0.0006228 x 8000) = 0.7 x 29.7024 = 20.8 | | | |
| **Step C:** Final score = 41 - 20.8 = 20.2 | | | |

The tables 7A-7C summarize criterion by criterion the measurements, their type (i.e. animal, resource, or management-based), the periods concerned, the tools for converting the original measurements into measurement scores, and the tools for aggregating the measurement scores into the 12 criterion scores. The sections 4.1.1 - 4.1.11 describe these formulae and the rules applied, in detail, for each of the 12 welfare criteria. Note that the criteria Good human-animal relationship and Positive emotional state have been combined in this Finnraccoon protocol.

*Table 7A. A summary of the measurements and score construction tools for the criteria within the principles Good feeding (C1-C2) and Good housing (C3-C5).*

| Criterion | Measure | Type of measure | Period | Construction at measurement level | Input data | Aggregation of measurements |
|---|---|---|---|---|---|---|
| C1: *Absence of prolonged hunger* | *Body condition* | Animal | P1, P2 & P3 | Curve | % of very lean animals | Weighted sum and conditional penalty |
| | *Availability of nutritional fibre* | Resource & Management | P1, P2 & P3 | Curve<br>Two separate curves according to the type of the feed | % of animals without additional nutritional fibre | |
| C2: *Absence of prolonged thirst* | *Continuous water availability* | Resource & Management | P1, P2 & P3 | Two sub-measurements are aggregated into one decision table & % rule. | %s of animals in 42 (P1 & P3) or 16 (P2) situations | No |
| C3: *Comfort around resting* | *Opportunity for allohuddling* | Management | P2 & P3 | Curve | % of animals without opportunity for allohuddling | Weighted sum and conditional penalty |
| | *Resting shelter* | Resource | P1, P2 & P3 | Weighted sum | %s of animals in the 4 situations | |
| C4: *Thermal comfort* | *Cleanliness of the fur* | Animal | P1 & P3 | Curve | P3: Weighted sum of %s of moderately and severely dirty animals<br>P1: % of dirty animals (the two severity categories combined) | P1 & P3: Weighted sum and conditional penalty<br>P2: No |
| | *Protection from wind* | Resource | P1 & P3 | Decision table & % rule | %s of animals in the 6 situations | |
| | *Protection from exceptionally hot weather* | Resource & Management | P2 | Decision table & % rule | %s of animals in the 12 situations | |

| Criterion | Measure | Type of measure | Period | Construction at measurement level | Input data | Aggregation of measure-ments |
|---|---|---|---|---|---|---|
| C5: *Ease of movement* | *Opportunity for horizontal move-ment* | Animal | P1, P2 & P3 | Decision table % rule | %s of animals in the 9 situations | Weighted sum and conditional penalty |
| | *Opportunity for vertical move-ment* | Animal | P1, P2 & P3 | Curve | % of animals without opportunity for verti-cal movement | |

*Table 7B. A summary of the measurements and score construction tools for the criteria within the principle Good health (C6-C8).*

| Criterion | Measure | Type of measure | Period | Construction at measure-ment level | Input data | Aggregation of measurements |
|---|---|---|---|---|---|---|
| C6: *Absence of injuries* | *Difficulties in moving* | Animal | P1, P2 & P3 | Curve | P2&P3: Weighted sum of %s of animals with difficulties in moving and unable to move<br>P1: % of animals with diffi-culties in moving (the two categories combined) | Weighted sum and conditional penalty |
| | *Skin lesions and other injuries to the body* | Animal | P1, P2 & P3 | Curve | P2&P3: Weighted sum of %s of animals with old and fresh injuries<br>P1: % of animals with injuries (the two injury categories combined) | |
| C7: *Absence of disease* | *Bent feet* | Animal | P2 & P3 | Spline | Weighted sum of %s of animals with slightly and severely bent feet | Weighted sum and conditional penalty |
| | *Diarrhoea* | Animal | P1, P2 & P3 | Curve | Weighted sum of %s of animals with loose faeces and diarrhoea | |
| | *Other disease* | Animal | P1, P2 & P3 | Curve | P2&P3: Weighted sum of %s of animals with struc-tural defects or develop-mental disturbances, poor or reduced health and seriously compromised health<br>P1: % of animals with signs and/or symptoms of other disease (the three categories combined) | |
| | *Mortality* | Animal & Management | P1, P2 & P3 | Decision table: One situation concerning the whole farm | The situation prevailing on the whole farm out of the 25 situations | |

*Table continued over page*

*Table continued from previous page*

| Criterion | Measure | Type of measure | Period | Construction at measure-ment level | Input data | Aggregation of measurements |
|---|---|---|---|---|---|---|
| C8: Absence *of pain induced by man-agement procedures* | *Emergency killing* | Resource and Management | P1 & P2 | Decision table: One situation concerning the whole farm | The situation prevailing on the whole farm out of the 4 (P1) or the 8 (P2) situations | P1 & P2: No |
| | *Killing at the farm at the end of P3* | Resource and Management | P3 | Decision table: One situation concerning the whole farm | The situation prevailing on the whole farm out of the 16 situations | P3: No |

*Table 7C. A summary of the measurements and score construction tools for the criteria within the principle Appropriate behaviour (C9-C12).*

| Criterion | Measure | Type of measure | Period | Construction at measurement level | Input data | Aggregation of measurements |
|---|---|---|---|---|---|---|
| C9: *Expression of social behaviour* | *Social housing of juveniles* | Resource and Man-agement | P2 & P3 | Curve | % of juveniles housed singly | No<br>Note: The criterion is not considered in P1 |
| C10: *Expression of other behaviour* | *Stereotypic behaviour* | Animal | P1, P2 & P3 | Curve | % of stereotyping animals | Weighted sum and conditional penalty<br>Note: Fur chewing is not considered in P2 |
| | *Fur chewing* | Animal | P1 & P3 | Curve | P3: Weighted sum of %s of animals with mild and severe fur chewing P1: % of animals with fur chewing (the two severity categories com-bined) | |
| | *Availability of straw* | Resource | P1, P2 & P3 | Curve | % of animals with-out straw | |
| | *Opportunity to use activity object* | Resource | P1, P2 & P3 | Decision table: Mean of the scores of indi-vidual animals | Scores of the individual animals based on a decision tree with the 5 situations | |
| | *Complexity of the available area* | Resource | P1, P2 & P3 | Weighted sum | %s of animals in 3 situations | |
| C11 & C12 *Good human-an-imal relationship & Positive emotional state* | *Voluntary approach test* | Animal | P1 & P3 | Weighted sum | %s of animals in the 3 (P1) or the 6 (P3) behavioural categories | No<br>Note: The same score is used for both C11 and C12 when calculat-ing the principle score. See page 88 for C11 and C12 scores in P2. |

### 4.1.1 *Criterion 1: Absence of prolonged hunger*

The score of a farm with regard to the *Absence prolonged hunger* criterion is calculated from the percentage of very lean Finnraccoons and availability of nutritional fibre. The first stage is to calculate the measurement scores for these two, and then to aggregate them into the criterion score.

#### *Body condition measurement score*

In terms of interpretation, the higher the percentage of very lean Finnraccoons the lower the *Body condition* measurement score.

The percentage of very lean animals observed on a farm is converted into the *Body condition* measurement score with two spline functions, one for the Periods 1 and 3, and one for the Period 2 (Table 8 and Figures 4 and 5).

*Table 8. Percentage of very lean animals (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1 & P3 | $0 \leq x \leq 10$ | $y = 100 - 10x$ |
| | $x > 10$ | $y = 0$ |
| P2 | $0 \leq x \leq 13$ | $y = 100 - 2.4940x - 0.9717x^2 + 0.0440x^3$ |
| | $x > 13$ | $y = 0$ |

*Figure 4. Body condition: Periods 1 & 3*

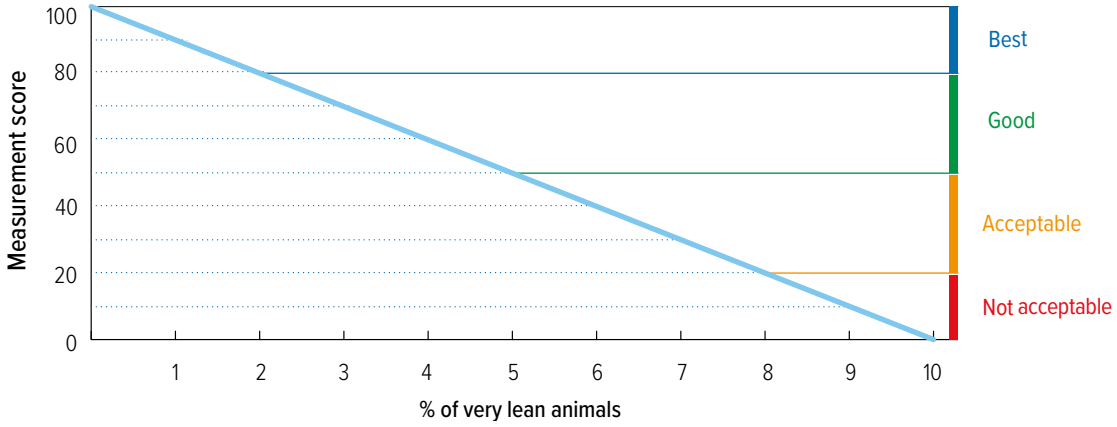
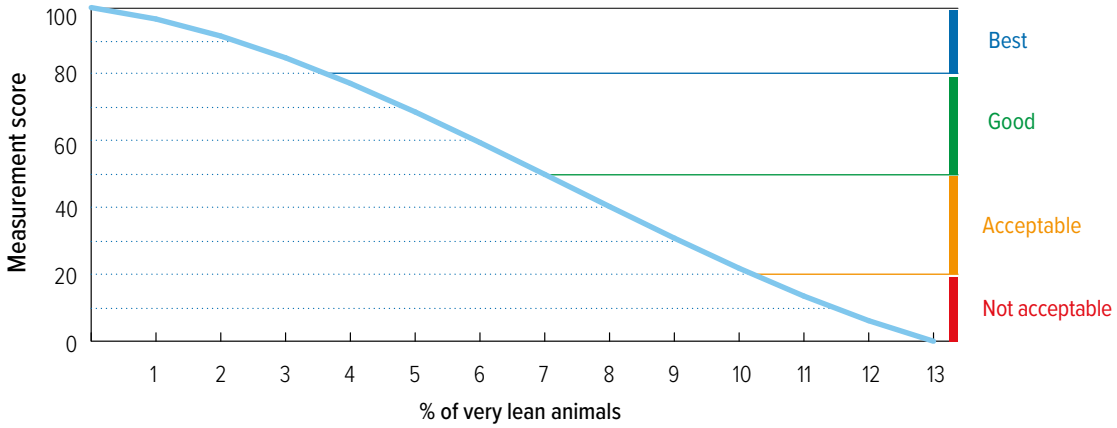



*Figure 5. Body condition: Period 2*



### *Availability of nutritional fibre* measurement score

In terms of interpretation, the higher the percentage of Finnraccoons without a source of nutritional fibre the lower the *Availability of nutritional fibre* measurement score.

First the situation on the farm in regard to the feed is considered, i.e. whether the Finnraccoons are fed with a special Finnraccoon feed, or other feed. Then, the provision of additional fibre is considered by using two spline functions, one for the 'Finnraccoon feed' situation and one for the 'Other feed' situation, to convert the percentage of Finnraccoons without additional nutritional fibre into the *Availability of nutritional fibre* measurement score (Table 9 and Figures 6 and 7).

*Table 9. Percentage of animals without additional nutritional fibre (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| All periods: **Finnraccoon feed** | $0 \leq x \leq 13$ | $y = 100 - 0.3061x - 0.2013x^2 - 0.00003x^3$ |
| | $15 < x \leq 25$ | $y = 125 - 5x$ |
| | $x > 25$ | $y = 0$ |
| All periods: **Other feed** | $0 \leq x \leq 15$ | $y = 100 - 7.4212x + 0.8502x^2 - 0.04148x^3$ |
| | $15 < x \leq 23$ | $y = 115 - 5x$ |
| | $x > 23$ | $y = 0$ |

*Figure 6. Finnraccoon feed: Periods 1, 2 & 3*

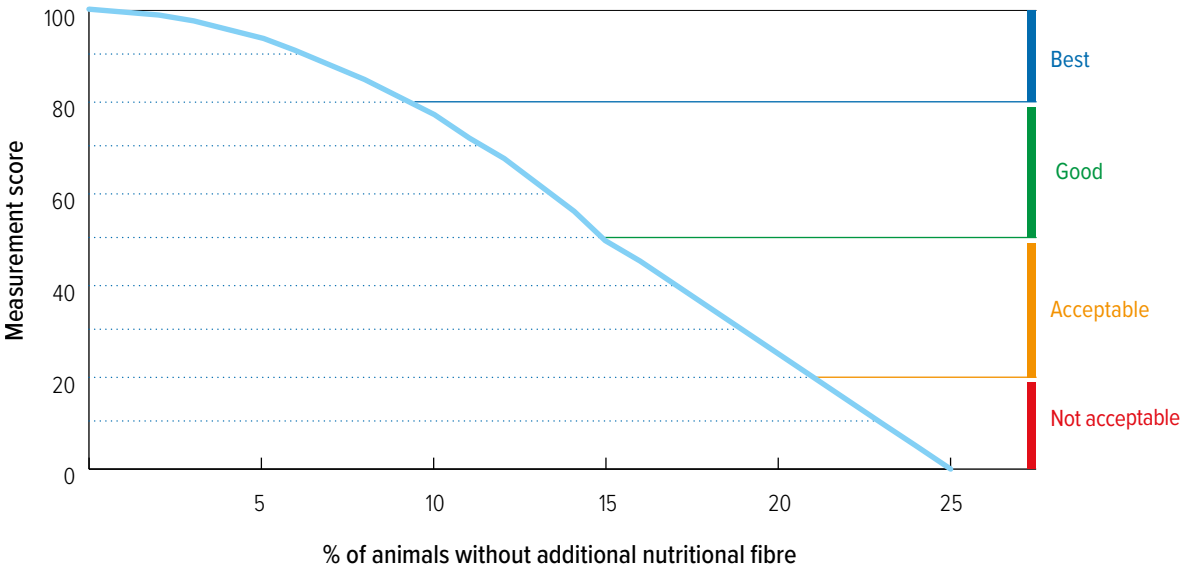
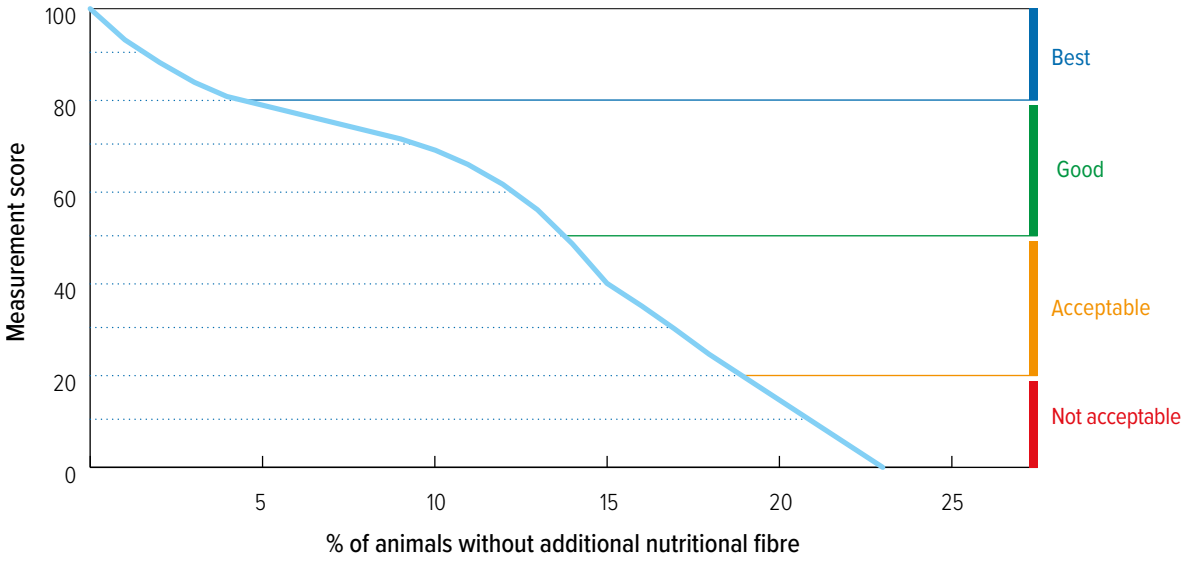


*Figure 7. Other feed: Periods 1, 2 & 3*




### Score for the *Criterion 1: Absence of prolonged hunger*

The *Body condition* ($y_B$) and *Availability of nutritional fibre* ($y_F$) measurement scores are aggregated to form the score for the *Absence of prolonged hunger* criterion ($C_1$) by calculating first their weighted sum, by applying the weights $w_B$ and $w_F$, respectively, presented in Table 10 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_B$ and $y_F$ is lower than 50 (Steps B and C).

*Table 10. Aggregation calculation for Absence of prolonged hunger score*

| Step A: Calculating weighted sum ($y_{WS}$) of *Body condition* ($y_B$) and *Availability of nutritional fibre* ($y_F$) | | | |
|---|---|---|---|
| Period | Weight: $w_B$ | Weight: $w_F$ | Weighted sum |
| **P1** | 0.5 | 0.5 | $y_{WS} = 0.5y_B + 0.5y_F$ |
| **P2** | 0.7 | 0.3 | $y_{WS} = 0.7y_B + 0.3y_F$ |
| **P3** | 0.6 | 0.4 | $y_{WS} = 0.6y_B + 0.4y_F$ |
| **Step B: Calculating penalty ($y_{Pen}$)** | | | |
| A penalty ($y_{Pen}$) is calculated, if and only if $y_B$ or $y_F$ or both of them have value lower than 50: $y_{Pen} = w_i\,(50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lower of the values $y_B$ and $y_F$, and $w_i$ is the weight (see Step A) of this measurement. If $y_B = y_F$, the greater of the two weights is used as $w_i$. | | | |
| **Step C: Calculating final criterion score $C_1$** | | | |
| $C_1 = y_{WS} - y_{Pen}$<br>If $(y_{WS} - y_{Pen}) < 0$, then $C_1 = 0$. | | | |

### 4.1.2 Criterion 2: Absence of prolonged thirst

The score of a farm with regard to the *Absence of prolonged thirst* criterion is determined with one measurement only, *Continuous water availability.*

#### *Continuous water availability* measurement score

*Continuous water availability* measurement consists of two sub-measurements: *Type of watering system* (*Type of watering system* and *Watering times per day) and Availability of potable water (Availability of water* and *Cleanliness of the water point.)*

The sub-measurements are combined with the decision table approach (Tables 11 and 12): each combination of the four factors ('situation') has a welfare interpretation, i.e. a *Continuous water availability* measurement score. In terms of interpretation, the more the access to water is limited by the issues relating to the type of watering system, number of water provisions, availability of water or cleanliness of the water point, the lower the score for the situation.

Since the assessment of the *Type of watering system* and *Availability of water* differs in the Periods 1 and 3 from the Period 2, there are two decision tables with the scores for the 42 (Table 11) and 16 (Table 12) situations, respectively. The animals on a farm may be housed with different water provision conditions. Therefore, the percentages of animals in each situation defined by the decision table are considered, and the final score to be assigned to the farm for *Continuous water availability* is the worst score (= the one corresponding to the worst situation found on the farm) observed in at least 4% of the animals.

*Table 11. Continuous water availability: Decision table for Periods 1 and 3. (Note: 4% rule applied)*

| Situation number | Type of watering system | Watering times per day | Availability of water | Cleanliness of the water point | Measurement score |
|---|---|---|---|---|---|
| Situation 1 | Automatic - frost protected | - | Water | Clean | 100 |
| Situation 2 | Automatic - frost protected | - | Water | Dirty | 70 |
| Situation 3 | Automatic - frost protected | - | Ice | Clean | 45 |
| Situation 4 | Automatic - frost protected | - | Ice | Dirty | 35 |
| Situation 5 | Automatic - frost protected | - | No water | Clean | 0 |
| Situation 6 | Automatic - frost protected | - | No water | Dirty | 0 |
| Situation 7 | Automatic - non frost protected | Twice a day | Water | Clean | 90 |
| Situation 8 | Automatic - non frost protected | Twice a day | Water | Dirty | 55 |
| Situation 9 | Automatic - non frost protected | Twice a day | Ice | Clean | 55 |
| Situation 10 | Automatic - non frost protected | Twice a day | Ice | Dirty | 40 |
| Situation 11 | Automatic - non frost protected | Twice a day | No water | Clean | 20 |
| Situation 12 | Automatic - non frost protected | Twice a day | No water | Dirty | 15 |
| Situation 13 | Automatic - non frost protected | Once a day | Water | Clean | 70 |
| Situation 14 | Automatic - non frost protected | Once a day | Water | Dirty | 50 |
| Situation 15 | Automatic - non frost protected | Once a day | Ice | Clean | 45 |
| Situation 16 | Automatic - non frost protected | Once a day | Ice | Dirty | 30 |

| Situation number | Type of watering system | Watering times per day | Availability of water | Cleanliness of the water point | Measurement score |
|---|---|---|---|---|---|
| Situation 17 | Automatic - non frost protected | Once a day | No water | Clean | 15 |
| Situation 18 | Automatic - non frost protected | Once a day | No water | Dirty | 10 |
| Situation 19 | Automatic - non frost protected | Less than once a day | Water | Clean | 50 |
| Situation 20 | Automatic - non frost protected | Less than once a day | Water | Dirty | 30 |
| Situation 21 | Automatic - non frost protected | Less than once a day | Ice | Clean | 45 |
| Situation 22 | Automatic - non frost protected | Less than once a day | Ice | Dirty | 25 |
| Situation 23 | Automatic - non frost protected | Less than once a day | No water | Clean | 0 |
| Situation 24 | Automatic - non frost protected | Less than once a day | No water | Dirty | 0 |
| Situation 25 | Manual | Twice a day | Water | Clean | 85 |
| Situation 26 | Manual | Twice a day | Water | Dirty | 50 |
| Situation 27 | Manual | Twice a day | Ice | Clean | 50 |
| Situation 28 | Manual | Twice a day | Ice | Dirty | 35 |
| Situation 29 | Manual | Twice a day | No water | Clean | 20 |
| Situation 30 | Manual | Twice a day | No water | Dirty | 15 |
| Situation 31 | Manual | Twice a day | Water | Clean | 70 |
| Situation 32 | Manual | Once a day | Water | Dirty | 45 |
| Situation 33 | Manual | Once a day | Ice | Clean | 50 |
| Situation 34 | Manual | Once a day | Ice | Dirty | 30 |
| Situation 35 | Manual | Once a day | No water | Clean | 15 |
| Situation 36 | Manual | Once a day | No water | Dirty | 10 |
| Situation 37 | Manual | Less than once a day | Water | Clean | 50 |
| Situation 38 | Manual | Less than once a day | Water | Dirty | 35 |
| Situation 39 | Manual | Less than once a day | Ice | Clean | 40 |
| Situation 40 | Manual | Less than once a day | Ice | Dirty | 25 |
| Situation 41 | Manual | Less than once a day | No water | Clean | 0 |
| Situation 42 | Manual | Less than once a day | No water | Dirty | 0 |

*Table 12. Continuous water availability: Decision table for Period 2. (Note: 5% rule applied)*

| Situation number | Type of watering system | Watering times per day | Availability of water | Cleanliness of the water point | Measurement score |
|---|---|---|---|---|---|
| **Situation 1** | Automatic | - | Water | Clean | **100** |
| **Situation 2** | Automatic | - | Water | Dirty | **70** |
| **Situation 3** | Automatic | - | No water | Clean | **0** |
| **Situation 4** | Automatic | - | No water | Dirty | **0** |
| **Situation 5** | Manual | Twice a day | Water | Clean | **80** |
| **Situation 6** | Manual | Twice a day | Water | Dirty | **60** |
| **Situation 7** | Manual | Twice a day | No water | Clean | **0** |
| **Situation 8** | Manual | Twice a day | No water | Dirty | **0** |
| **Situation 9** | Manual | Once a day | Water | Clean | **70** |
| **Situation 10** | Manual | Once a day | Water | Dirty | **50** |
| **Situation 11** | Manual | Once a day | No water | Clean | **0** |
| **Situation 12** | Manual | Once a day | No water | Dirty | **0** |
| **Situation 13** | Manual | Less than once a day | Water | Clean | **45** |
| **Situation 14** | Manual | Less than once a day | Water | Dirty | **30** |
| **Situation 15** | Manual | Less than once a day | No water | Clean | **0** |
| **Situation 16** | Manual | Less than once a day | No water | Dirty | **0** |

#### Score for the *Criterion 2: Absence of prolonged thirst*

The score for a farm with regard to the *Absence of prolonged of thirst* criterion is determined by *Continuous water availability* only. Thus, the *Absence of prolonged thirst* criterion score ($C_2$) equates to the *Continuous water availability* measurement score.

### 4.1.3 Criterion 3: *Comfort around resting*

The score of a farm with regard to the *Comfort around resting* criterion is calculated from the percentage of animals without an opportunity to allohuddle and the percentage of animals without a resting shelter. The first stage is to calculate the measurement scores for these two, and then to aggregate them into the criterion score.

#### *Opportunity for allohuddling* measurement score (only Periods 2 and 3)

In terms of interpretation, the higher the percentage of the Finnraccoons without an opportunity to allohuddle the lower the *Opportunity for allohuddling* measurement score.

The percentage of animals without an opportunity to allohuddle observed on a farm is converted to *Opportunity for allohuddling* measurement score with two spline functions, one for the Period 2 and one for the Period 3 (Table 13, Figures 8 and 9). Note that allohuddling is not considered in Period 1.

*Table 13. Percentage of animals without an opportunity for allohuddling (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P2 | $0 \leq x \leq 13$ | $y = -13.9966x + 0.3249x^2 + 0.0123x^3$ |
| | $x > 13$ | $y = 0$ |
| P3 | $0 \leq x \leq 5$ | $y = 100 - 5x$ |
| | $5 < x \leq 19$ | $y = 159.8 - 22.727x + 1.1899x^2 - 0.02297x^3$ |
| | $x > 19$ | $y = 0$ |

*Figure 8. Allohuddling: Period 2*

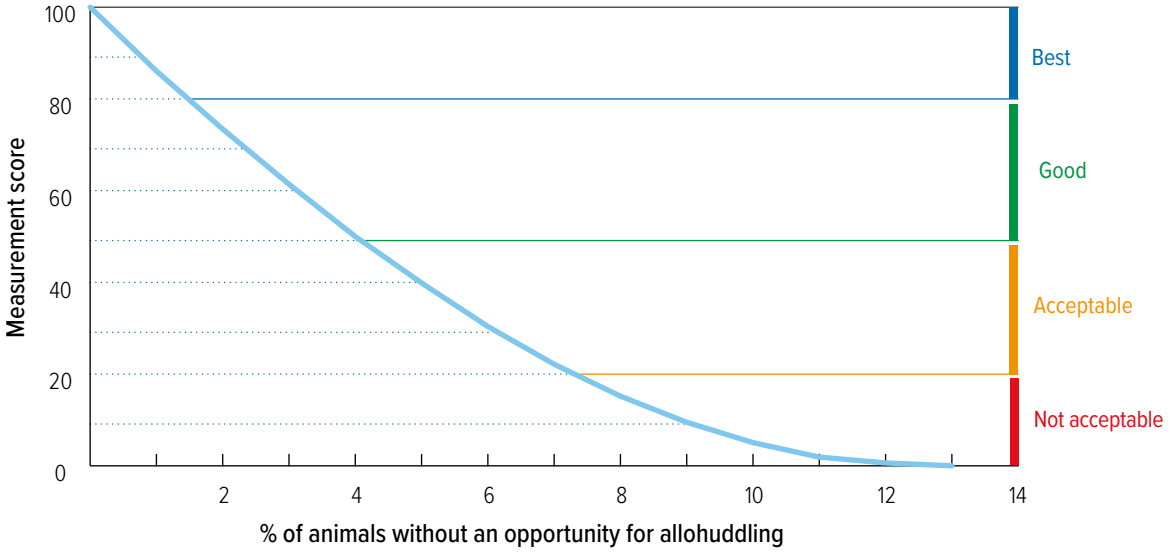
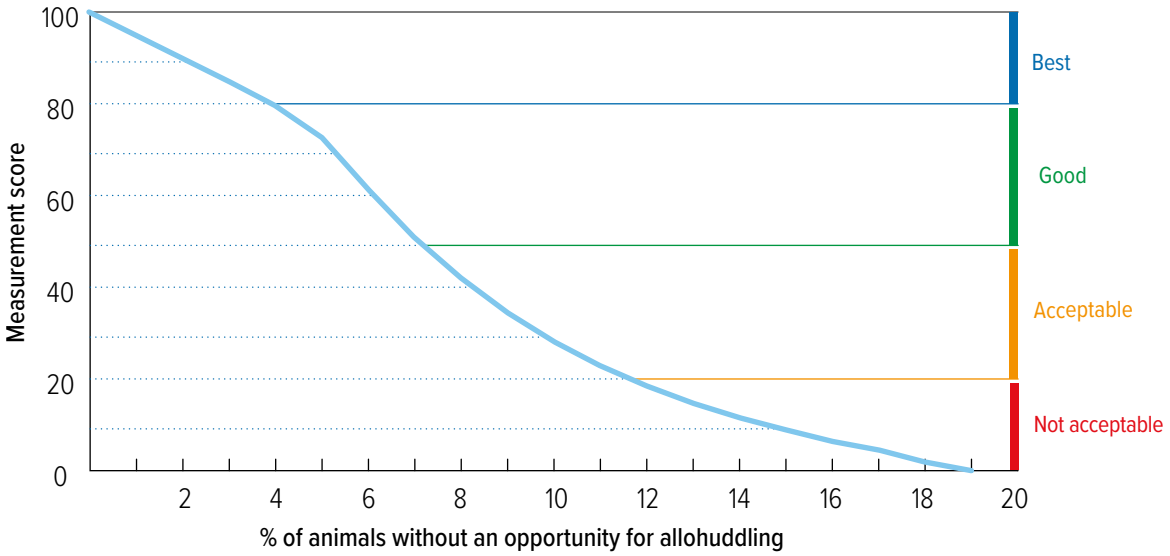



*Figure 9. Allohuddling: Period 3*



### *Resting shelter* measurement score

In terms of interpretation, the higher the percentage of the Finnraccoons without any resting shelter the lower the *Resting shelter* measurement score. However, the score is affected also by the number of walls in the resting shelters: the higher the number of walls the higher the score.

The *Resting shelter* measurement score is calculated as the weighted sum of the percentages of animals in cages with a resting shelter with 0 (= no resting shelter), 1, 2 and 3 walls, with the weights 0, 0.5, 0.9 and 1, respectively (Tables 14 and 15).

*Table 14. Percentage of animals in cages with 0 ($x_0$), 1 ($x_1$), 2 ($x_2$) and 3 ($x_3$) walls ➔ Measurement score (y, 0-100)*

| Period | Weights for the four conditions | | | | Measurement score calculation |
|---|---|---|---|---|---|
| | $x_0$ | $x_1$ | $x_2$ | $x_3$ | |
| All Periods | 0 | 0.5 | 0.9 | 1 | $y = 0.5x_1 + 0.9x_2 + x_3$ |

*Table 15. Five examples illustrating the calculation of the Resting shelter measurement score:*

| Percentages of animals in cages with 0 ($x_0$), 1 ($x_1$), 2 ($x_2$) and 3 ($x_3$) walls | | | | Score (y) |
|---|---|---|---|---|
| $x_0$ | $x_1$ | $x_2$ | $x_3$ | $y = 0.5x_1 + 0.9x_2 + x_3$ |
| 100 | 0 | 0 | 0 | **0** |
| 50 | 50 | 0 | 0 | **25** |
| 25 | 25 | 25 | 25 | **60** |
| 0 | 0 | 50 | 50 | **95** |
| 0 | 0 | 0 | 100 | **100** |

### Score for the *Criterion 3: Comfort around resting*

The *Opportunity for allohuddling* ($y_A$) and *Resting shelter* ($y_S$) measurement scores are aggregated to form the *Comfort around resting* criterion score ($C_3$) by calculating first their weighted sum, by applying the weights $w_A$ and $w_S$, respectively, presented in Table 16 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_A$ and $y_S$ is lower than 50 (Steps B and C). Note that the weights differ between the periods, and the weight of the *Opportunity for allohuddling* measurement in the Period 1 is 0, since allohuddling is not considered in that period.

*Table 16. Aggregation calculation for Comfort around resting score*

**Step A: Calculating weighted sum ($y_{WS}$) of Opportunity for allohuddling ($y_A$) and Resting shelter ($y_S$)**

| Period | Weight: $w_A$ | Weight: $w_S$ | Weighted sum |
|---|---|---|---|
| P1 | 0 | 1 | $y_{WS} = y_S$ |
| P2 | 0.7 | 0.3 | $y_{WS} = 0.7y_A + 0.3y_S$ |
| P3 | 0.6 | 0.4 | $y_{WS} = 0.6y_A + 0.4y_S$ |

**Step B: Calculating penalty ($y_{Pen}$)**

A penalty ($y_{Pen}$) is calculated, if and only if $y_A$ or $y_S$ or both of them have value lower than 50:
$y_{Pen} = w_i (50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lower of the values $y_A$ and $y_S$, and $w_i$ is the weight (see Step A) of this measurement. If $y_A = y_S$, the greater of the two weights is used as $w_i$.

**Step C: Calculating final criterion score $C_3$**

$C_3 = y_{WS} - y_{Pen}$
If $(y_{WS} - y_{Pen}) < 0$, then $C_3 = 0$

### 4.1.4 *Criterion 4: Thermal comfort*

The score of a farm with regard to the *Thermal comfort* criterion is calculated in the Periods 1 and 3 from the percentage of animals that are dirty, and the level of protection from wind. The first stage is to calculate the measurement scores for these two criteria, and then to aggregate them to make the criterion score. In the Period 2, the score for *Thermal comfort* is determined with one measurement only, the level of protection from exceptionally hot weather.

#### *Cleanliness of fur* measurement score (only Periods 1 and 3)

In terms of interpretation, the higher the percentage of the Finnraccoons with dirty fur, the lower the *Cleanliness of fur* measurement score.

The severity of the dirtiness is considered while calculating the percentage of animals with dirty fur: severe dirtiness has twice the weight of moderate dirtiness (Table 17: Step A). The percentage of animals with dirty fur is converted into *Cleanliness of fur* measurement score with two spline functions, one for the Period 1 (Table 17 and Figure 10) and one for the Period 3 (Table 17 and Figure 11).

*Table 17. Percentages of animals that are moderately ($x_m$) or severely ($x_s$) dirty➙ Measurement score (y, 0-100)*

| Step A: Determining the weighted percentage that is used in Step B | |
|---|---|
| P1: The percentages (x) includes both cases ($x_m$ and $x_s$), and both categories are considered severe | $x = 2x_{m,s}$ |
| P3: The two percentages ($x_m$ and $x_s$) are combined to final percentage x by using weights 1 and 2, respectively. | $x = x_m + 2x_s$ |

Step B: Calculating the measurement score

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1 | $0 \le x \le 7$ | $y = 100 - 9.1888x + 0.6261x^2 - 0.0477x^3$ |
| | $7 < x \le 17$ | $y = 50 + 5.2792x - 0.9436x^2 + 0.0271x^3$ |
| | $x > 17$ | $y = 0$ |
| P3 | $0 \le x \le 19$ | $y = 100 - 5.2632x$ |
| | $x > 19$ | $y = 0$ |

*Figure 10. Cleanliness of fur: Period 1*

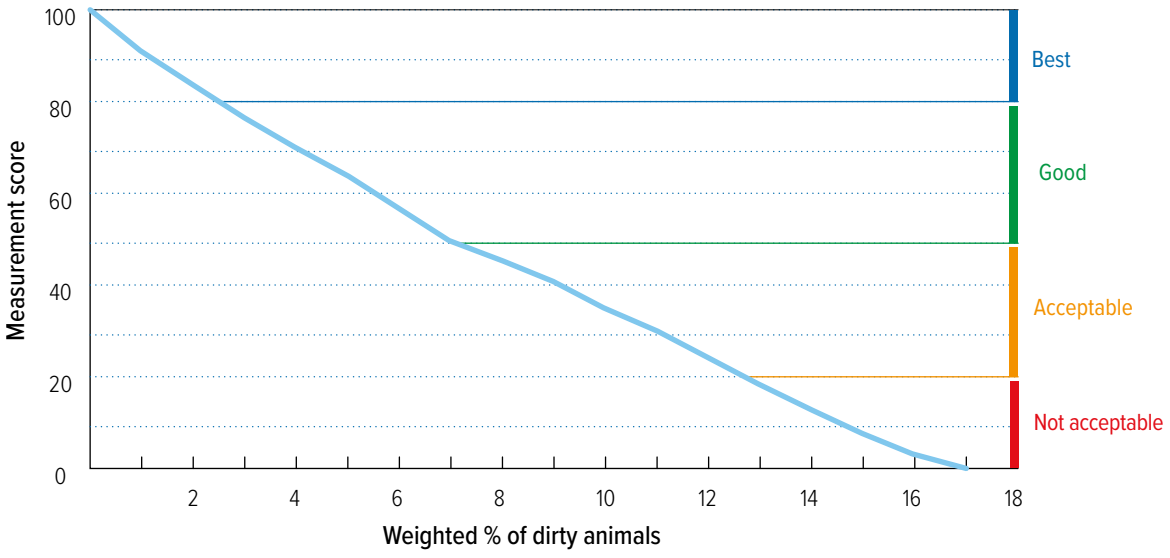
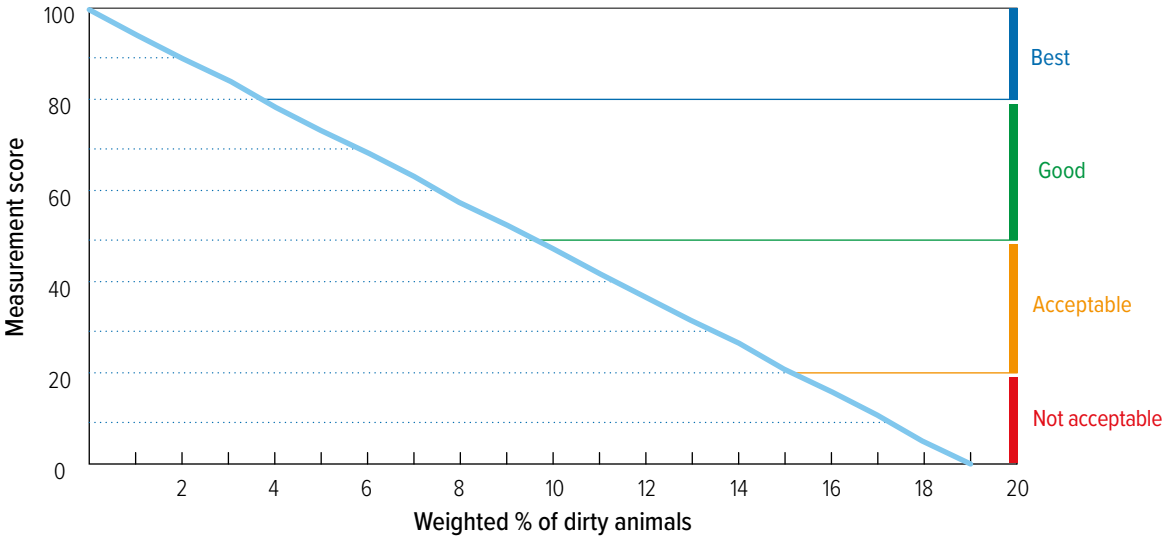


*Figure 11. Cleanliness of fur: Period 3*




### *Protection from wind* measurement score (only Periods 1 and 3)

In terms of interpretation, the higher the percentage of the Finnraccoons without protection from wind the lower the *Protection from wind* measurement score. The measurement is not considered in Period 2 (summer).

This measurement consists of two kinds of categorical data: *Environmental protection from wind* and *Wind shields*. They are combined with the decision table approach: i.e. each individual combination of these two ('situation') has a welfare interpretation, i.e. a *Protection from wind* measurement score. The scores differ between the Periods 1 and 3, and, thus, two decision tables are required (Tables 18 and 19, respectively). The animals on a farm may be housed in varying conditions in regard to the protection from wind. Therefore, the percentages of animals in each situation defined by the decision tables is considered, and the final score to be assigned to the farm for *Protection from wind* is the worst score (= the one corresponding to the worst situation found on the farm) observed in at least 10% of the animals.

*Table 18. Protection from wind: Decision table for Period 1. (Note: 10% rule applied)*

| Situation number | Environmental protection from wind | Wind shield | Measurement score |
|---|---|---|---|
| Situation 1 | Yes | Large | 100 |
| Situation 2 | Yes | Small | 80 |
| Situation 3 | Yes | No | 50 |
| Situation 4 | No | Large | 70 |
| Situation 5 | No | Small | 35 |
| Situation 6 | No | No | 0 |

*Table 19. Protection from wind: Decision table for Period 3. (Note: 10% rule applied)*

| Situation number | Environmental protection from wind | Wind shield | Measurement score |
|---|---|---|---|
| Situation 1 | Yes | Large | 100 |
| Situation 2 | Yes | Small | 80 |
| Situation 3 | Yes | No | 55 |
| Situation 4 | No | Large | 80 |
| Situation 5 | No | Small | 40 |
| Situation 6 | No | No | 0 |

### *Protection from exceptionally hot weather* measurement score (only Period 2)

In terms of interpretation, the higher the percentage of the Finnraccoons without the potential for cooling the cages (with water and/or ventilation) and protection from direct sunlight, the lower the *Protection from exceptionally hot weather* measurement score. The measurement is considered only in Period 2 (summer).

This measurement consists of three kinds of categorical data: Sprinkling of the air inside the shed/cage or roofs of the sheds/cages, Ventilation in the sheds and barns and Protection from direct sunlight. They are combined with the decision table approach: each individual combination of these three ('situation') has a welfare interpretation, i.e. the *Protection from exceptionally hot weather* measurement score (Table 20). The animals on a farm may be housed in different conditions in regard to the protection from hot weather. Therefore, the percentages of animals in each situation defined by the decision table are considered, and the final score to be assigned to the farm for *Protection from exceptionally hot weather* is the worst score (= the one corresponding to the worst situation found on the farm) observed in at least 10% of the animals.

*Table 20. Protection from exceptionally hot weather: Decision table for Period 2. (Note: 10% rule applied)*

| Situation number | Sprinkling | Ventilation | Protection from sunlight | Measurement score |
|---|---|---|---|---|
| Situation 1 | Yes | Ventilation in shed | Yes | 100 |
| Situation 2 | Yes | Ventilation in shed | No | 70 |
| Situation 3 | Yes | No ventilation in shed | Yes | 80 |
| Situation 4 | Yes | No ventilation in shed | No | 45 |
| Situation 5 | Yes | Barn | Yes | 60 |
| Situation 6 | Yes | Barn | No | 10 |
| Situation 7 | No | Ventilation in shed | Yes | 85 |
| Situation 8 | No | Ventilation in shed | No | 50 |
| Situation 9 | No | No ventilation in shed | Yes | 60 |
| Situation 10 | No | No ventilation in shed | No | 25 |
| Situation 11 | No | Barn | Yes | 40 |
| Situation 12 | No | Barn | No | 0 |

### Score for the *Criterion 4: Thermal comfort*

The way the *Thermal comfort criterion* score is calculated depends on the period, because the measurements are different in Period 2 (summer) when compared to Periods 1 (winter) and 3 (autumn).

In Periods 1 and 3, the *Cleanliness of fur* ($y_F$) and *Protection from wind* ($y_W$) measurement scores are aggregated to form the score for the *Thermal comfort* criterion ($C_4$) by calculating first their weighted sum, by applying the weights $w_F$ and $w_w$ respectively, presented in Table 21 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_F$ and $y_w$ is lower than 50 (Steps B and C).

*Table 21. Aggregation calculation for Thermal comfort score*

**Step A: Calculating weighted sum ($y_{WS}$) of *Cleanliness of fur* ($y_F$) and *Protection from wind* ($y_w$)**

| Period | Weight: $w_F$ | Weight: $w_w$ | Weighted sum |
|---|---|---|---|
| P1 & P3 | 0.4 | 0.6 | $y_{WS} = 0.4y_F + 0.6y_W$ |

**Step B: Calculating penalty ($y_{Pen}$)**

A penalty ($y_{Pen}$) is calculated, if and only if $y_F$ or $y_W$ or both of them have value lower than 50:

$y_{Pen} = w_i (50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lower of the values $y_F$ and $y_W$ and $w_i$ is the weight (see Step A) of this measurement. If $y_F = y_W$, the greater of the two weights is used as $w_i$.

**Step C: Calculating final criterion score $C_4$**

$C_4 = y_{WS} - y_{Pen}$

If $(y_{WS} - y_{Pen}) < 0$, then $C_4 = 0$

*Protection from exceptionally hot weather* is the only measurement score to be considered in Period 2, and in that period the score for the Thermal comfort criterion ($C_4$) equates the *Protection from exceptionally hot weather* measurement score.

### 4.1.5 Criterion 5: Ease of movement

The score of a farm with regard to the *Ease of movement* criterion is calculated from the percentages of animals with varying opportunities for horizontal and vertical movement. The first stage is to determine the measurement scores for these two criteria, and then to aggregate them into the criterion score.

#### *Opportunity for horizontal movement measurement score*

In terms of interpretation, the higher the percentage of Finnraccoons with smaller width and length dimensions of the cages, the lower the *Opportunity for horizontal movement* measurement score.

This measurement consists of two kinds of categorical data: Width of the cage and Length of the cage. They are combined with the decision table approach: each individual combination of these two ('situation') has a welfare interpretation, i.e. an *Opportunity for horizontal movement* measurement score.

The scores of the Period 1 differ from those of the Periods 2 and 3, and, thus, two decision tables are required (Tables 22 and 23, respectively). The animals on a farm may be housed in varying conditions in regard to the opportunity for horizontal movement. Therefore, the percentages of animals in each situation defined by the decision tables is considered, and the final measurement score to be assigned to the farm for the *Opportunity for horizontal movement* is the worst score (= the one corresponding to the worst situation found on the farm) observed in at least 10% of the animals.

*Table 22. Opportunity for horizontal movement: Decision table for Period 1. (Note: 10% rule applied)*

| Situation number | Width | Length | Measurement score |
|---|---|---|---|
| Situation 1 | Longer than body length | Longer than body length | 100 |
| Situation 2 | Longer than body length | Approximately body length | 90 |
| Situation 3 | Longer than body length | Shorter than body length | 50 |
| Situation 4 | Approximately body length | Longer than body length | 90 |
| Situation 5 | Approximately body length | Approximately body length | 80 |
| Situation 6 | Approximately body length | Shorter than body length | 50 |
| Situation 7 | Shorter than body length | Longer than body length | 50 |
| Situation 8 | Shorter than body length | Approximately body length | 50 |
| Situation 9 | Shorter than body length | Shorter than body length | 0 |

*Table 23. Opportunity for horizontal movement: Decision table for Periods 2 and 3. (Note: 10% rule applied)*

| Situation number | Width | Length | Measurement score |
|---|---|---|---|
| Situation 1 | Longer than body length | Longer than body length | 100 |
| Situation 2 | Longer than body length | Approximately body length | 90 |
| Situation 3 | Longer than body length | Shorter than body length | 50 |
| Situation 4 | Approximately body length | Longer than body length | 90 |
| Situation 5 | Approximately body length | Approximately body length | 70 |
| Situation 6 | Approximately body length | Shorter than body length | 40 |
| Situation 7 | Shorter than body length | Longer than body length | 50 |
| Situation 8 | Shorter than body length | Approximately body length | 40 |
| Situation 9 | Shorter than body length | Shorter than body length | 0 |

#### *Opportunity for vertical movement* measurement score

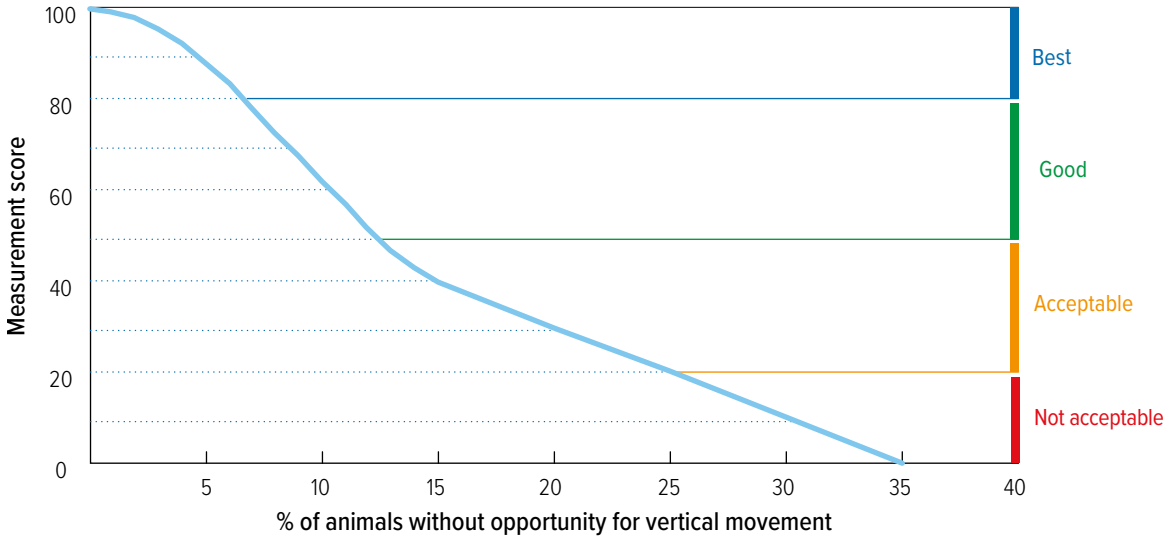
In terms of interpretation, the higher the percentage of the Finnraccoons without potential to stretch their bodies in the vertical direction of the cage, the lower the *Opportunity for vertical movement* measurement score.

The percentage of animals without an opportunity for vertical movement is converted to the *Opportunity for vertical movement* measurement score with a spline function (Table 24 and Figure 12).

*Table 24. Percentage of animals without an opportunity for vertical movement (x) ➜Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1, P2 & P3 | $0 \leq x \leq 15$ | $y = 100 + 0.4031x - 0.6693x^2 + 0.0250x^3$ |
| | $15 < x \leq 35$ | $y = 70 - 2x$ |
| | $x > 35$ | $y = 0$ |

*Figure 12. Opportunity for vertical movement: all periods*




## Score for the *Criterion 5: Ease of movement*

The *Opportunity for horizontal movement* ($y_H$) and *Opportunity for vertical movement* ($y_V$) measurement scores are aggregated to form the *Ease of movement* criterion score ($C_5$) by first calculating their weighted sum, by applying the weights $w_H$ and $w_V$, respectively, presented in Table 25 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_H$ and $y_V$ is lower than 50 (Steps B and C).

*Table 25. Aggregation calculation for Ease of movement score*

**Step A: Calculating weighted sum ($y_{WS}$) of *Cleanliness of fur* ($y_H$) and *Vertical movement* ($y_V$)**

| Period | Weight: $w_H$ | Weight: $w_V$ | Weighted sum |
|---|---|---|---|
| All periods | 0.7 | 0.3 | $y_{WS} = 0.7y_H + 0.3y_V$ |

**Step B: Calculating penalty ($y_{Pen}$)**

A penalty ($y_{Pen}$) is calculated, if and only if $y_H$ or $y_V$ or both of them have value lower than 50:

$y_{Pen} = w_i (50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lower of the values $y_H$ and $y_V$ and $w_i$ is the weight (see Step A) of this measurement. If $y_H = y_V$, the greater of the two weights is used as $w_i$.

**Step C: Calculating final criterion score $C_5$**

$C_5 = y_{WS} - y_{Pen}$

If $(y_{WS} - y_{Pen}) < 0$, then $C_5 = 0$

### 4.1.6 *Criterion 6: Absence of injuries*

The score of a farm with regard to the *Absence of injuries* criterion is calculated from the percentage of animals with difficulties in moving and percentage of animals with skin lesions and other injuries to the body. The first step is to calculate the measurement scores for these two criteria, and then to aggregate them into the criterion score.

#### *Difficulties in moving* measurement score

In terms of interpretation, the higher the percentage of the Finnraccoons with difficulties in moving, the lower the *Difficulties in moving* measurement score.

In Periods 2 and 3, the severity of the problem at the level of individual animals is considered while calculating the percentage of animals with moving difficulties: total inability to move has five times the weight of the less severe cases of moving difficulties (Table 26: Step A). In the Period 1, these two severity categories are treated together. The percentage of animals with difficulties in moving is converted into the *Difficulties in moving* measurement score with two spline functions, one for the Period 1 (Table 26 and Figure 13), and one for the Periods 2 and 3 (Table 26 and Figure 14).

*Table 26. Percentages of animals that have difficulties in moving ($x_d$) and animals that are unable to move ($x_u$) ➔ Measurement score (y, 0-100)*

| Step A: Determining the percentage that is used in Step B | |
|---|---|
| P1: The percentage (x) includes both cases ($x_d$ and $x_u$), and both categories are considered severe. | $x = x_{d,u}$ |
| P2 & P3: The two percentages ($x_d$ and $x_u$) are combined into the final percentage x by using the weights 1 and 5, respectively | $x = x_d + 5x_u$ |

Step B: Calculating the measurement score (y)

| Period | Percentage range | Measurement score |
|---|---|---|
| P1 | $0 \leq x \leq 5$ | $y = 100 - 10.7616x + 0.7678x^2 - 0.1232x^3$ |
| | $x > 8$ | $y = 0$ |
| P3 & P3 | $0 \leq x \leq 15$ | $y = 100 - 0.6667x$ |
| | $x > 15$ | $y = 0$ |

*Figure 13.Difficulties in moving: Period 1*

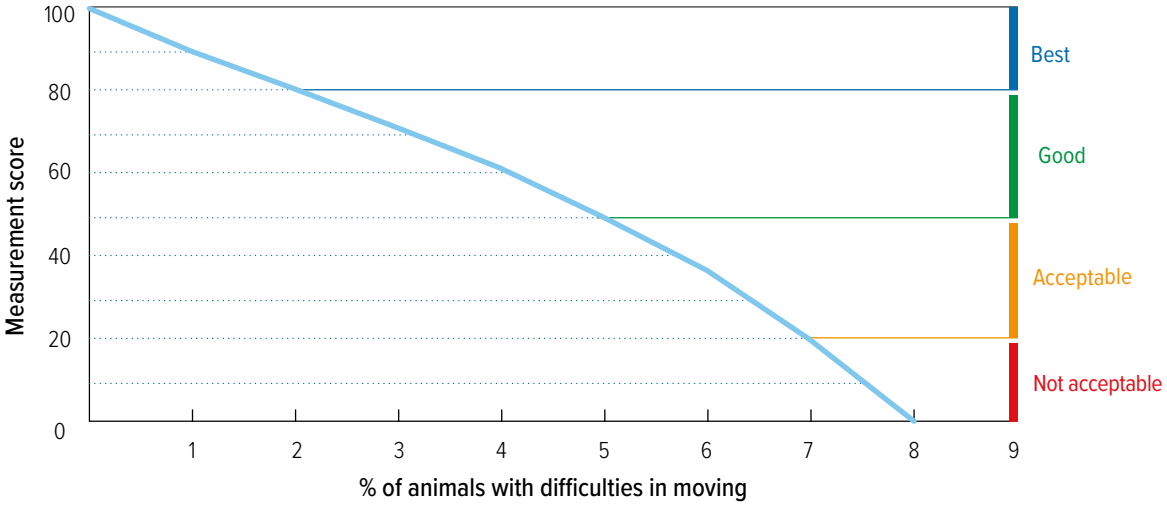
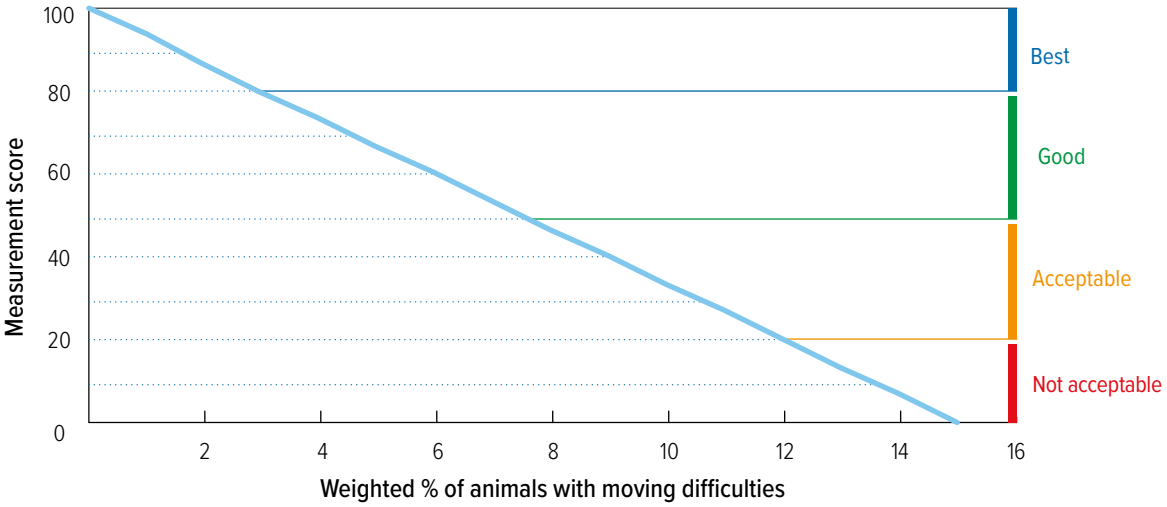


*Figure 14. Difficulties in moving: Periods 2 & 3*




### *Skin lesions and other injuries to the body* measurement score

In terms of interpretation, the higher the percentage of the Finnraccoons with skin lesions and other injuries to the body, the lower the *Skin lesions and other injuries* measurement score.

In Periods 2 and 3, the 'freshness' of the skin lesion, at the level of individual animal, is considered while calculating the percentage of animals with skin injuries and lesions: fresh (more recent) injuries and lesions have five times the weight of healed injuries and lesions (Table 27: Step A). The two types of injuries and lesions are not differentiated in Period 1. The percentage of animals with skin lesions and other injuries to the body is converted to the *Skin lesions and other injuries* measurement score with three spline functions, one for each period (Table 27 and Figures 15 and 16).

*Table 27. Percentages of animals that have old ($x_o$) and fresh ($x_f$) lesions ➔ score (y, 0-100)*

| Step A: Determining the percentage (x) that is used in Step B | |
|---|---|
| P1: The percentage (x) includes both cases ($x_o$ and $x_f$), and both categories are considered as 'fresh'. | $x = 5x_{o,f}$ |
| P2 & P3: The two percentages ($x_o$ and $x_f$) are combined to the final percentage (x) by using the weights 1 and 5, respectively. | $x = x_o + 5x_f$ |

Step B: Calculating the measurement score (y)

| Period | Percentage range | Measurement score |
|---|---|---|
| P1 | $0 \le x \le 20$ | $y = 100 - 7.8275x + 0.1406x^2 + 0.00004x^3$ |
| | $x > 20$ | $y = 0$ |
| P2 | $0 \le x \le 10$ | $y = 100 - 4.3177x + 0.0317x^2 + 0.000005x^3$ |
| | $10 < x \le 20$ | $y = -118.42 - 0.3254x - 0.8236x^2 + 0.0272x^3$ |
| | $x > 20$ | $y = 0$ |
| P3 | $0 \le x \le 20$ | $y = 100 - 2.6016x - 0.3597x^2 + 0.01120x^3$ |
| | $x > 20$ | $y = 0$ |

*Figure 15. Lesions and other injuries: Period 1*

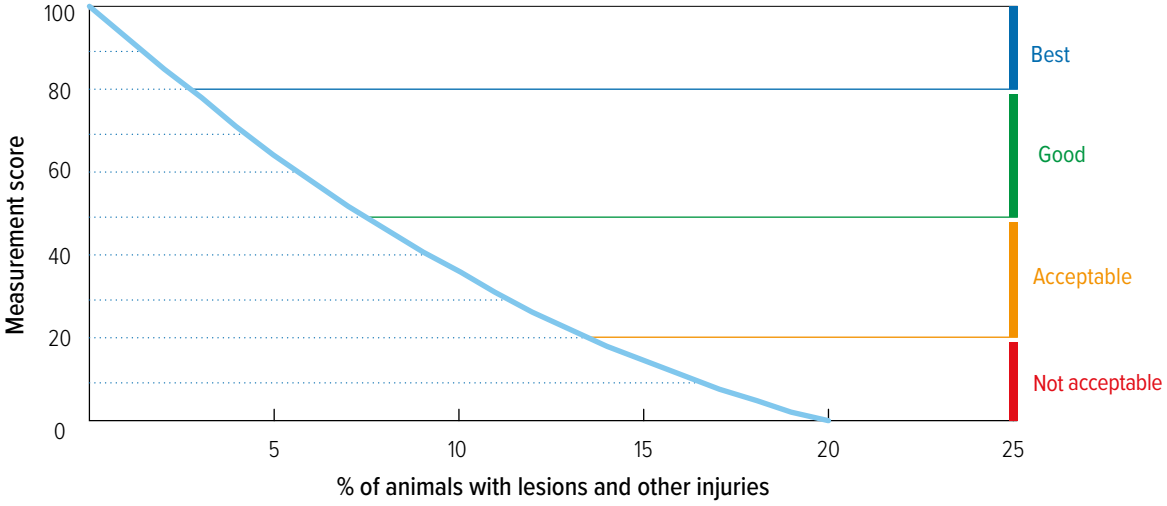



*Figure 16. Lesions and other injuries: Period 2*

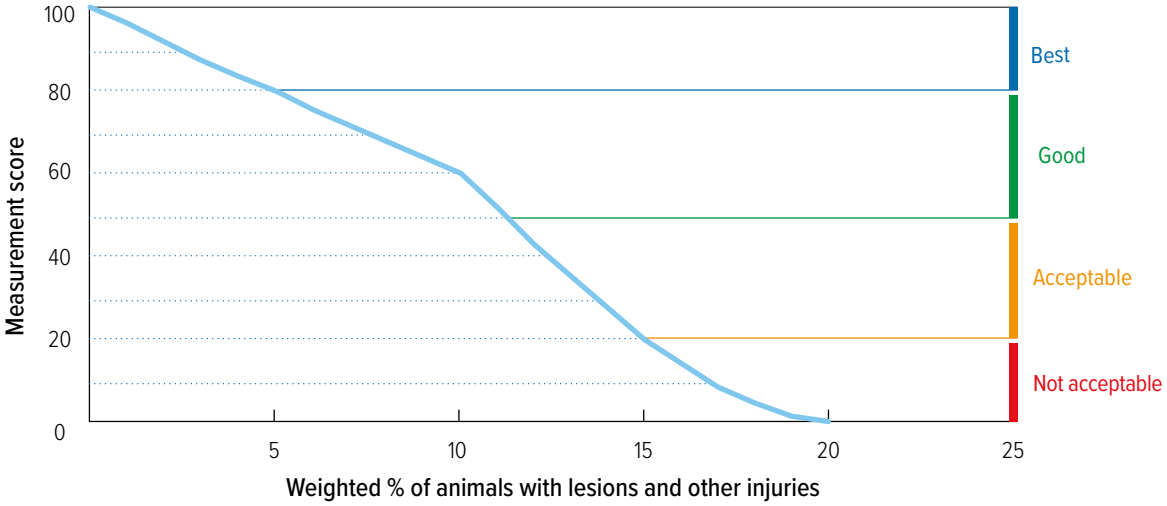
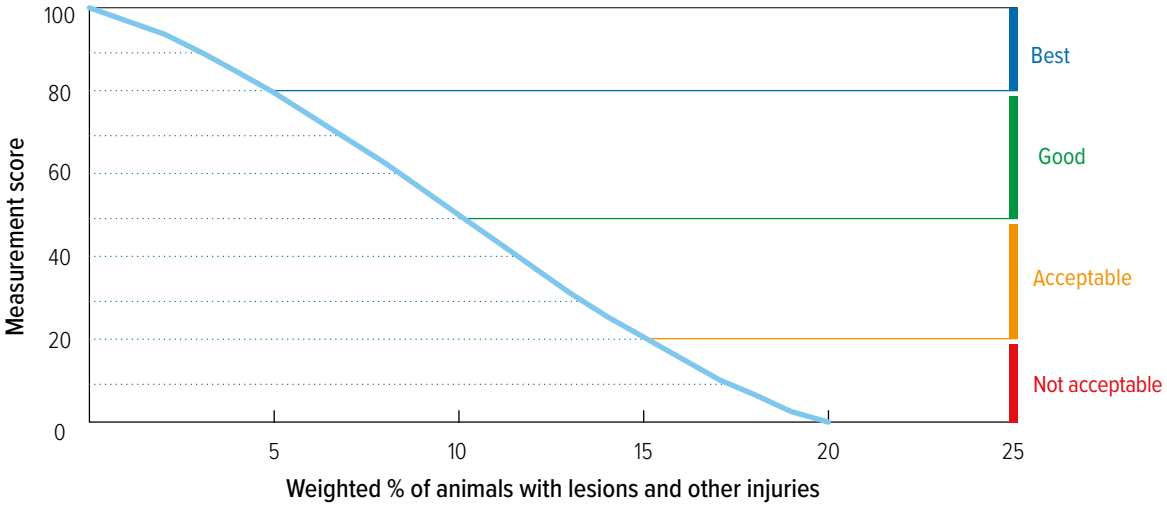



*Figure 17. Lesions and other injuries: Period 3*



### Score for the Criterion 6: Absence of injuries

The *Difficulties in moving* ($y_M$) and *Lesions and other injuries to the body* ($y_L$) measurement scores are aggregated to form the score *Absence of injuries* criterion score ($C_6$) by calculating first their weighted sum, by applying the weights $w_M$ and $w_L$ respectively, presented in Table 28 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_H$ and $y_V$ is lower than 50 (Steps B and C).

*Table 28. Aggregation calculation for Absence of injuries score*

| Step A: Calculating weighted sum ($y_{WS}$) of *Difficulties in moving* ($y_M$) and *Lesions and other injuries to the body* ($y_L$) | | | |
|---|---|---|---|
| Period | Weight: $w_M$ | Weight: $w_L$ | Weighted sum |
| All periods | 0.5 | 0.5 | $y_{WS} = 0.5y_M + 0.5y_L$ |

**Step B: Calculating penalty ($y_{Pen}$)**

A penalty ($y_{Pen}$) is calculated, if and only if $y_M$ or $y_I$ or both of them have value lower than 50:
$y_{Pen} = w_i (50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lower of the values $y_M$ and $y_I$ and $w_i$ is the weight (see Step A) of this measurement. If $y_M = y_L$, the greater of the two weights is used as $w_i$.

**Step C: Calculating final criterion score $C_6$**

$C_6 = y_{WS} - y_{Pen}$
*If* $(y_{WS} - y_{Pen}) < 0$, *then* $C_6 = 0$.

## 4.1.7 *Criterion 7: Absence of disease*

The score of a farm with regard to the *Absence of disease* criterion is calculated from the percentages of animals with bent feet, diarrhoea, 'other disease' and mortality. The first stage is to calculate the measurement scores for these four criteria, and then to aggregate them into the criterion score.

### *Bent feet* measurement score (only Periods 2 and 3)

In terms of interpretation, the higher the percentage of the Finnraccoons with bent feet the lower the *Bent feet* measurement score.

In Periods 2 and 3, the severity of the problem at the level of individual animals is considered, while calculating the percentage of animals with the bent feet: severely bent feet have five times the weight of slightly bent feet (Table 29: Step A). *Bent feet* are not recorded in Period 1. The percentage of animals with bent feet is converted into a *Bent feet* measurement score with two spline functions, one for Period 2 (Table 29 and Figure 18), and one for Period 3 (Table 29 and Figure 19).

*Table 29. Percentages of animals that have slightly ($x_{sl}$) and severely ($x_{se}$) bent feet ➡ Measurement score (y, 0-100)*

| Step A: Determining the weighted percentage (x) that is used in Step B. | |
|---|---|
| P1: Measurement not considered | |
| P2 & P3: The two percentage ($x_{sl}$ and $x_{se}$) are combined into the final percentage (x) by using the weights 1 and 5, respectively. | $x = x_{sl} + 5x_{se}$ |

**Step B: Calculation of the score (y).**

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P2 | $0 \le x \le 8$ | $y = 100 - 8.3413x + 0.5459x^2 - 0.0356x^3$ |
| | $8 < x \le 20$ | $y = 50 + 5.6349x - 0.9028x^2 + 0.02480x^3$ |
| | $x > 20$ | $y = 0$ |

*Table continued over page*

*Table continued from previous page*

| | | |
|---|---|---|
| P3 | $0 \leq x \leq 13$ | $y = 100 - 5x$ |
| | $12 < x \leq 20$ | $y = 20 + 16.6572x - 1.7610x^2 + 0.0439x^3$ |
| | $x > 20$ | $y = 0$ |

*Figure 18. Bent feet: Period 2*

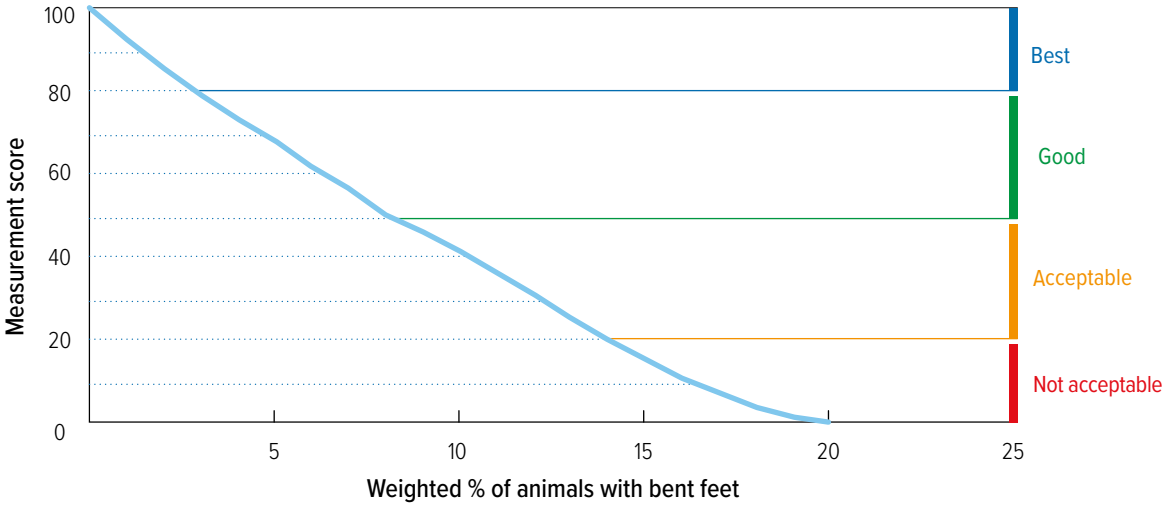
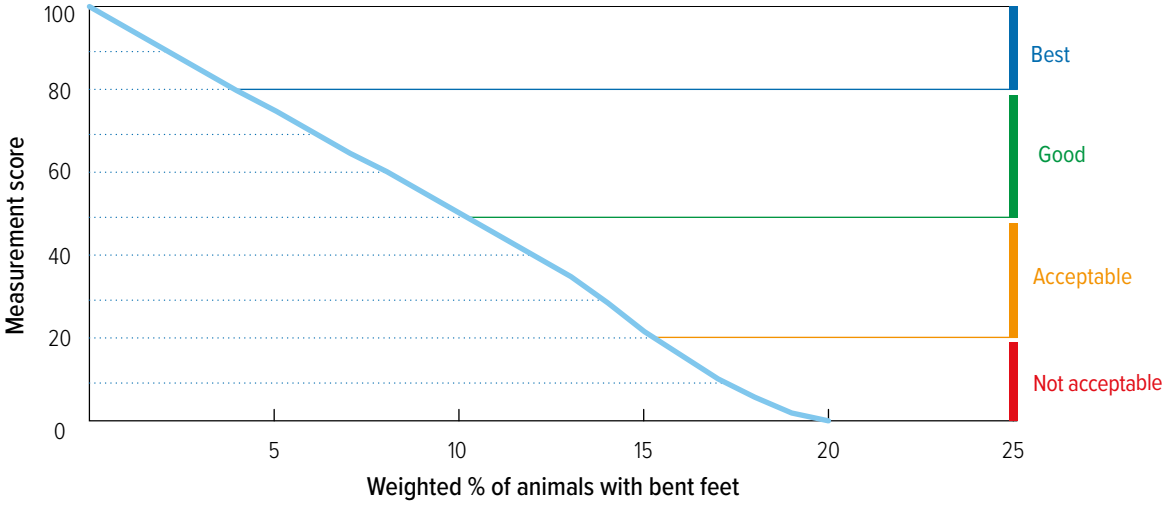



*Figure 19. Bent feet: Period 3*




### *Diarrhoea* measurement score

In terms of interpretation, the higher the percentage of Finnraccoons with diarrhoea, the lower the *Diarrhoea* measurement score.

The severity of the problem at the level of individual animals is considered while calculating the percentage of animals with diarrhoea: in Period 1 true diarrhoea has twice, and in Periods 2 and 3, four times the weight of loose faeces (Table 30: Step A). In addition, the severity of loose faeces has a double weight in Period 1 as compared to Periods 2 and 3. The percentage of animals with diarrhoea is converted to the *Diarrhoea* measurement score with three spline functions, one for each period (Table 30 and Figures 20 and 22).

*Table 30. Percentages of animals that have loose faeces ($x_l$) or diarrhoea ($x_d$) ➔ Measurement score (y, 0-100)*

| Step A: Determining the weighted percentage (x) that is used in Step B. | |
|---|---|
| P1: The two percentage ($x_l$ and $x_d$) are combined into the final percentage (x) by using the weights 1 and 2, respectively. | $x = x_l + 2x_d$ |
| P2 & P3: The two percentage ($x_l$ and $x_d$) are combined into the final percentage (x) by using the weights 0.5 and 2, respectively. | $x = 0.5x_l + 2x_d$ |

Step B: Calculating the measurement score (y)

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1 | $0 \le x \le 20$ | $y = 100 - 5x$ |
| | $x > 20$ | $y = 0$ |
| P2 | $0 \le x \le 9$ | $y = 100 - 5.6514x + 0.2545x^2 + 0.0003x^3$ |
| | $9 < x \le 23$ | $y = 115 - 5x$ |
| | $x > 23$ | $y = 0$ |
| P3 | $0 \le x \le 19$ | $y = 100 - 5.7113x + 0.3379x^2 - 0.0094x^3$ |
| | $19 < x \le 27$ | $y = 50 + 14.4751x - 1.1571x^2 + 0.0205x^3$ |
| | $x > 27$ | $y = 0$ |

*Figure 20. Diarrhoea: Period 1*

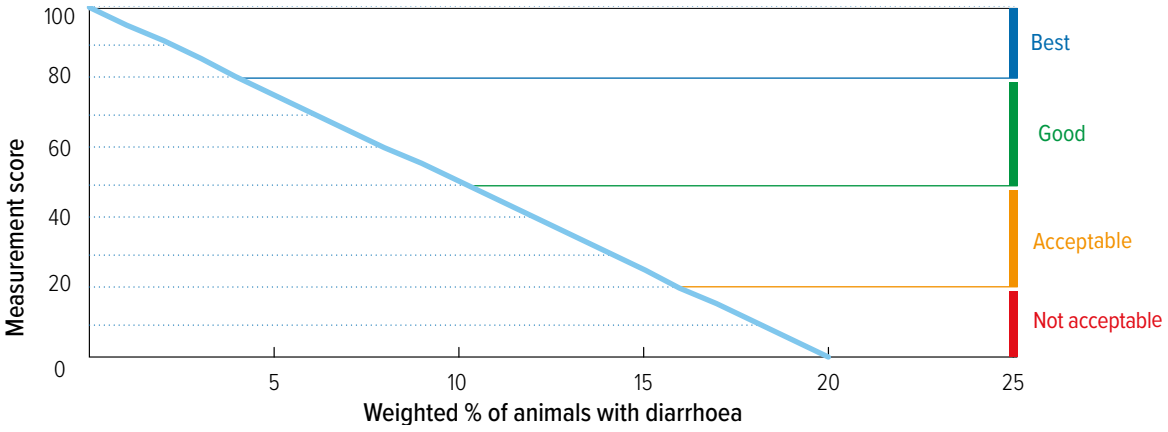



*Figure 21. Diarrhoea: Period 2*

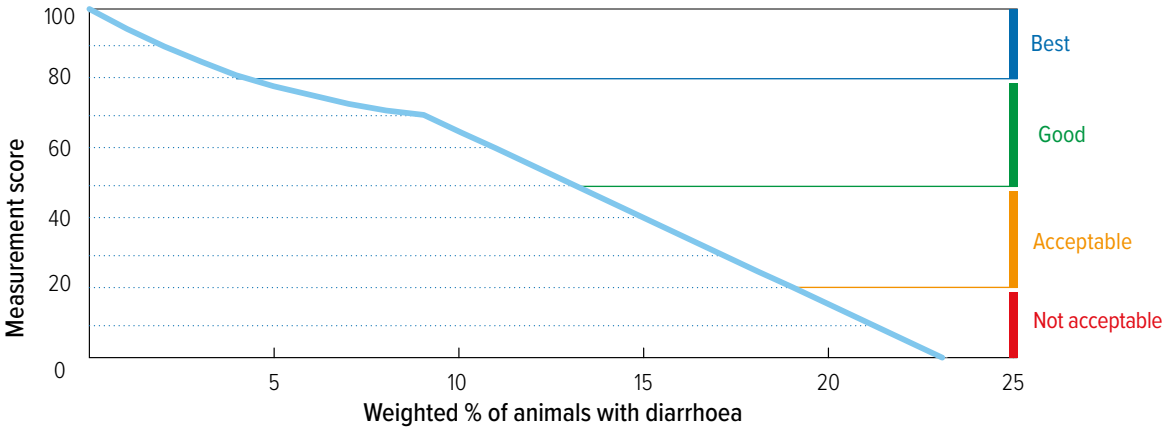
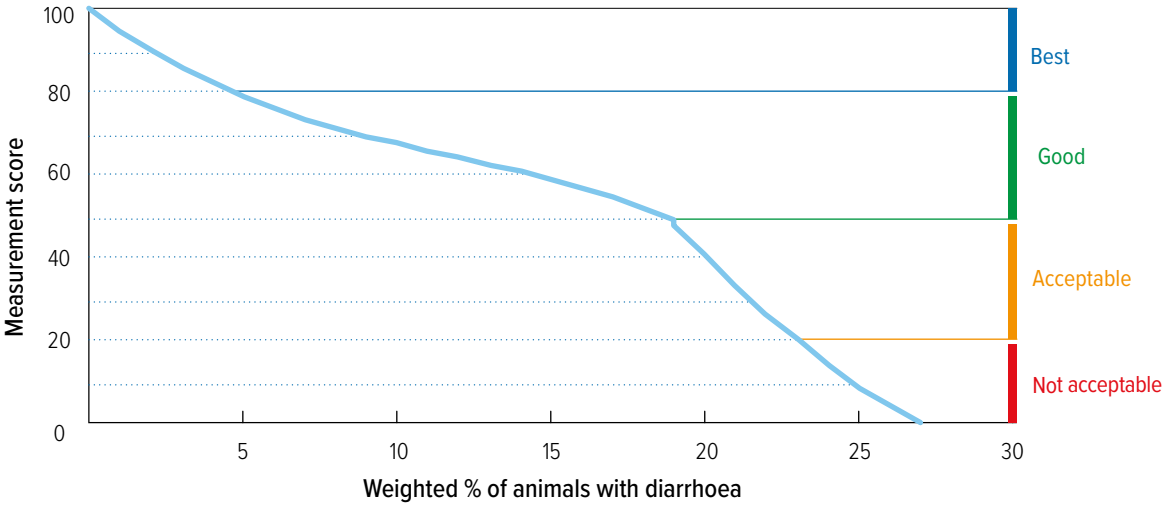


*Figure 22. Diarrhoea: Period 3*




### *'Other disease'* measurement score

In terms of interpretation, the higher the percentage of Finnraccoons with some 'other disease' (other than bent feet or diarrhoea), the lower the *Other disease* measurement score.

In Periods 2 and 3, the severity of the problem at the level of individual animals is considered while calculating the percentage of animals with the other diseases: obvious signs of poor or reduced health have three times higher, and health problems seriously compromising welfare have ten times higher weight, than obvious signs of structural or developmental disturbance (Table 31: Step A). In Period 1 all observed health problems are considered to be in the middle category (with the weight 3). The percentage of animals with 'other disease' is converted into the *Other disease* measurement score with two spline functions, one for Period 1 (Table 31 and Figure 23), and one for Periods 2 and 3 (Table 31 and Figure 24).

*Table 31. Percentages of animals with obvious sign of structural defect or developmental disturbance ($x_1$), obvious sign of poor or reduced health ($x_2$) and seriously compromised welfare ($x_3$) ➔ Measurement score (y, 0-100)*

| Step A: Determining the weighted percentage (x) that is used in Step B. | |
|---|---|
| P1: The percentage (x) includes all the three cases ($x_1$, $x_2$ and $x_3$), since they are not recorded separately on the farm. | $x = 3x_{1,2,3}$ |
| P2 & P3: The three percentages ($x_1$, $x_2$ and $x_3$) are combined into the final percentage (x) by using the weights 1, 3 and 10, respectively. | $x = x_1 + 3x_2 + 10x_3$ |

Step B: The calculation of the measurement score (y)

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1 | $0 \le x \le 18$ | $y = 100 - 8.1784x + 0.3173x^2 - 0.0095x^3$ |
| | $x > 18$ | $y = 0$ |
| P2 & P3 | $0 \le x \le 9$ | $y = 100 - 6.1866x + 0.4328x^2 - 0.0129x^3$ |
| | $69 < x \le 23$ | $y = 115 - 5x$ |
| | $x > 23$ | $y = 0$ |

*Figure 23. Other disease: Period 1*

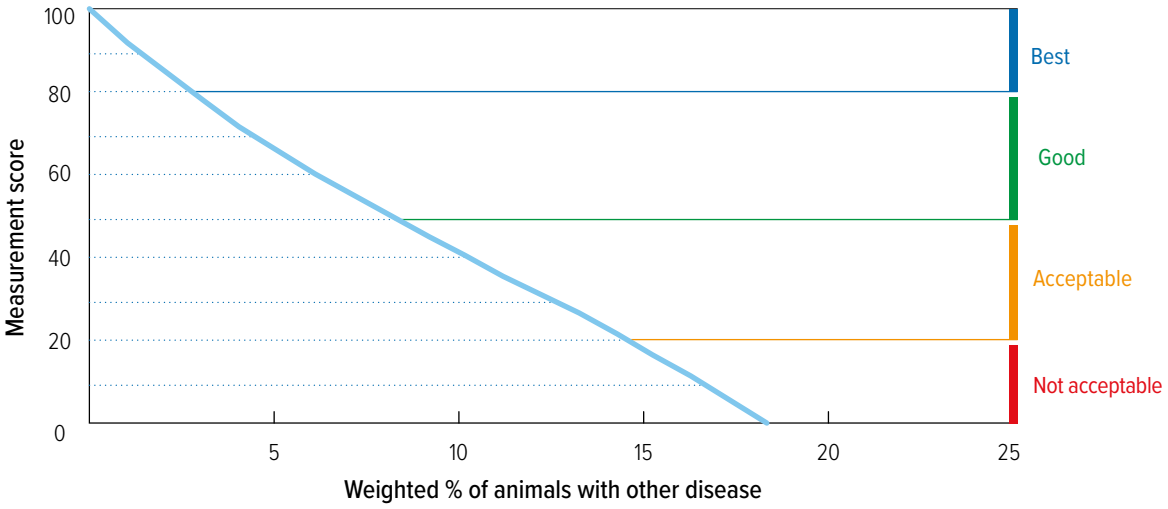
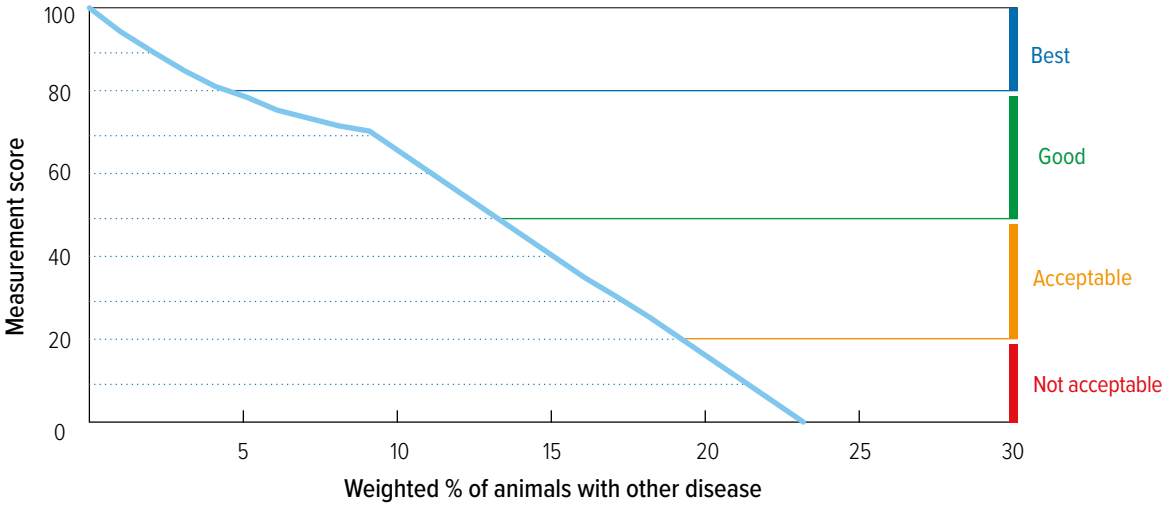



*Figure 24. Other disease: Periods 2 & 3*




### Mortality measurement score

In terms of interpretation, the greater the total mortality, the lower the *Mortality* measurement score. However, the score is affected also by the quality of the mortality data collected on the farm (the lower the quality the lower the score), and the percentage of humanely killed animals out of the total mortality (the high threshold for euthanizing sick animals leads to a lower score, as humane euthanasia of sick animals is considered a welfare positive practice).

This measurement consists of three kinds of categorical data: Quality of the mortality data, Total mortality and Percentage of humanely killed animals out of total mortality. They are combined with the decision table approach: each individual combination of these three ('situation'), has a welfare interpretation, i.e. a *Mortality* measurement score. The scores of the Period 2 differ from those of Periods 1 and 3, and, thus, two decision tables are required (Tables 32 and 33, respectively). The *Mortality* measurement score for a farm is determined according to the situation prevailing on the farm.

*Table 32. Mortality: Decision table for Periods 1 and 3.*

| Situation number | Quality of the mortality data | Total mortality (m) | Percentage of humanely killed animals (h) | Measure-ment score |
|---|---|---|---|---|
| Situation 1 | Valuable data | m < 1% | h ≥ 50% | 100 |
| Situation 2 | Valuable data | m < 1% | 25% ≤ h < 50% | 90 |
| Situation 3 | Valuable data | m < 1% | h < 25% | 80 |
| Situation 4 | Valuable data | 1% ≤ m < 2% | h ≥ 50% | 75 |
| Situation 5 | Valuable data | 1% ≤ m < 2% | 25% ≤ h < 50% | 65 |
| Situation 6 | Valuable data | 1% ≤ m < 2% | h < 25% | 55 |
| Situation 7 | Valuable data | 2% ≤ m < 5% | h ≥ 50% | 70 |
| Situation 8 | Valuable data | 2% ≤ m < 5% | 25% ≤ h < 50% | 60 |
| Situation 9 | Valuable data | 2% ≤ m < 5% | h < 25% | 50 |
| Situation 10 | Valuable data | m > 5% | h ≥ 50% | 60 |
| Situation 11 | Valuable data | m > 5% | 25% ≤ h < 50% | 50 |
| Situation 12 | Valuable data | m > 5% | h < 25% | 40 |
| Situation 13 | No systematically collected data | m < 1% | h ≥ 50% | 75 |
| Situation 14 | No systematically collected data | m < 1% | 25% ≤ h < 50% | 65 |
| Situation 15 | No systematically collected data | m < 1% | h < 25% | 55 |
| Situation 16 | No systematically collected data | 1% ≤ m < 2% | h ≥ 50% | 60 |
| Situation 17 | No systematically collected data | 1% ≤ m < 2% | 25% ≤ h < 50% | 50 |
| Situation 18 | No systematically collected data | 1% ≤ m < 2% | h < 25% | 40 |
| Situation 19 | No systematically collected data | 2% ≤ m < 5% | h ≥ 50% | 50 |
| Situation 20 | No systematically collected data | 2% ≤ m < 5% | 25% ≤ h < 50% | 40 |
| Situation 21 | No systematically collected data | 2% ≤ m < 5% | h < 25% | 30 |
| Situation 22 | No systematically collected data | m > 5% | h ≥ 50% | 40 |
| Situation 23 | No systematically collected data | m > 5% | 25% ≤ h < 50% | 30 |
| Situation 24 | No systematically collected data | m > 5% | h < 25% | 20 |
| Situation 25 | No data | - | - | 0 |

*Table 33. Mortality: Decision table for Period 2.*

| Situation number | Quality of the mortality data | Total mortality (m) | Percentage of humanely killed animals (h) | Measure-ment score |
|---|---|---|---|---|
| Situation 1 | Valuable data | m < 1% | h ≥ 50% | 100 |
| Situation 2 | Valuable data | m < 1% | 25% ≤ h < 50% | 90 |
| Situation 3 | Valuable data | m < 1% | h < 25% | 80 |
| Situation 4 | Valuable data | 1% ≤ m < 2% | h ≥ 50% | 80 |
| Situation 5 | Valuable data | 1% ≤ m < 2% | 25% ≤ h < 50% | 70 |
| Situation 6 | Valuable data | 1% ≤ m < 2% | h < 25% | 60 |
| Situation 7 | Valuable data | 2% ≤ m < 5% | h ≥ 50% | 70 |
| Situation 8 | Valuable data | 2% ≤ m < 5% | 25% ≤ h < 50% | 60 |

| Situation number | Quality of the mortality data | Total mortality (m) | Percentage of humanely killed animals (h) | Measure-ment score |
|---|---|---|---|---|
| Situation 9 | Valuable data | 2% ≤ m < 5% | h < 25% | 50 |
| Situation 10 | Valuable data | m > 5% | h ≥ 50% | 60 |
| Situation 11 | Valuable data | m > 5% | 25% ≤ h < 50% | 50 |
| Situation 12 | Valuable data | m > 5% | h < 25% | 40 |
| Situation 13 | No systematically collected data | m < 1% | h ≥ 50% | 75 |
| Situation 14 | No systematically collected data | m < 1% | 25% ≤ h < 50% | 65 |
| Situation 15 | No systematically collected data | m < 1% | h < 25% | 55 |
| Situation 16 | No systematically collected data | 1% ≤ m < 2% | h ≥ 50% | 60 |
| Situation 17 | No systematically collected data | 1% ≤ m < 2% | 25% ≤ h < 50% | 50 |
| Situation 18 | No systematically collected data | 1% ≤ m < 2% | h < 25% | 40 |
| Situation 19 | No systematically collected data | 2% ≤ m < 5% | h ≥ 50% | 50 |
| Situation 20 | No systematically collected data | 2% ≤ m < 5% | 25% ≤ h < 50% | 40 |
| Situation 21 | No systematically collected data | 2% ≤ m < 5% | h < 25% | 30 |
| Situation 22 | No systematically collected data | m > 5% | h ≥ 50% | 40 |
| Situation 23 | No systematically collected data | m > 5% | 25% ≤ h < 50% | 30 |
| Situation 24 | No systematically collected data | m > 5% | h < 25% | 20 |
| Situation 25 | No data | - | - | 0 |

### Score for the *Criterion 7: Absence of disease*

The *Bent feet* ($y_B$), *Diarrhoea* ($y_D$), *Other disease* ($y_O$) and *Mortality* ($y_M$) measurement scores are aggregated to form the score for the *Absence of disease* criterion($C_7$) by first calculating their weighted sum, applying the weights $w_B$, $w_D$, $w_O$, $w_M$, respectively, presented in Table 34 (Step A). Then, a 'penalty' is subtracted from this sum if, and only if, at least one of $y_B$, $y_D$, $y_O$ or $y_M$ is lower than 50 (Steps B and C). Note that bent feet are not assessed in Period 1, and, thus, the weight of *Bent feet* in that period is 0.

*Table 34. Aggregation calculation for Absence of disease score*

**Step A: Calculating weighted sum ($y_{WS}$) of *Bent feet* ($y_B$), *Diarrhoea* ($y_F$) *Other Disease* ($y_O$) and *Mortality* (yM)**

| Period | Weight: $w_B$ | Weight: $w_D$ | Weight: $w_O$ | Weight: $w_M$ | Weighted sum |
|---|---|---|---|---|---|
| P1 | 0 | 0.4 | 0.4 | 0.2 | $y_{WS} = 0.4y_D + 0.4y_O + 0.2y_M$ |
| P2 & P3 | 0.2 | 0.2 | 0.35 | 0.25 | $y_{WS} = 0.2y_B + 0.2y_D + 0.35y_O + 0.25y_M$ |

**Step B: Calculating penalty ($y_{Pen}$)**

A penalty ($y_{Pen}$) is calculated, if and only if at least one of $y_B$, $y_F$, $y_O$ or $y_M$ has value lower than 50:

$y_{Pen} = w_i (50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lowest of the values $y_B$, $y_F$, $y_O$ and $y_M$, and $w_i$ is the weight (see Step A) of this measurement. If two or more measurements have the same lowest value, the highest $w_i$ among these measurements is used.

**Step C: Calculating final criterion score $C_7$**

$C_7 = y_{WS} - y_{Pen}$

If $(y_{WS} - y_{Pen}) < 0$, then $C_7 = 0$.

### 4.1.8 *Criterion 8: Absence of pain induced by management procedures*

The score of a farm with regard to the criterion *Absence of pain induced by management procedures* is determined in each period with one measurement only. In Periods 1 and 2 the measurement is *Emergency killing*, and in Period 3 the measurement is *Killing at the farm at the end of Period 3*.

#### *Emergency killing* measurement score (only Periods 1 and 2)

This measurement consists of three kinds of categorical data: Killing device, Certificate of the inspection of the device and Killing method of cubs, the last one being considered only in Period 2 (summer). These criteria are combined with the decision table approach: each individual combination of these three ('situation') has a welfare interpretation, i.e. a *Emergency killing* measurement score. Since *Killing method of cubs* is considered only in Period 2, the Periods 1 and 2 have separate decision tables with 4 and 8 situations, respectively (Tables 35 and 36, respectively). The *Emergency killing* measurement score for a farm is determined according to the situation prevailing on the whole farm.

*Table 35. Emergency killing: Decision table for the Period 1.*

| Situation number | Killing device | Certificate of the device | Measurement score |
|---|---|---|---|
| Situation 1 | Electrocution | Yes | 100 |
| Situation 2 | Electrocution | No | 60 |
| Situation 3 | Other | - | 80 |
| Situation 4 | No killing device | - | 0 |

*Table 36. Emergency killing: Decision table for the Period 2.*

| Situation number | Killing device for adults and juveniles | Certificate of the device | Killing method for cubs | Measurement score |
|---|---|---|---|---|
| Situation 1 | Electrocution | Yes | Yes | 100 |
| Situation 2 | Electrocution | Yes | No | 60 |
| Situation 3 | Electrocution | No | Yes | 79 |
| Situation 4 | Electrocution | No | No | 45 |
| Situation 5 | Other | - | Yes | 80 |
| Situation 6 | Other | - | No | 45 |
| Situation 7 | No killing device | - | Yes | 10 |
| Situation 8 | No killing device | - | No | 0 |

#### *Killing at farm at the end of Period 3* measurement score (only Period 3)

This measure consists of four kinds of categorical data: Species specific standard operating procedure for killing, Certification of competence, Killing device and Certification of the inspection of the device. The measures are combined with the decision table approach: each individual combination of these four ('situation') has a welfare interpretation, i.e. a *Killing at farm at the end of Period 3* measurement score (Table 37). The score for a farm is determined according to the situation prevailing on the whole farm.

*Table 37. Killing at farm at the end of Period 3: Decision table for the Period 3.*

| Situation number | SOP for killing | Certification of competence for killing | Killing device | | Measurement score |
|---|---|---|---|---|---|
| Situation 1 | Yes | Yes | Electrocution | Yes | 100 |
| Situation 2 | Yes | Yes | Electrocution | No | 80 |

| Situation number | SOP for killing | Certification of competence for killing | Killing device | | Measurement score |
|---|---|---|---|---|---|
| Situation 3 | Yes | Yes | Other | - | 90 |
| Situation 4 | Yes | Yes | No device | - | 20 |
| Situation 5 | Yes | No | Electrocution | Yes | 65 |
| Situation 6 | Yes | No | Electrocution | No | 55 |
| Situation 7 | Yes | No | Other | - | 45 |
| Situation 8 | Yes | No | No device | - | 10 |
| Situation 9 | No | Yes | Electrocution | Yes | 45 |
| Situation 10 | No | Yes | Electrocution | No | 40 |
| Situation 11 | No | Yes | Other | - | 40 |
| Situation 12 | No | Yes | No device | - | 10 |
| Situation 13 | No | No | Electrocution | Yes | 25 |
| Situation 14 | No | No | Electrocution | No | 10 |
| Situation 15 | No | No | Other | - | 20 |
| Situation 16 | No | No | No device | - | 0 |

#### Score for the *Criterion 8: Absence of pain induced by management procedures*

The score of a farm with regard to the *Absence of pain induced by management procedures* criterion is determined in all the periods by one measurement only. Therefore, the *Absence of pain induced by management procedures* criterion score ($C_8$) equates to the *Emergency killing* measurement score in Periods 1 and 2, and the *Killing at the farm at the end of Period 3* measurement score in Period 3.

### 4.1.9 *Criterion 9: Expression of social behaviour*

The score of a farm with regard to the *Expression of social behaviour* criterion is determined in Periods 2 and 3 by one measurement only, *Social housing of juveniles*. This criterion does not have any measurement in Period 1.

#### *Social housing of juveniles* measurement score (only Periods 2 and 3)

In terms of interpretation, the higher the percentage of the juvenile Finnraccoons housed singly, the lower the *Social housing of juveniles* measurement score.

The percentage of juvenile animals housed singly on a farm is converted to a *Social housing of juveniles* measurement score with two spline functions, one for Period 2 (Table 38 and Figure 25) and one for Period 3 (Table 38 and Figure 26).

*Table 38. Percentages of juvenile animals housed singly (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P2 | $0 \leq x \leq 8$ | $y = 100 - 10x$ |
| | $8 < x \leq 18$ | $y = 36 - 2x$ |
| | $x > 18$ | $y = 0$ |
| P3 | $0 \leq x \leq 1$ | $y = 100 - 10x$ |
| | $1 < x \leq 19$ | $y = 95 - 5x$ |
| | $x > 19$ | $y = 0$ |

*Figure 25. Social housing of juveniles: Period 2*

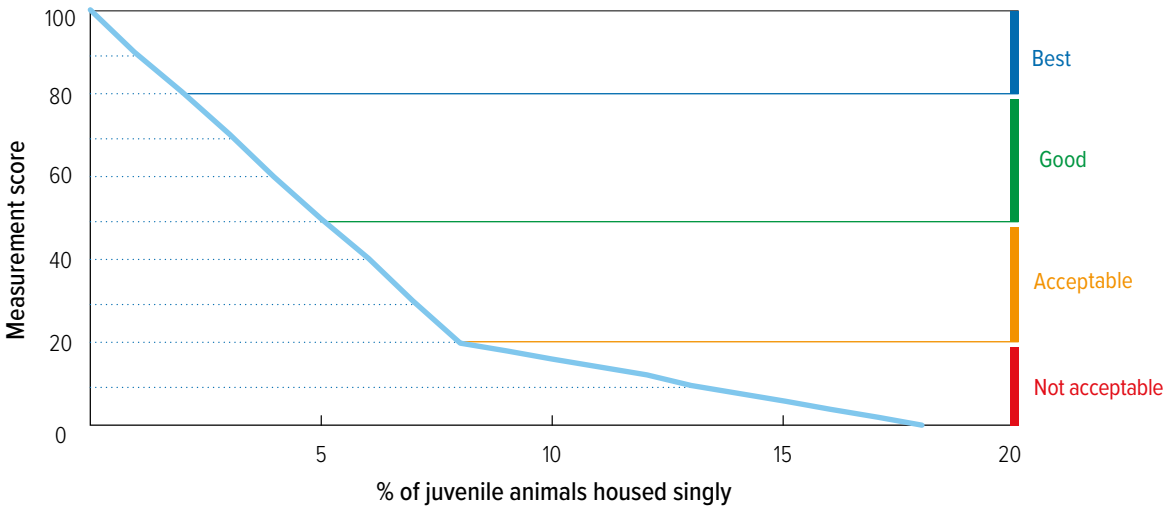
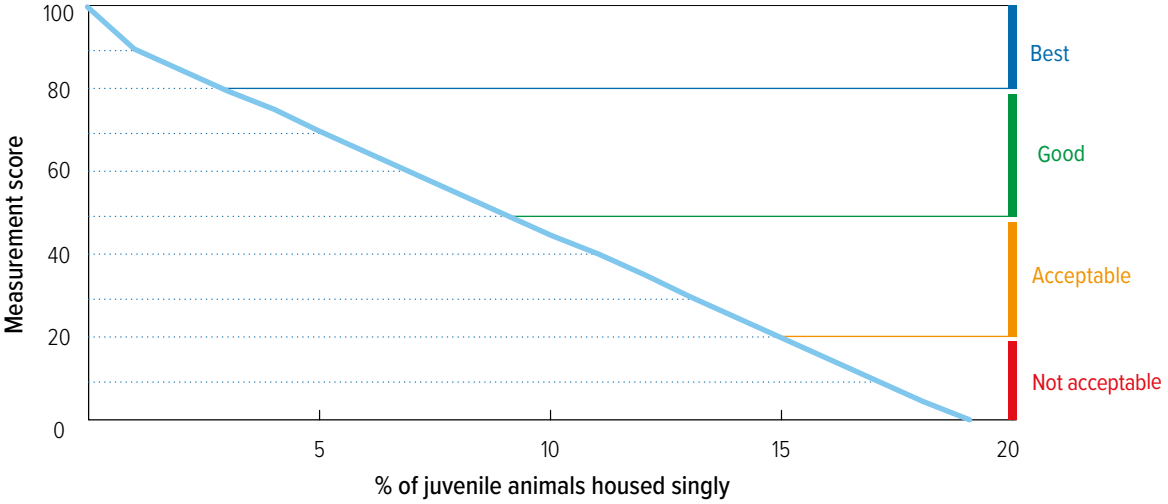



*Figure 26. Social housing of juveniles: Period 3*




### Score for the *Criterion 9: Social housing*

The score of a farm with regard to the *Social housing* criterion is determined in Periods 2 and 3 by one measurement only. Therefore, the *Social housing* criterion score ($C_9$) equates to the *Social housing of juveniles* measurement score in these periods. There are no juveniles on the farm in Period 1, and the Social housing criterion score is substituted with the *Expression of other behaviour* criterion score (see page 90).

## 4.1.10 Criterion 10: Expression of other behaviour

The score of a farm with regard to the *Expression of other behaviour* criterion score is determined by five measurements: *Stereotypic behaviour, Fur chewing, Availability of straw, Opportunity to use activity object* and *Complexity of the available area*. The first stage is to calculate the measurement scores for these five measurements, and then to aggregate them into the criterion score.

### *Stereotypic behaviour* measurement score

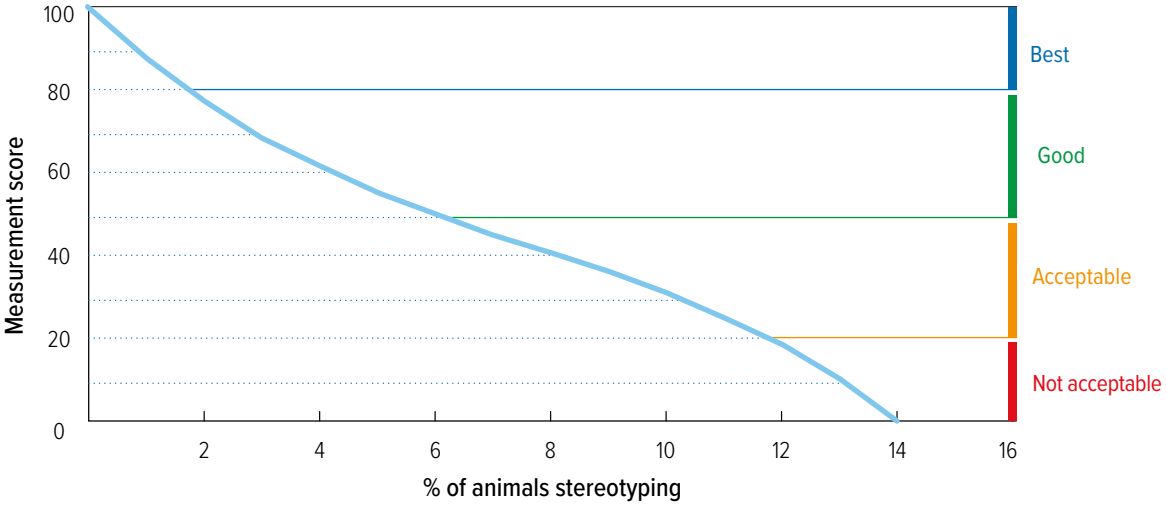
In terms of interpretation, the greater the percentage of animals with stereotypic behaviour the lower the *Stereotypic behaviour* measurement score.

The percentage of animals with stereotypic behaviour is converted to *Stereotypic behaviour* measurement score with a spline function that is the same for all the periods (Table 39 and Figure 27)

*Table 39. Percentages of animals performing stereotypic behaviour (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1, P2 & P3 | $0 \le x \le 14$ | $y = 100 - 13.5406x + 1.1760x^2 - 0.0514x^3$ |
| | $x > 14$ | $y = 0$ |

*Figure 27.* Stereotypic behaviour: all periods




### *Fur chewing* measurement score (only periods 1 and 3)

In terms of interpretation, the higher the percentage of animals with fur chewing, the lower the *Fur chewing* measurement score.

In Period 3, the severity of the problem at the level of individual animals is considered, while calculating the percentage of animals with fur chewing: severe fur chewing has three times the weight of mild fur chewing (Table 40 : Step A). In Period 1, these are combined into one, and the same, category. The percentage of animals with fur chewing is converted to a *Fur chewing* measurement score with two spline functions, one for Period 1 (Table 40 and Figure 28) and another for Period 3 (Table 40 and Figure 29). Note that fur chewing is not measured in Period 2.

*Table 40. Percentages of animals that have mild ($x_{mi}$) and severe ($x_{se}$) fur chewing ➔ Measurement score (y, 0-100)*

| Step A: Calculating the weighted percentage (x) that is used in Step B | |
|---|---|
| P1: The percentage (x) includes both cases ($x_{mi}$ and $x_{se}$), and both categories are considered severe. | $x = 3x_{mi,se}$ |
| P3: The two percentage ($x_{mi}$ and $x_{se}$) are combined to the final percentage (x) by using weights 1 and 3, respectively. | $x = x_{mi} + 3x_{se}$ |

| Step B: Calculation of the score (y) | | |
|---|---|---|
| Period | Percentage range | Measurement score calculation |
| P1 | $0 \le x \le 7$ | $y = 100 - 11.1358x + 0.5668x^2 + 0.0005x^3$ |
| | $7 < x \le 14$ | $y = 50 + 13.2758x - 2.5897x^2 + 0.0990x^3$ |
| | $x > 14$ | $y = 0$ |
| P3 | $0 \le x \le 20$ | $y = 100 - 5x$ |
| | $x > 20$ | $y = 0$ |

*Figure 28. Fur chewing: Period 1*

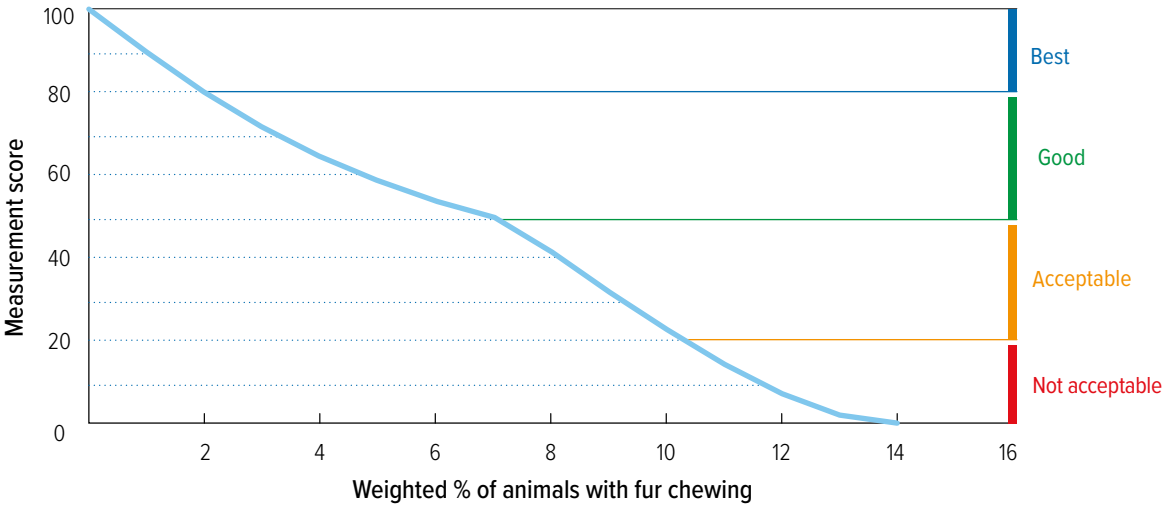
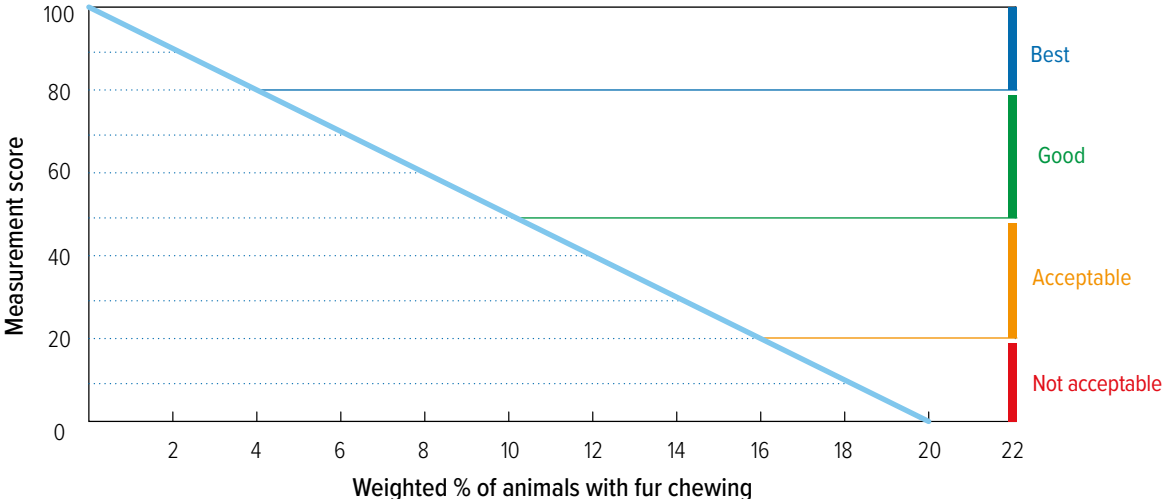



*Figure 29. Fur chewing: Period 3*




### *Availability of straw* measurement score

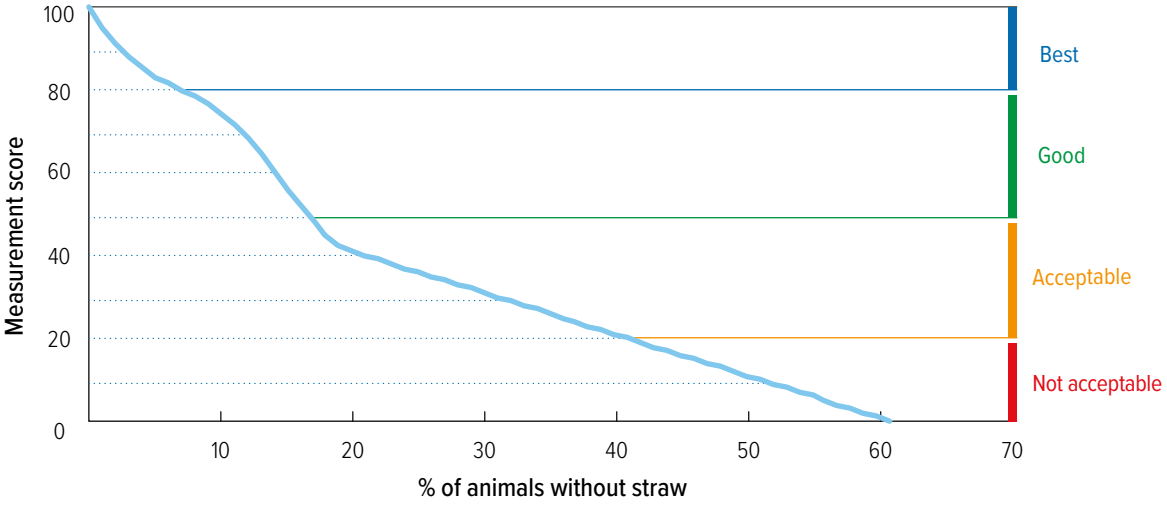
In terms of interpretation, the higher the percentage of animals without straw, the lower the *Availability of straw* measurement score.

The percentage of animals without straw is converted to *Availability of straw* measurement score with a spline function that is the same for all the three periods (Table 41 and Figure 30).

*Table 41. Percentages of animals without straw (x) ➔ Measurement score (y, 0-100)*

| Period | Percentage range | Measurement score calculation |
|---|---|---|
| P1, P2 & P3 | $0 \leq x \leq 14$ | $y = 100 - 5.4168x + 0.5485x^2 - 0.0261x^3$ |
| | $14 < x \leq 21$ | $y = 60 + 8.5448x - 0.9265x^2 + 0.0226x^3$ |
| | $21 < x \leq 61$ | $y = 61 - x$ |
| | $x > 61$ | $y = 0$ |

*Figure 30. Availability of straw: all periods*




### *Opportunity to use activity object* measurement score

In terms of interpretation, the lower the number of activity objects per animal, and the lower the number of different types of the objects, the lower the *Activity object* measurement score.

This measurement consists of two kinds of data: Number of activity objects per animal and Number of different types of activity objects. These criteria are combined with the decision table approach: each individual combination of these two ('situation') has a welfare interpretation, i.e. a *Opportunity to use activity object* measurement score (Table 42).

Note that the scores differ in Period 2 from the scores in Periods 1 and 3. Each animal gets its individual score according to the decision table, and the *Opportunity to use activity object* measurement score for a farm is calculated as the arithmetic mean of the values of the individual animals. For example, let's assume that in the Period 1 the percentages of animals on the farm in the Situations 1-5 are 20%, 30%, 0%, 30% and 20%, respectively, then the score would be 0.2 × 100 + 0.3 × 80 + 0.0 × 60 + 0.3 × 40 + 0.2 × 0 = 20 + 24 + 0 + 12 + 0 = 56.

*Table 42. Opportunity to use activity object: Decision table for the Periods 1, 2 and 3.*

| | Type of object | Number of object per animal | Score P2 | Score P1 & P3 |
|---|---|---|---|---|
| Situation 1 | At least two different | At least one per animal | 100 | 100 |
| Situation 2 | At least two different | Less than on per animal | 90 | 80 |
| Situation 3 | One type | At least one per animal | 80 | 60 |
| Situation 4 | One type | Less than one per animal | 40 | 40 |
| Situation 5 | No | - | 0 | 0 |

### *Complexity of the available area* measurement score

In terms of interpretation, the lower the number of constructions which can increase the diversity of the housing environment, the lower the *Complexity of the available area* measurement score.

The number of constructions which increase the quality of the environment is considered: no constructions, one construction and at least two constructions. The percentages of animals on the farm in each of the three situations are calculated. These three percentages are converted to a *Complexity of the available measurement* score directly by a formula with weights: the situation 'at least two constructions' has twice the weight of the 'one construction' situation, and the weight for the 'no construction' situation is zero. The procedure is summarized in the top part of Table 43. The bottom part of the table illustrates the measurement score calculations with five examples.

*Table 43. Percentage of animals in cages with 0 ($x_0$), 1 ($x_1$) and at least 2 ($x_2$) constructions ➔ Measurement score (y, 0-100)*

| Period | Weights for the three situations | | | Measurement score calculation |
|---|---|---|---|---|
| | $x_0$ | $x_1$ | $x_2$ | |
| All Periods | 0 | 0.5 | 1 | $y = 0.5x_1 + x_2$ |
| **Examples** | **Percentages of animals in the three situations** | | | **Measurement score** |
| | $x_0$ | $x_1$ | $x_2$ | $y = 0.5x_1 + x_2$ |
| Example 1 | 100 | 0 | 0 | **0** |
| Example 2 | 50 | 50 | 0 | **25** |
| Example 3 | 33 | 34 | 33 | **50** |
| Example 4 | 0 | 50 | 50 | **75** |
| Example 5 | 0 | 0 | 100 | **100** |

### Score for the *Criterion 10: Other behaviour*

The *Stereotypic behaviour* ($y_{SB}$), *Fur chewing* ($y_{FC}$), *Availability of straw* ($y_{AS}$), *Availability of activity object* ($y_{AO}$) and *Complexity of available area* ($y_{CA}$) measurement scores are aggregated to form the score for the *Other behaviour* criterion score ($C_{10}$) by first calculating their weighted sums, by applying the weights presented in Table 44 (Step A). Then, a 'penalty' is subtracted from this sum if at least one of $y_{SB}$, $y_{FC}$, $y_{AS}$, $y_{AO}$ or $y_{CA}$ is lower than 50 (Steps B and C). Note that *Fur chewing* is not assessed in Period 2, and, thus, its weight in that period is 0.

*Table 44. Aggregation calculation for Other behaviour score*

Step A: Calculating weighted sum ($y_{WS}$) of *Stereotypic behaviour* ($y_{SB}$), *Fur chewing* ($y_{FC}$), *Availablity of straw* ($y_{AS}$), *Availability of activity object* ($y_{AO}$) and *Complexity of available area* ($y_{CA}$)

| Period | Weight: $w_{SB}$ | Weight: $w_{FC}$ | Weight: $w_{AS}$ | Weight: $w_{AO}$ | Weight: $w_{QA}$ | Weighted sum |
|---|---|---|---|---|---|---|
| P2 | 0.25 | 0 | 0.25 | 0.25 | 0.25 | $y_{WS} = 0.25y_{SB} + 0.25y_{AS} + 0.25y_{AO} + 0.25y_{CA}$ |
| P1 & P3 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | $y_{WS} = 0.2y_{SB} + 0.2y_{FC} + 0.2y_{AS} + 0.2y_{AO} + 0.2y_{CA}$ |

Step B: Calculating penalty ($y_{Pen}$)

A penalty ($y_{Pen}$) is calculated, if and only if at least one of $y_{SB}$, $y_{FC}$, $y_{AS}$, $y_{AO}$ or $y_{CA}$ has value lower than 50:

$y_{Pen} = w_i(50 - 0.402z - 0.0431z^2 + 0.0006228z^3)$, where z is the lowest of the values $y_{SB}$, $y_{FC}$, $y_{AS}$, $y_{AO}$ and $y_{CA}$, and $w_i$ is the weight (see Step A) of this value. If two or more measurements have the same lowest value, the highest $w_i$ among these measurements is used.

Step C: Calculating final criterion score $C_{10}$

$C_{10} = y_{WS} - y_{Pen}$

If $(y_{WS} - y_{Pen}) < 0$, then $C_{10} = 0$.

## 4.1.11 *Criteria 11 and 12: Good human-animal relationship and Positive emotional state*

The scores for a farm with regard to the *Good human-animal relationship* and *Positive emotional state* criteria are determined by one common measurement, the *Voluntary approach test*.

### *Voluntary approach test* measurement score

In terms of interpretation, the lower the percentage of animals with curious behaviour towards a human, and the higher the percentage of animals showing fear or aggression reactions towards a human, the lower the *Voluntary approach test* measurement score.
The percentages of animals in the six behavioural categories in Period 3, and in the three behavioural categories in Period 1, are converted to a *Voluntary approach test* measurement score directly by a formula with weights for the categories. The six categories and their weights are: Confident (1), Inactive (0.6), Active (0.5), Freezing (-0.3), Aggressive (-0.4) and Fearful (-1). In Period 1, the three categories considered are Confident, Aggressive and Fearful. There is a restriction that the measurement score cannot be negative. The aggregation is summarized in Table 45. The measurement is not used in Period 2.

*Table 45. Percentages of animals in the behavioural categories confident ($x_{Co}$), inactive ($x_{In}$), active ($x_{Ac}$), freezing ($x_{Fr}$), aggressive ($x_{Ag}$) and fearful ($x_{Fe}$) ➔ Measurement score (y, 0-100)*

| Period | Weights for the behavioural categories | | | | | | Measurement score calculation |
|---|---|---|---|---|---|---|---|
| | $x_{Co}$ | $x_{In}$ | $x_{Ac}$ | $x_{Fr}$ | $x_{Ag}$ | $x_{Fe}$ | |
| P1 | 1 | - | - | - | -0.4 | -1 | $y = x_{Co} - 0.4x_{Ag} - x_{Fe}$ |
| P3 | 1 | 0.6 | 0.5 | -0.3 | -0.4 | -1 | $y = x_{Co} + 0.6x_{In} + 0.5x_{Ac} - 0.3x_{Fr} - 0.4x_{Ag} - x_{Fe}$ |

If $y \geq 0$, then the measurement score = y. If $y < 0$, then the measurement score = 0.

*Table 46. Five examples illustrating the calculation of the Voluntary approach test measurement score in the Period 1*

| | Percentages of animals in three behavioural categories | | | Measurement score, y (≥0) |
|---|---|---|---|---|
| | $x_{Co}$ | $x_{Ag}$ | $x_{Fe}$ | $y = x_{Co} - 0.4x_{Ag} - x_{Fe}$ |
| Example 1 | 100 | 0 | 0 | **100** |
| Example 2 | *50* | *50* | 0 | **30** |
| Example 3 | *50* | *25* | 25 | **15** |
| Example 4 | *50* | *0* | 50 | **0** |
| Example 5 | *0* | *0* | 100 | **0*** |

*Note, that according to the formula the value can be below 0.

*Table 47. Five examples illustrating the calculation of the Voluntary approach test measurement score in the Period 3*

| | Percentages of animals in six behavioural categories | | | | | | Measurement score, y (≥0) |
|---|---|---|---|---|---|---|---|
| | $x_{Co}$ | $x_{In}$ | $x_{Ac}$ | $x_{Fr}$ | $x_{Ag}$ | $x_{Fe}$ | $y = x_{Co} + 0.6x_{In} + 0.5x_{Ac} - 0.3x_{Fr} - 0.4x_{Ag} - x_{Fe}$ |
| Example 6 | 100 | 0 | 0 | 0 | 0 | 0 | **100** |
| Example 7 | 33 | 34 | 33 | 0 | 0 | 0 | **69.9** |
| Example 8 | 20 | 15 | 15 | 15 | 15 | 20 | **6** |
| Example 9 | 0 | 0 | 0 | 33 | 34 | 33 | **0*** |
| Example 10 | 0 | 0 | 0 | 0 | 0 | 100 | **0*** |

*Note, that according to the formula the value can be below 0.

### Score for the criterion 11: Good human-animal relationship

The score of a farm with regard to the *Good human animal relationship* criterion is determined by the *Voluntary approach test* only. Thus, the *Good human animal relationship* criterion score ($C_{11}$) equates to the *Voluntary approach* test measurement score in Periods 1 and 3.

*The Voluntary approach* test is not carried out in Period 2, and in that period the *Positive emotional state* criterion score ($C_{12}$) equates to the average of the *Social behaviour* and *Other behaviour* scores ($[C_9 + C_{10}]/2$).

### Score for the criterion 12: Positive emotional state

The score for a farm with regard to the criterion of *Positive emotional state* is determined by *Voluntary approach* test only. Thus, the *Positive emotional state* criterion score ($C_{12}$) equates to the *Voluntary approach* test measurement score in Period 1.

The *Voluntary approach* test is not carried out in Period 2, and in that period the *Positive emotional state* criterion score ($C_{12}$) equates to the *Other behaviour* score ($C_{10}$).

Although *Positive emotional state* score ($C_{12}$) exists in the Period 3, it is replaced with $C_{10}$ that has more appropriate measures of positive emotional state in that period.

## 4.2. From the criterion scores to the period-wise principle scores

To calculate principle-scores in WelFur, the same process was adopted as in Welfare Quality®. In Welfare Quality®, parameters of the calculation (using Choquet integrals) to aggregate criterion scores into principle scores were defined for each animal type under study (dairy cows, fattening bulls, veal calves, fattening pigs, sows and piglets, broilers and layers).

The analysis of the experts' answers obtained in Welfare Quality® for the 8 types of animals cited above showed that there is no significant difference between the principle scores calculated for each type of animal. We therefore decided to calculate WelFur principle scores by gathering all animal types experts' answers into only one set of parameters, to be used in WelFur. Consequently, we use Choquet integrals in order to form principle scores by using the mean of each animal type's principle scores obtained by the combination of criterion scores assigned by the Welfare Quality® method.

The detailed description of how the 12 criterion scores are combined to the four principle scores period-wise are presented, with the parameters of the Choquet integrals, in sections 4.2.1- 4.2.4.

### 4.2.1 Good feeding principle: Combining $C_1$ and $C_2$ to Good feeding principle score ($P_{Fe}$)

$C_1$ and $C_2$ are the criterion-scores obtained by a given farm for the Criterion of *Absence of prolonged hunger* and the Criterion of *Absence of prolonged thirst,* respectively. $\mu_1$ and $\mu_2$ are the capacities of Criteria *Absence of prolonged hunger* and *Absence of prolonged thirst,* respectively.

For the principle of *Good feeding*

$\mu_1 = 0.11$ $\mu_2 = 0.29$

$$\text{Good feeding-score } P_{Fe} = \begin{cases} C_1 + (C_2 - C_1)\,\mu_2 & \text{if} \quad C_1 \le C_2 \\ C_2 + (C_1 - C_2)\,\mu_1 & \text{if} \quad C_2 \le C_1 \end{cases}$$

Therefore, with the $\mu$ listed above:

$$\text{Good feeding-score } P_{Fe} = \begin{cases} C_1 + 0.29(C_2 - C_1) & \text{if} \quad C_1 \le C_2 \\ C_2 + 0.11(C_1 - C_2) & \text{if} \quad C_2 \le C_1 \end{cases}$$

### 4.2.2 Good housing principle: Combining $C_3$, $C_4$ and $C_5$ to Good housing principle score ($P_{Ho}$)

$C_3$, $C_4$ and $C_5$ are the criterion-scores obtained by a given farm for the Criterion of *Comfort around resting*, the Criterion of *Thermal comfort* and the Criterion of *Ease of movement*, respectively. $\mu_3$, $\mu_4$ and $\mu_5$ are the capacities of Criteria *Comfort around resting*, *Thermal comfort* and *Ease of movement,* respectively. $\mu_{34}$ is the capacity of the group made from the Criteria of *Comfort around resting* and *Thermal comfort* and so on...

For the principle of *Good housing*

| | | | | | |
|---|---|---|---|---|---|
| $\mu_3$ | = | 0.15 | $\mu_{34}$ | = | 0.34 |
| $\mu_4$ | = | 0.10 | $\mu_{35}$ | = | 0.42 |
| $\mu_5$ | = | 0.13 | $\mu_{45}$ | = | 0.36 |

$$\text{Good housing-score } P_{Ho} = \begin{cases} C_3 + (C_4 - C_3)\mu_{45} + (C_5 - C_4)\mu_5 & \text{if } C_3 \le C_4 \le C_5 \\ C_3 + (C_5 - C_3)\mu_{45} + (C_4 - C_5)\mu_4 & \text{if } C_3 \le C_5 \le C_4 \\ C_4 + (C_3 - C_4)\mu_{35} + (C_5 - C_3)\mu_5 & \text{if } C_4 \le C_3 \le C_5 \\ C_4 + (C_5 - C_4)\mu_{35} + (C_3 - C_5)\mu_3 & \text{if } C_4 \le C_5 \le C_3 \\ C_5 + (C_3 - C_5)\mu_{34} + (C_4 - C_3)\mu_4 & \text{if } C_5 \le C_3 \le C_4 \\ C_5 + (C_4 - C_5)\mu_{34} + (C_3 - C_4)\mu_3 & \text{if } C_5 \le C_4 \le C_3 \end{cases}$$

Therefore, with the $\mu$ listed above:

$$\text{Good housing-score } P_{Ho} = \begin{cases} C_3 + 0.36(C_4 - C_3) + 0.13(C_5 - C_4) & \text{if } C_3 \le C_4 \le C_5 \\ C_3 + 0.36(C_5 - C_3) + 0.10(C_4 - C_5) & \text{if } C_3 \le C_5 \le C_4 \\ C_4 + 0.42(C_3 - C_4) + 0.13(C_5 - C_3) & \text{if } C_4 \le C_3 \le C_5 \\ C_4 + 0.42(C_5 - C_4) + 0.15(C_3 - C_5) & \text{if } C_4 \le C_5 \le C_3 \\ C_5 + 0.34(C_3 - C_5) + 0.10(C_4 - C_3) & \text{if } C_5 \le C_3 \le C_4 \\ C_5 + 0.34(C_4 - C_5) + 0.15(C_3 - C_4) & \text{if } C_5 \le C_4 \le C_3 \end{cases}$$

### 4.2.3 Good health principle: Combining $C_6$, $C_7$ and $C_8$ to Good health principle score ($P_{He}$)

$C_6$, $C_7$ and $C_8$ are the scores obtained by a given farm for the Criterion of *Absence of injuries*, the Criterion of *Absence of diseases* and the Criterion of *Absence of pain induced by management procedures,* respectively. $\mu_6$, $\mu_7$ and $\mu_8$ are the capacities of the Criteria of *Absence of injuries*, *Absence of diseases and Absence of pain induced by management procedures,* respectively. $\mu_{67}$ is the capacity of the group made from the Criteria of *Absence of injuries* and *Absence of diseases* and so on...

For the principle of *Good health*

| | | | | | |
|---|---|---|---|---|---|
| $\mu_6$ | = | 0.08 | $\mu_{67}$ | = | 0.36 |
| $\mu_7$ | = | 0.22 | $\mu_{68}$ | = | 0.18 |
| $\mu_8$ | = | 0.12 | $\mu_{78}$ | = | 0.22 |

$$\text{Good health-score } p_{He} = \begin{cases} C_6 + (C_7 - C_6)\mu_{78} + (C_8 - C_7)\mu_8 & \text{if } C_6 \le C_7 \le C_8 \\ C_6 + (C_8 - C_6)\mu_{78} + (C_7 - C_8)\mu_7 & \text{if } C_6 \le C_8 \le C_7 \\ C_7 + (C_6 - C_7)\mu_{68} + (C_8 - C_6)\mu_8 & \text{if } C_7 \le C_6 \le C_8 \\ C_7 + (C_8 - C_7)\mu_{68} + (C_6 - C_8)\mu_6 & \text{if } C_7 \le C_8 \le C_6 \\ C_8 + (C_6 - C_8)\mu_{67} + (C_7 - C_6)\mu_7 & \text{if } C_8 \le C_6 \le C_7 \\ C_8 + (C_7 - C_8)\mu_{67} + (C_6 - C_7)\mu_6 & \text{if } C_8 \le C_7 \le C_6 \end{cases}$$

Therefore, with the $\mu$ listed above:

$$\text{Good health-score } p_{He} = \begin{cases} C_6 + 0.22(C_7 - C_6) + 0.12(C_8 - C_7) & \text{if} \quad C_6 \le C_7 \le C_8 \\ C_6 + 0.22(C_8 - C_6) + 0.22(C_7 - C_8) & \text{if} \quad C_6 \le C_8 \le C_7 \\ C_7 + 0.18(C_6 - C_7) + 0.12(C_8 - C_6) & \text{if} \quad C_7 \le C_6 \le C_8 \\ C_7 + 0.18(C_8 - C_7) + 0.08(C_6 - C_8) & \text{if} \quad C_7 \le C_8 \le C_6 \\ C_8 + 0.36(C_6 - C_8) + 0.22(C_7 - C_6) & \text{if} \quad C_8 \le C_6 \le C_7 \\ C_8 + 0.36(C_7 - C_8) + 0.08(C_6 - C_7) & \text{if} \quad C_8 \le C_7 \le C_6 \end{cases}$$

### 4.2.4 Appropriate behaviour principle: Combining $C_9$, $C_{10}$, C11 and $C_{12}$ to Appropriate behaviour principle score ($P_{Be}$)

There are no criterion scores for all the criteria of *Appropriate behaviour* in all of the periods, because of lack of measures available for some of the criteria. The principle scores cannot be calculated if there are missing criteria scores. Therefore, the missing scores are replaced with other *Appropriate behaviour* scores or their combinations (Table 48). There is no criterion score for *Social behaviour* ($C_9$) in the Period 1 and it is replaced with *Other behaviour* ($C_{10}$). There are no criteria scores for *Good human animal relationship* ($C_{11}$) and *Positive emotional state* ($C_{12}$) in the Period 3, and they are replaced with the average of *Social behaviour* and *Other behaviour* scores ([$C_9$ + $C_{10}$]/2), and *Other behaviour* score ($C_{10}$), respectively.

In addition, although *Positive emotional state* score ($C_{12}$) exists in Period 3, it is replaced with Criteria $C_{10}$ *Other behaviour* that contains more appropriate measures of positive emotional state in that period.

*Table 48. A Summary of how the criterion scores $C^9$-$C^{12}$ are applied.*

| Criterion | Period 1 | Period 2 | Period 3 |
|---|---|---|---|
| $C_9$ | No $C_9$ ➡ $C_{10}$ is used | $C_9$ | $C_9$ |
| $C_{10}$ | $C_{10}$ | $C_{10}$ | $C_{10}$ |
| $C_{11}$ | $C_{11}$ | No $C_{11}$ ➡ $(C_9+C_{10})/2$ is used | $C_{11}$ |
| $C_{12}$ | $C_{12}$ | No $C_{12}$ ➡ $C_{10}$ is used | Although $C_{12}$ exists, $C_{10}$ is used |

$C_9$, $C_{10}$, $C_{11}$ and $C_{12}$ are the scores obtained by a given farm for the Criterion *Expression of social behaviours*, the Criterion *Expression of other behaviours*, the Criterion *Good human-animal relationship* and the Criterion *Positive emotional state*, respectively. $\mu_9$, $\mu_{10}$, $\mu_{11}$ and $\mu_{12}$ are the capacities of the Criteria *Expression of social behaviours*, *Expression of other behaviours*, *Good human-animal relationship* and *Positive emotional state*, respectively. $\mu_{910}$ is the capacity of the group made of the Criteria *Expression of social behaviours* and *Expression of other behaviours* and so on...

For the principle of *Appropriate behaviour*

| | | | | | |
|---|---|---|---|---|---|
| $\mu_9$ | = | 0.14 | $\mu_{1011}$ | = | 0.16 |
| $\mu_{10}$ | = | 0.07 | $\mu_{1012}$ | = | 0.20 |
| $\mu_{11}$ | = | 0.09 | $\mu_{1112}$ | = | 0.27 |
| $\mu_{12}$ | = | 0.16 | $\mu_{91011}$ | = | 0.48 |
| $\mu_{910}$ | = | 0.16 | $\mu_{91012}$ | = | 0.56 |
| $\mu_{911}$ | = | 0.14 | $\mu_{91112}$ | = | 0.53 |
| $\mu_{912}$ | = | 0.23 | $\mu_{101112}$ | = | 0.51 |

Appropriate behaviour score $P_{Be}$ =

$$
\begin{cases}
C_9 + (C_{10} - C_9)\mu_{101112} + (C_{11} - C_{10})\mu_{1112} + (C_{12} - C_{11})\mu_{12} & \text{if} \quad C_9 \le C_{10} \le C_{11} \le C_{12} \\
C_9 + (C_{10} - C_9)\mu_{101112} + (C_{12} - C_{10})\mu_{1112} + (C_{11} - C_{12})\mu_{11} & \text{if} \quad C_9 \le C_{10} \le C_{12} \le C_{11} \\
C_9 + (C_{11} - C_9)\mu_{101112} + (C_{10} - C_{11})\mu_{1012} + (C_{12} - C_{10})\mu_{12} & \text{if} \quad C_9 \le C_{11} \le C_{10} \le C_{12} \\
C_9 + (C_{11} - C_9)\mu_{101112} + (C_{12} - C_{11})\mu_{1012} + (C_{10} - C_{12})\mu_{10} & \text{if} \quad C_9 \le C_{11} \le C_{12} \le C_{10} \\
C_9 + (C_{12} - C_9)\mu_{101112} + (C_{10} - C_{12})\mu_{1011} + (C_{11} - C_{10})\mu_{11} & \text{if} \quad C_9 \le C_{12} \le C_{10} \le C_{11} \\
C_9 + (C_{12} - C_9)\mu_{101112} + (C_{11} - C_{12})\mu_{1011} + (C_{10} - C_{11})\mu_{10} & \text{if} \quad C_9 \le C_{12} \le C_{11} \le C_{10} \\
C_{10} + (C_9 - C_{10})\mu_{91112} + (C_{11} - C_9)\mu_{1112} + (C_{12} - C_{11})\mu_{12} & \text{if} \quad C_{10} \le C_9 \le C_{11} \le C_{12} \\
C_{10} + (C_9 - C_{10})\mu_{91112} + (C_{12} - C_9)\mu_{1112} + (C_{11} - C_{12})\mu_{11} & \text{if} \quad C_{10} \le C_9 \le C_{12} \le C_{11} \\
C_{10} + (C_{11} - C_{10})\mu_{91112} + (C_9 - C_{11})\mu_{912} + (C_{12} - C_9)\mu_{12} & \text{if} \quad C_{10} \le C_{11} \le C_9 \le C_{12} \\
C_{10} + (C_{11} - C_{10})\mu_{91112} + (C_{12} - C_{11})\mu_{912} + (C_9 - C_{12})\mu_9 & \text{if} \quad C_{10} \le C_{11} \le C_{12} \le C_9 \\
C_{10} + (C_{12} - C_{10})\mu_{91112} + (C_{11} - C_{12})\mu_{911} + (C_9 - C_{11})\mu_9 & \text{if} \quad C_{10} \le C_{12} \le C_{11} \le C_9 \\
C_{10} + (C_{12} - C_{10})\mu_{91112} + (C_9 - C_{12})\mu_{911} + (C_{11} - C_9)\mu_{11} & \text{if} \quad C_{10} \le C_{12} \le C_9 \le C_{11} \\
C_{11} + (C_{10} - C_{11})\mu_{91012} + (C_9 - C_{10})\mu_{912} + (C_{12} - C_9)\mu_{12} & \text{if} \quad C_{11} \le C_{10} \le C_9 \le C_{12} \\
C_{11} + (C_{10} - C_{11})\mu_{91012} + (C_{12} - C_{10})\mu_{912} + (C_9 - C_{12})\mu_9 & \text{if} \quad C_{11} \le C_{10} \le C_{12} \le C_9 \\
C_{11} + (C_{12} - C_{11})\mu_{91012} + (C_{10} - C_{12})\mu_{910} + (C_9 - C_{10})\mu_9 & \text{if} \quad C_{11} \le C_{12} \le C_{10} \le C_9 \\
C_{11} + (C_{12} - C_{11})\mu_{91012} + (C_{10} - C_{12})\mu_{910} + (C_{10} - C_9)\mu_{10} & \text{if} \quad C_{11} \le C_{12} \le C_9 \le C_{10} \\
C_{11} + (C_9 - C_{11})\mu_{91012} + (C_{12} - C_9)\mu_{1012} + (C_{10} - C_{12})\mu_{10} & \text{if} \quad C_{11} \le C_9 \le C_{12} \le C_{10} \\
C_{11} + (C_9 - C_{11})\mu_{91012} + (C_{10} - C_9)\mu_{1012} + (C_{12} - C_{10})\mu_{12} & \text{if} \quad C_{11} \le C_9 \le C_{10} \le C_{12} \\
C_{12} + (C_9 - C_{12})\mu_{91011} + (C_{10} - C_9)\mu_{1011} + (C_{11} - C_{10})\mu_{11} & \text{if} \quad C_{12} \le C_9 \le C_{10} \le C_{11} \\
C_{12} + (C_9 - C_{12})\mu_{91011} + (C_{11} - C_9)\mu_{1011} + (C_{10} - C_{11})\mu_{10} & \text{if} \quad C_{12} \le C_9 \le C_{11} \le C_{10} \\
C_{12} + (C_{10} - C_{12})\mu_{91011} + (C_{11} - C_{10})\mu_{911} + (C_9 - C_{11})\mu_9 & \text{if} \quad C_{12} \le C_{10} \le C_{11} \le C_9 \\
C_{12} + (C_{10} - C_{12})\mu_{91011} + (C_9 - C_{10})\mu_{911} + (C_{11} - C_9)\mu_{11} & \text{if} \quad C_{12} \le C_{10} \le C_9 \le C_{11} \\
C_{12} + (C_{11} - C_{12})\mu_{91011} + (C_9 - C_{11})\mu_{910} + (C_{10} - C_9)\mu_{10} & \text{if} \quad C_{12} \le C_{11} \le C_9 \le C_{10} \\
C_{12} + (C_{11} - C_{12})\mu_{91011} + (C_{10} - C_{11})\mu_{910} + (C_9 - C_{10})\mu_9 & \text{if} \quad C_{12} \le C_{11} \le C_{10} \le C_9
\end{cases}
$$

Therefore, with the $\mu$ listed above:

$$\text{Appropriate behaviour score } P_{Be} = \begin{cases}
C_9 + 0.51(C_{10} - C_9) + 0.27(C_{11} - C_{10}) + 0.16(C_{12} - C_{11}) & \text{if} \quad C_9 \le C_{10} \le C_{11} \le C_{12} \\
C_9 + 0.51(C_{10} - C_9) + 0.27(C_{12} - C_{10}) + 0.09(C_{11} - C_{12}) & \text{if} \quad C_9 \le C_{10} \le C_{12} \le C_{11} \\
C_9 + 0.51(C_{11} - C_9) + 0.20(C_{10} - C_{11}) + 0.16(C_{12} - C_{10}) & \text{if} \quad C_9 \le C_{11} \le C_{10} \le C_{12} \\
C_9 + 0.51(C_{11} - C_9) + 0.20(C_{12} - C_{11}) + 0.07(C_{10} - C_{12}) & \text{if} \quad C_9 \le C_{11} \le C_{12} \le C_{10} \\
C_9 + 0.51(C_{12} - C_9) + 0.16(C_{10} - C_{12}) + 0.09(C_{11} - C_{10}) & \text{if} \quad C_9 \le C_{12} \le C_{10} \le C_{11} \\
C_9 + 0.51(C_{12} - C_9) + 0.16(C_{11} - C_{12}) + 0.07(C_{10} - C_{11}) & \text{if} \quad C_9 \le C_{12} \le C_{11} \le C_{10} \\
C_{10} + 0.53(C_9 - C_{10}) + 0.27(C_{11} - C_9) + 0.16(C_{12} - C_{11}) & \text{if} \quad C_{10} \le C_9 \le C_{11} \le C_{12} \\
C_{10} + 0.53(C_9 - C_{10}) + 0.27(C_{12} - C_9) + 0.09(C_{11} - C_{12}) & \text{if} \quad C_{10} \le C_9 \le C_{12} \le C_{11} \\
C_{10} + 0.53(C_{11} - C_{10}) + 0.23(C_9 - C_{11}) + 0.16(C_{12} - C_9) & \text{if} \quad C_{10} \le C_{11} \le C_9 \le C_{12} \\
C_{10} + 0.53(C_{11} - C_{10}) + 0.23(C_{12} - C_{11}) + 0.14(C_9 - C_{12}) & \text{if} \quad C_{10} \le C_{11} \le C_{12} \le C_9 \\
C_{10} + 0.53(C_{12} - C_{10}) + 0.14(C_{11} - C_{12}) + 0.14(C_9 - C_{11}) & \text{if} \quad C_{10} \le C_{12} \le C_{11} \le C_9 \\
C_{10} + 0.53(C_{12} - C_{10}) + 0.14(C_9 - C_{12}) + 0.09(C_{11} - C_9) & \text{if} \quad C_{10} \le C_{12} \le C_9 \le C_{11} \\
C_{11} + 0.56(C_{10} - C_{11}) + 0.23(C_9 - C_{10}) + 0.16(C_{12} - C_9) & \text{if} \quad C_{11} \le C_{10} \le C_9 \le C_{12} \\
C_{11} + 0.56(C_{10} - C_{11}) + 0.23(C_{12} - C_{10}) + 0.14(C_9 - C_{12}) & \text{if} \quad C_{11} \le C_{10} \le C_{12} \le C_9 \\
C_{11} + 0.56(C_{12} - C_{11}) + 0.16(C_{10} - C_{12}) + 0.14(C_9 - C_{10}) & \text{if} \quad C_{11} \le C_{12} \le C_{10} \le C_9 \\
C_{11} + 0.56(C_{12} - C_{11}) + 0.16(C_9 - C_{12}) + 0.07(C_{10} - C_9) & \text{if} \quad C_{11} \le C_{12} \le C_9 \le C_{10} \\
C_{11} + 0.56(C_9 - C_{11}) + 0.20(C_{12} - C_9) + 0.07(C_{10} - C_{12}) & \text{if} \quad C_{11} \le C_9 \le C_{12} \le C_{10} \\
C_{11} + 0.56(C_9 - C_{11}) + 0.20(C_{10} - C_9) + 0.16(C_{12} - C_{10}) & \text{if} \quad C_{11} \le C_9 \le C_{10} \le C_{12} \\
C_{12} + 0.48(C_9 - C_{12}) + 0.16(C_{10} - C_9) + 0.09(C_{11} - C_{10}) & \text{if} \quad C_{12} \le C_9 \le C_{10} \le C_{11} \\
C_{12} + 0.48(C_9 - C_{12}) + 0.16(C_{11} - C_9) + 0.07(C_{10} - C_{11}) & \text{if} \quad C_{12} \le C_9 \le C_{11} \le C_{10} \\
C_{12} + 0.48(C_{10} - C_{12}) + 0.14(C_{11} - C_{10}) + 0.14(C_9 - C_{11}) & \text{if} \quad C_{12} \le C_{10} \le C_{11} \le C_9 \\
C_{12} + 0.48(C_{10} - C_{12}) + 0.14(C_9 - C_{10}) + 0.09(C_{11} - C_9) & \text{if} \quad C_{12} \le C_{10} \le C_9 \le C_{11} \\
C_{12} + 0.48(C_{11} - C_{12}) + 0.16(C_9 - C_{11}) + 0.07(C_{10} - C_9) & \text{if} \quad C_{12} \le C_{11} \le C_9 \le C_{10} \\
C_{12} + 0.48(C_{11} - C_{12}) + 0.16(C_{10} - C_{11}) + 0.14(C_9 - C_{10}) & \text{if} \quad C_{12} \le C_{11} \le C_{10} \le C_9
\end{cases}$$

### 4.2.5 Remarks of the calculation of the principle scores

Due to the positive values of the interactions between criteria-scores, the principle-scores are always intermediate between the lowest and the highest values obtained at criterion level and always closer to the minimum value.

Within each principle, some criteria are considered more important than others (and will contribute to a large extent to the principle score):

- Within the principle *Good feeding*, the criterion *Absence of prolonged thirst* is considered more important than the criterion *Absence of prolonged hunger*.
- Within the principle *Good housing*, *Comfort around resting* is considered more important than *Ease of movement* which in turn is considered more important than *Thermal comfort*.
- Within the principle *Good health*, *Absence of disease* is considered more important than *Absence of injuries* which in turn is considered more important than *Absence of pain induced by management procedures*.
- Within the principle *Appropriate behaviour*, *Positive emotional state* is considered more important than *Expression of social behaviours* which in turn is considered more important than *Good human-animal relationship* which in turn is considered more important than *Expression of other behaviours*.

Examples of principle scores resulting from criterion scores are provided in Tables 49-52 .

*Table 49. Examples of scores for Principle Good feeding according to combinations of criterion scores for the Criteria Absence of prolonged hunger and Absence of prolonged thirst*

| Absence of prolonged hunger | Absence of prolonged thirst | Principle Good feeding |
|---|---|---|
| 25 | 75 | 39 |
| 40 | 60 | 46 |
| 50 | 50 | 50 |
| 60 | 40 | 42 |
| 75 | 25 | 30 |

*Table 50. Examples of scores for the Principle Good housing according to combinations of criterion scores for the Criteria Comfort around resting, Thermal comfort and Ease of movement*

| Comfort around resting | Thermal comfort | Ease of movement | Principle of Good housing |
|---|---|---|---|
| 25 | 50 | 75 | 37 |
| 25 | 75 | 50 | 37 |
| 40 | 50 | 60 | 45 |
| 40 | 60 | 50 | 45 |
| 50 | 25 | 75 | 39 |
| 50 | 40 | 60 | 46 |
| 50 | 50 | 50 | 50 |
| 50 | 60 | 40 | 44 |
| 50 | 75 | 25 | 36 |
| 60 | 40 | 50 | 46 |
| 60 | 50 | 40 | 45 |
| 75 | 25 | 50 | 39 |
| 75 | 50 | 25 | 37 |

*Table 51. Examples of scores for the Principle Good health according to combinations of criterion scores for the Criteria Absence of injuries, Absence of disease and Absence of pain induced by management procedures*

| Absence of injuries | Absence of diseases | Absence of pain induced by management procedures | Principle of Good health |
|---|---|---|---|
| 25 | 50 | 75 | 34 |
| 25 | 75 | 50 | 36 |
| 40 | 50 | 60 | 43 |
| 40 | 60 | 50 | 44 |
| 50 | 25 | 75 | 33 |
| 50 | 40 | 60 | 43 |
| 50 | 50 | 50 | 50 |
| 50 | 60 | 40 | 46 |
| 50 | 75 | 25 | 40 |
| 60 | 40 | 50 | 43 |
| 60 | 50 | 40 | 44 |
| 75 | 25 | 50 | 32 |
| 75 | 50 | 25 | 36 |

*Table 52. Examples of scores for the Principle Appropriate behaviour according to combinations of criterion scores for the Criteria Expression of social behaviours, Expression of other behaviours, Good human-animal relationship and Positive emotional state*

| Expression of social behaviours | Expression of other behaviours | Good human-animal relationships | Positive emotional state | Principal of Appropriate behaviour |
|---|---|---|---|---|
| 35 | 35 | 65 | 65 | 43 |
| 35 | 50 | 50 | 65 | 45 |
| 35 | 50 | 65 | 50 | 44 |
| 35 | 65 | 35 | 65 | 41 |
| 35 | 65 | 50 | 50 | 44 |
| 35 | 65 | 65 | 35 | 40 |
| 50 | 35 | 50 | 65 | 45 |
| 50 | 35 | 65 | 50 | 44 |
| 50 | 50 | 35 | 65 | 46 |
| 50 | 50 | 50 | 50 | 50 |
| 50 | 50 | 65 | 35 | 44 |
| 50 | 65 | 35 | 50 | 44 |
| 50 | 65 | 50 | 35 | 43 |
| 65 | 35 | 35 | 65 | 42 |
| 65 | 35 | 50 | 50 | 45 |
| 65 | 35 | 65 | 35 | 39 |
| 65 | 50 | 35 | 50 | 45 |
| 65 | 50 | 50 | 35 | 44 |
| 65 | 65 | 35 | 35 | 40 |

## 4.3. From the principle scores to period-wise overall category

The synthesis of the four principle scores into an overall welfare category is carried out separately for each of the three periods. The scores obtained by a farm on all welfare principles are used to assign the final category.

Four welfare categories are identified, and the rules for determining the category are presented in Table 53.

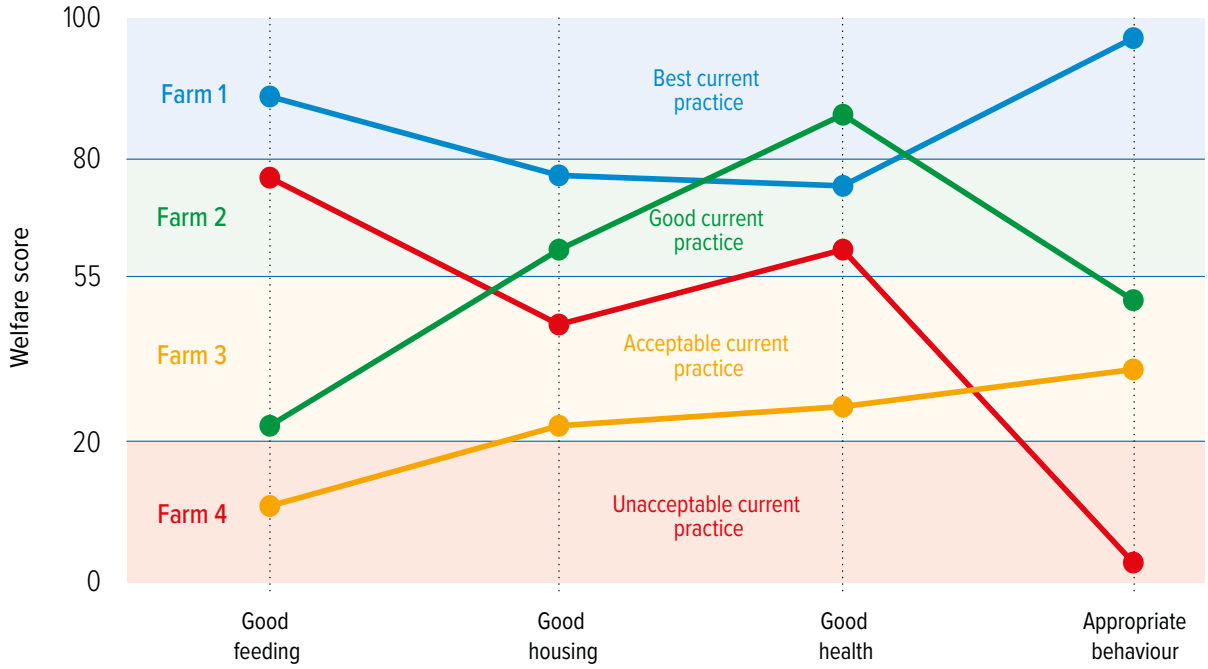
*Table 53. The rules that determine the final welfare category of the farm based on the four principle scores (both period-wise and across the periods).*

| Category | Rule |
|---|---|
| **Best current practice** | The farm scores more than 55 on all principles and more than 80 on at least two principles. |
| **Good current practice** | The farm scores more than 20 on all principles and more than 55 on at least two principles. |
| **Acceptable current practice** | The farm scores more than 10 on all principles and more than 20 on at least three principles. |
| **Not acceptable current practice** | The farm does not reach the minimum standards set for the 'Acceptable current practice' (see above). |

The 'Best' threshold is set at 80, the one for 'Good' at 55 and that for acceptability at 20. However, just as criteria do not compensate for each other within a principle (see section 4.2), high scores in one principle do not offset low scores in another, so categories cannot be based on average scores. At the same time, it is important that the final classification reflects not only the theoretical acknowledgement of what can be considered as best, good, and acceptable, but also what can realistically be achieved in practice.

Examples of farms with varying principle scores are presented in Figure 31.

*Figure 31. Examples of farms in the four welfare categories*




## 4.4 From the period-wise principle scores to the final overall category

The period-wise principle scores are used to calculate the four final principle scores as presented in Table 54. Note that Period 1 has only half of the weight of Periods 2 and 3. This is due to the greater challenges in gathering assessment data in Period 1.

*Table 54. Aggregating the period-wise (P1, P2 and P3) principle scores to the four final principle scores.*

| Principle | Period 1 | Period 2 | Period 3 | Aggregated final principle score |
|---|---|---|---|---|
| Good feeding (Fe) | $P_{FeP1}$ | $P_{FeP2}$ | $P_{FeP3}$ | $P_{Fe} = 0.2 \times P_{FeP1} + 0.4 \times P_{FeP2} + 0.4 \times P_{FeP3}$ |
| Good housing (Ho) | $P_{HoP1}$ | $P_{HoP2}$ | $P_{HoP3}$ | $P_{Ho} = 0.2 \times P_{HoP1} + 0.4 \times P_{HoP2} + 0.4 \times P_{HoP3}$ |
| Good health (He) | $P_{HeP1}$ | $P_{HeP2}$ | $P_{HeP3}$ | $P_{He} = 0.2 \times P_{HeP1} + 0.4 \times P_{HeP2} + 0.4 \times P_{HeP3}$ |
| Appropriate behaviour (Be) | $P_{BeP1}$ | $P_{BeP2}$ | $P_{BeP3}$ | $P_{Be} = 0.2 \times P_{BeP1} + 0.4 \times P_{BeP2} + 0.4 \times P_{BeP3}$ |

Finally, the synthesis of the four final principle scores into a final overall category is done with the same rule as presented above (see section 4.3) for the period-wise overall scores, but now an 'indifference threshold equal to 5' is applied: for instance, 50 is not considered significantly lower than 55. This indifference threshold is required because of uncertainties in the welfare assessment.

Note: The rules to assign a farm to a given welfare category may be subject to modifications once a sufficient number of commercial farms have been inspected to provide data for further refinement of the category parameters.

## 5.1 Annex A: Contributors to WelFur

| **WelFur partners** | **Country** |
|---|---|
| Fur Europe | Belgium |
| INRA (National Institute of Agronomic Research) | France |
| University of Eastern Finland (UEF, Department of Biology) | Finland |
| MTT Agrifood Research Finland (MTT, Animal Production Research) | Finland |
| Natural Resources Institute Finland (Luke) | Finland |
| Aarhus University (AU, Department of Animal Science) | Denmark |
| Norwegian University of Life Sciences (NMBU, Department of Animal and Aquacultural Sciences) | Norway |
| Swedish University of Agricultural Sciences (SLU, Department of Animal Environment and Health) | Sweden |
| University of Utrecht (UU, Faculty of Veterinary Medicine, Department of Animals in Science & Society) | The Netherlands |
| University of Guelph (Animal and Poultry Department of Science) | Canada |
| University of Birmingham (School of Biosciences) | United-Kingdom |
| Experts from the original Welfare Quality® project | |

| **Contributors to the Finnraccoon protocol:** | |
|---|---|
| Natural Resources Institute Finland (Luke) | Finland |
| IRTA (Institute of Agrifood Research and Technology) | Spain |
| Experts from the original Welfare Quality® project | |
| Fur Europe | Belgium |



*The authors of the Finnraccoon protocol (in alphabetical order):*

*Tarja Koistinen (Luke), Jaakko Mononen (Luke)*

*Expert consultant of the scoring system:*

*Antoni Dalmau Bueno (IRTA)*

*Foreword:*

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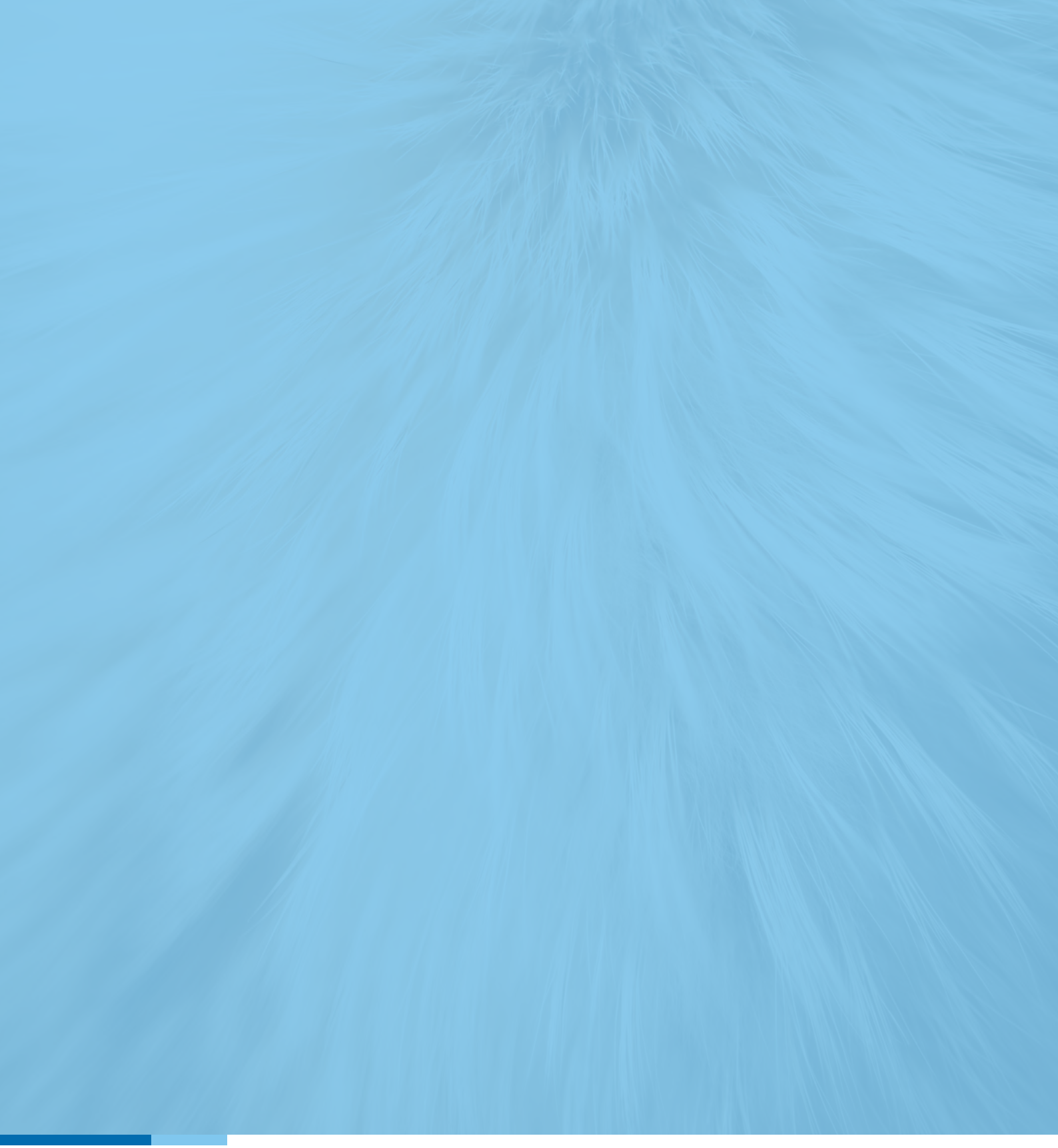

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