Manual PIGLOW welfare self-assessment Sows

Contents

Introduction

Why a welfare self-assessment tool

Monitoring animal welfare is valuable to detect particular welfare problems requiring attention and to evaluate effects of management adaptations or trends in time. By periodically assessing the welfare of your animals yourself you can become more aware of many different indicators of animal welfare and associated possible welfare problems. A mobile application can be a useful tool for welfare self-assessments, because it is an easy way to collect, organise and store the data. Additionally, it can include automated advice that will help farmers solve the identified problems. With this in mind, the PIGLOW app was developed.

PIGLOW application

The PIGLOW app was developed by ILVO – in close collaboration with ACTA-ITAVI, IFIP, INRAE, Utrecht University and Yncrea - to allow farmers to self-assess the welfare of their fattening pigs and sows reared in organic and low-input outdoor production systems. It was based on previous welfare assessment tools, namely BEEP, Dierenwelzijn Scan, KTBL tool, ProPIG, SusPigSys and Welfare Quality®. The tool primarily includes animal-based indicators, which means that many of the questions in the app are about the animals themselves instead of just about the environment (e.g. in addition to asking if enrichment is present, we ask if the animals are using the enrichment). The questions about the animals are mostly related to animal health and behaviour (e.g. body condition, lameness, confidence in humans, playful behaviour).

Additionally, key questions on management, housing and production parameters are included. The values for these parameters are used to anonymously compare the results of farms that are similar to one another (customized benchmarking). This is an extra function of the app that will allow you to see how the results of your farm for different welfare indicators compare to the results of similar farms. You can also compare your own results over time and easily see if your scores for certain welfare indicators have improved since you started using the app.

No internet connection is necessary to complete the assessment, only to submit it and receive the results. The assessment can even be closed intermediately and be finished at a later time. After the assessment has been completed, the data will be stored locally until you can submit it. Immediately after submitting your assessment you are provided with the results in PDF form by e-mail and a link to www.piglow.eu, where you will find automated feedback in the form of potential risk factors for all of the measured welfare indicators. If you want to improve your score for a certain welfare indicator, the respective risk factors can serve as a basis for discussion with your veterinarian or other consultant to set-up a tailor-made action plan. While the listed risk factors cover the most common causes of low scores for the corresponding indicators, the list is **non-exhaustive** and it **cannot be guaranteed** that one of them is indeed the cause of the problem.

Downloading of the app and registration

The app can be downloaded for free in the Google Play Store (Android) and App Store (iPhone). Once you open the app, you can enter your e-mail address and press "next" to be redirected to the registration page. You can then select the right type of profile (Farmer, Consultant, Scientist or Student) and language and choose your password. Finally, click "register" to create your account (figure A).

While your e-mail address is necessary to create an account and to receive your results, this e-mail address will be replaced automatically by an artificial code (pseudonymized) before your data is stored in the central data base. This means that no personal data is linked to the results of your assessments.

Content and set-up of the PIGLOW welfare assessment

The app contains three questionnaires for sows, namely one each for management, pregnant sows and farrowing sows (figure B). The **sow management** questionnaire consists of questions on production parameters and management practices. The assessments for **pregnant sows** and **farrowing sows** each start with the section "general" in which some additional data on management is asked that is specific for one of the two stages of reproduction. The assessment for pregnant sows contains two more sections for group observations as well as individual observations of the sows, whereas the assessment for farrowing sows only has one more section for individual observations of sows together with their litter.
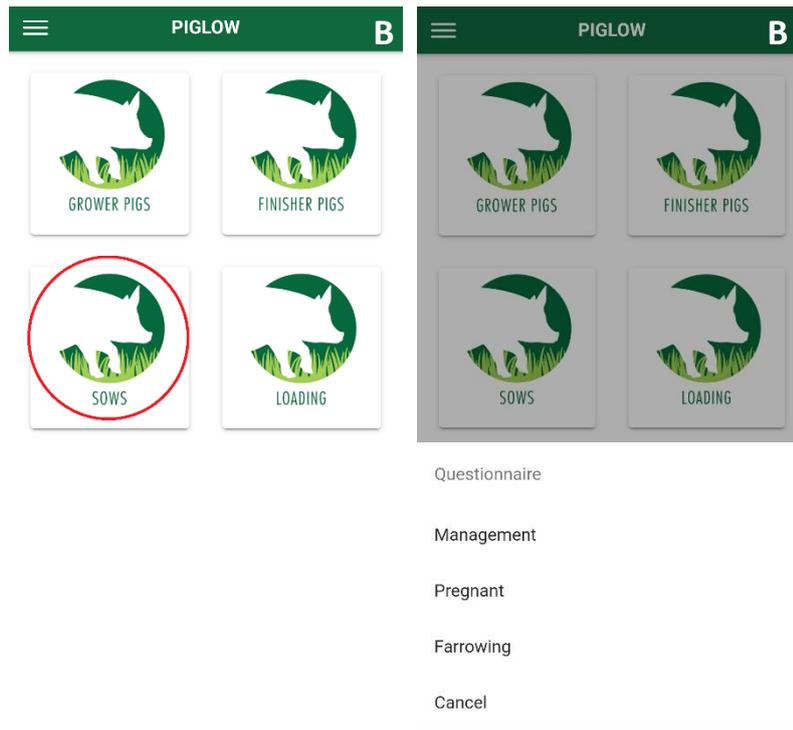
Timing of assessments

It is recommended to perform the assessments when the animals have been housed in the same group for at least 14 days, because the possible social stress associated with being in a new group could influence welfare indicators.

If possible, please start the observation at least one hour after the sows have been fed to avoid effects of feeding time, such as stress or competition to access the feeder. The aim of the assessment is to record the indicators in a stable context.

Question types

The welfare assessment contains several different types of questions. For some of the questions, the answers can be typed freely in a **text field**. If the answer is supposed to be a **number**, a key pad with only numbers will be visible. These questions can have a minimum or maximum value. For example, it is not possible to answer with a number above 100 if the answer represents a percentage (figure C). If the answer must be given in words, a key pad with letters will be visible.

Several questions ask for a **date** (figure D). To select the right date, click on the date of today that is automatically shown. A window will open in which you can scroll to the correct day, month and year. After selecting the right date, press "Done" to confirm your answer.

The assessments also contain **yes/no questions**. Simply select one of the two options before continuing with the next question.

There are two different types of **multiple choice questions**, namely one where only one answer can be selected and one where multiple answers can be selected. For the first type, there are circles in front of each answer (figure E) and for the second type there are squares (figure F). For some questions, it is necessary to scroll down to be able to see all answer options. You will easily see for which questions this is the case, because the arrow button to continue to the next question will only be visible below the last option, thus you cannot continue to the next question without scrolling down (figure F).

Finally, there are questions that are answered by **counting** the number of occurrences of a specific indicator by pressing the **+ button** for each occurrence that you observe (figure G). If you clicked by accident, you can remove one occurrence by pressing the **– button**. If you accidentally end up with a negative number as your total, it will not be possible to continue to the next question (figure H).
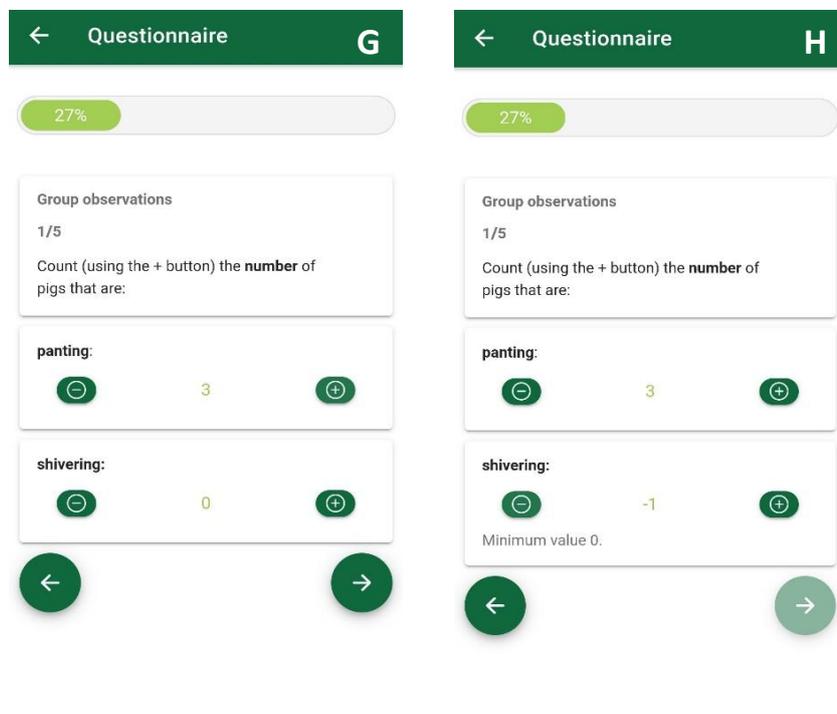
Some questions contain **photos** or an **additional explanation** to clarify the meaning of the question. Photos and explanations can be found under the **image-icon** and the **i-icon**, respectively (figure I).
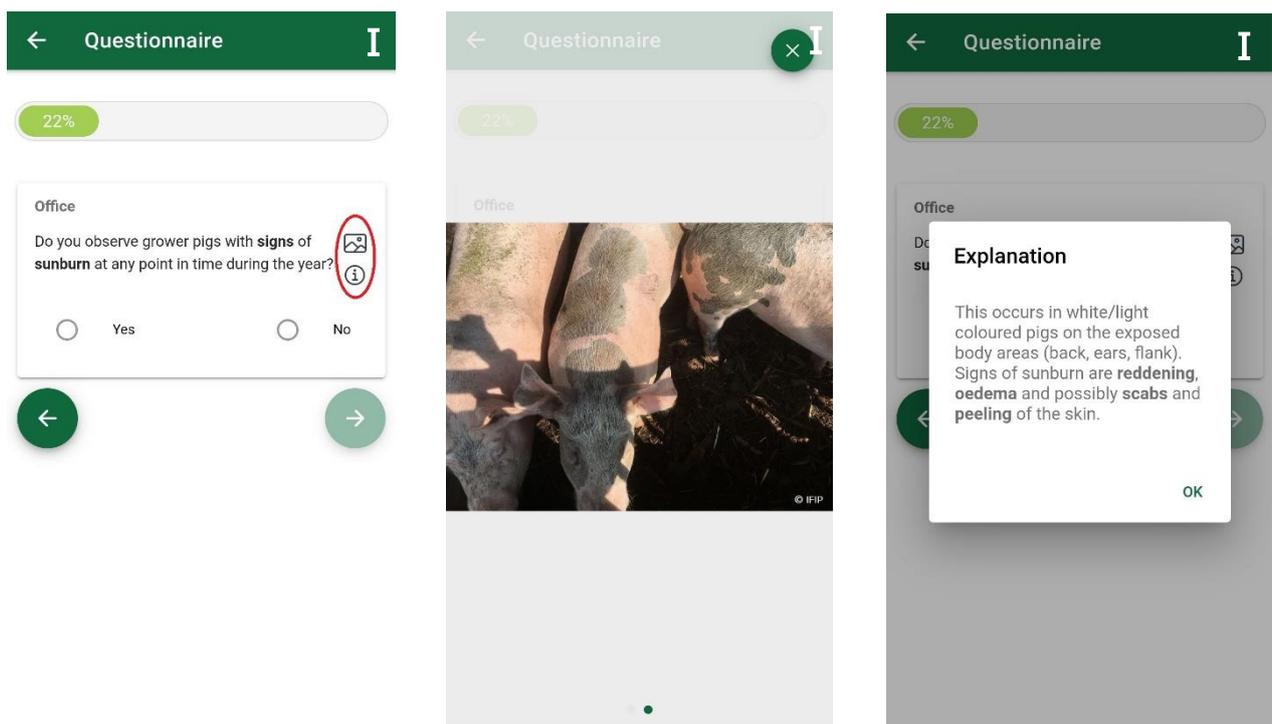
Sows management

The questions in this section mainly concern general information about the farm. Some of the information is collected to get an idea of, for example, the size of your farm and the management practices that are applied, but will not be used to calculate any kind of score or result for your farm. If data have been collected from a large enough number of farms, this information could possibly be used (anonymously) to detect a relation between some of these factors and the behaviour or welfare of the animals. It could also be used to compare your farm more specifically to farms that are similar in size or that apply the same management practices. In additional to this, questions about production parameters such as mortality and replacement rates are asked. These parameters can be an indicator of the general health of the animals.

This questionnaire should be completed in a location where you have access to data on the animals and the buildings. Unless stated otherwise, you should answer the questions using data from the last 12 months.

Pregnant sows

General

This section of the assessment should be completed in a location where you have access to data on the animals and the buildings.

If you have already completed an assessment in the past, you will see the previously introduced answers for some of these questions. You should check whether these answers are still correct and modify them if necessary.

The questions in this section mainly concern general information about the farm. This information is collected to get an idea of, for example, the size of your farm and the management practices that are applied, but will not be used to calculate any kind of score or result for your farm. If data have been collected from a large enough number of farms, this information could possibly be used (anonymously) to detect a relation between some of these factors and the behaviour or welfare of the animals. It could also be used to compare your farm more specifically to farms that are similar in size or that apply the same management practices.

The only exceptions are the questions concerning the use of the outdoor area and signs of sunburn. The answers to these questions say something about animal behaviour or welfare.

Question – Use of the outdoor area
Are there any parts of the outdoor area that are rarely used?
Explanation
If this is the case, this says something about the behaviour of the animals and about the suitability of the outdoor area. If the area that is not used is the furthest away from the building or huts, this points to a less exploratory attitude of the animals. Exploratory behaviour is an important natural behaviour for pigs that should be stimulated, for example by providing frequently changing enrichment. If one or several specific spots of the outdoor area are not used, this could also indicate that there is something in the environment that is unpleasant to the animals.
Risk factors
- Not enough stimulation of exploratory behaviour - The presence of unpleasant stimuli in the outdoor area (can be related to flooring, vegetation, increased predation risk, unpleasant noises, etc.)

Question – Signs of sunburn
Do you observe pigs with signs of sunburn at any point during the year? Y/N
Explanation

This occurs in white/light coloured pigs on the exposed body areas (back, ears, flank). Signs of sunburn are reddening, oedema and possibly scabs and peeling of the skin.

Sunburn is very painful for the animals and is therefore a serious health risk. It will occur when the animal housing does not contain enough space with shade and the animals have no choice but to stay in the sun.

Risk factors
- Lack of areas in the shade

Group observations

For the group observations it is important to select a representative group of animals. If you have fewer than 50 pregnant sows, you should assess all of them. If you have 50 or more pregnant sows, you should assess at least 50 pigs from, if possible, at least 2 different pens. Select pens that are evenly distributed throughout the housing unit and make sure to select sows of different gestational stages to ensure a representative sample.

For each pen, you may choose to assess the animals either inside or outside, depending on where the majority of the animals is situated or where visibility is best. Include all animals from the pen that are visible in your assessment. The number of observations depends on the number of available animals, with a maximum of 5.

Question – Number of sows

How many sows are observed for this assessment?

Explanation
The total number of sows that is included in the assessment is needed to calculate percentages of pigs based on the answers of other questions (e.g. the percentage of sows that is panting can be automatically calculated after counting both the number of sows that are panting and the total number of sows).

Question – Thermal comfort

Observe how the sows are distributed throughout the pen. Is more than 50% of the sows:
- Huddling   Yes/No
- Widely spread on their flank   Yes/No

Count (using the + button) the number of sows that are:
- Panting   - 0 +
- Shivering   - 0 +

Explanation
These behaviours are all indicators of thermal comfort.

"Huddling" is defined as lying with more than half of its body in contact with another pig (i.e. virtually lying on top of another pig).

Huddling and shivering could indicate that the animals are cold and trying to get warm. Panting or lying widely spread on the flanks could indicate that the sows are too hot and trying to increase contact with the floor to lose heat.

Risk factors
- The temperature is above or below the limit of the thermal comfort zone
- Climate control/ventilation is not optimal
- Design of the free-range is not optimal (not enough shelter, lack of shade)
- Floor type (holds too much or not enough heat)

Question – Enrichment use

Record the number of sows that are using the enrichment in this pen.

Explanation
When answering this question, please take into account the types of enrichment that you selected earlier as answers to the question about the types of enrichment that are present indoors and outdoors.

Enrichment allows animals to express natural and species specific behaviour, which is very important for good animal welfare. If the enrichment is not used by many animals, this could indicate that the provided enrichment is not right for them.

Risk factors
- The enrichment that is provided is not species appropriate/difficult for them to use
- The enrichment has been present for too long and is not interesting anymore
- The enrichment is too dirty for the animals to use
- There is not enough enrichment for a group of this size

Question – Frothy saliva

Count (using the + button) the number of sows with frothy saliva - 0 +

Explanation
Frothy saliva is an indicator that the sow is showing oral stereotypic behaviours, such as sham chewing. Stereotypic behaviours are a repetitive action with no clear goal.

Oral stereotypic behaviours can develop as a result of frustration or boredom. The composition of the feed and the way it is presented can also be important factors for the development. Providing feed that needs to be thoroughly chewed and providing it in a way that takes more time to consume (for example spread out through the pen) could be beneficial. Once stereotypies have developed in a specific animal, the behaviour often does not disappear when the original cause is removed.

Risk factors
- Boredom (which can be a consequence of unsuitable enrichment)

- Stress
- Composition of the feed (not enough structure)
- Distribution of the feed (no need to forage, too easy to finish eating quickly, which leads to boredom)

Question – Bad general state

Count (using the + button) the number of sows that are in a bad general state
- 0 +

Explanation

"Bad general state" is defined as animals which are obviously in pain, sick, in need of further care to avoid complications, dull or apathic (not bright, alert and responsive), isolated from the group (lying, standing, eating), with dull/sunken eyes, blue/red ears or snout, pale skin colour, rapid respiration, and animals with a physical deformation or large hernia (bigger than the distance between the actual hernia and the floor).

These sows need to be assessed thoroughly and a veterinarian needs to be consulted if required. Proper care should be given.

Risk factors

- Illness
- Injuries
- Hygiene

Question – Drinking water

Might some animals in the group have difficulty accessing good quality drinking water at some point in time? Yes/No

Explanation

The animals could have trouble accessing drinking water for different reasons. A factor can be that there are not enough drinkers for the size of the group, but even more important is the flow rate. If this is too low, the animals need to drink for a very long time to drink enough water.

Also important is the location of the drinkers. For example, if all drinking places are very close together or too close to the feeding place, the access to some drinkers could be blocked by other sows that are eating or drinking and aggression could develop.

Risk factors

- Not enough drinkers, which could lead to competition
- The flow rate is too low (should be 1,5-2,2 L/min for pregnant sows)
- Drinkers are broken
- The drinkers are too close together or to the feeding place and cannot all be used at the same time without a risk of negative social interactions

Question – Liquid faeces

Do you observe any signs of liquid faeces in the pen (on walls or floor)? Yes/No

Explanation

Liquid faeces are a sign of problems of the digestive system. Likely causes can be physical, such as an infection, or related to (social) stress.

Risk factors
- Diet
- General health condition
- Infections
- Hygiene
- Social stress

Question – Coughing and sneezing

Did you hear any coughing and/or sneezing in this group during this assessment? Yes/No

Explanation

Coughing and sneezing are indications of problems of the respiratory system, which could mean that the air quality in the environment is not optimal. Ventilation of the air could be an important factor, where too much ventilation could lead to too much cold air, but not enough ventilation could lead to a higher concentration of harmful particles in the air. Air that is too dry or too humid could also affect the airways.

Risk factors
- Air quality (too much or not enough ventilation)
- Humidity (too high or too low)
- Dust
- Infections

Individual observations

Question – Confidence in humans

Score the confidence in humans for this sow
Scale: 1-2-3

Explanation

This is a test to score how comfortable sows are in the presence of humans when being approached. When conducting this test, first walk around the pen calmly to make your presence known. The test consists of 3 steps of 10 seconds each. You assign a score from 1 to 3 (figure J).

1) Walk towards the front side of the sow and stop at a distance of 50 cm to 1 m. If the sow moves away and does not return within 10 seconds, assign score 1. If the sow stays close, continue with step 2 of the test.
2) Squat in front of the sow. If the sow moves away and does not return within 10 seconds, also assign score 1. If the sow stays close, continue with step 2.
3) Try to touch the sow between the ears. If the sow moves away, assign score 2. If the sow stays close (with or without slight withdrawal), assign score 3.

^J Confidence in Humans – Sows

= test in 3 steps of 10 seconds each

Step 1

Step 2

sow moves away (without approaching again within 10 sec)

Score 1

Step 3

sow moves away when attempted to touch
(without approaching again within 10 sec)

Score 2

sow allows being touched between its ears;
may withdraw when being touched but stays close

Score 3
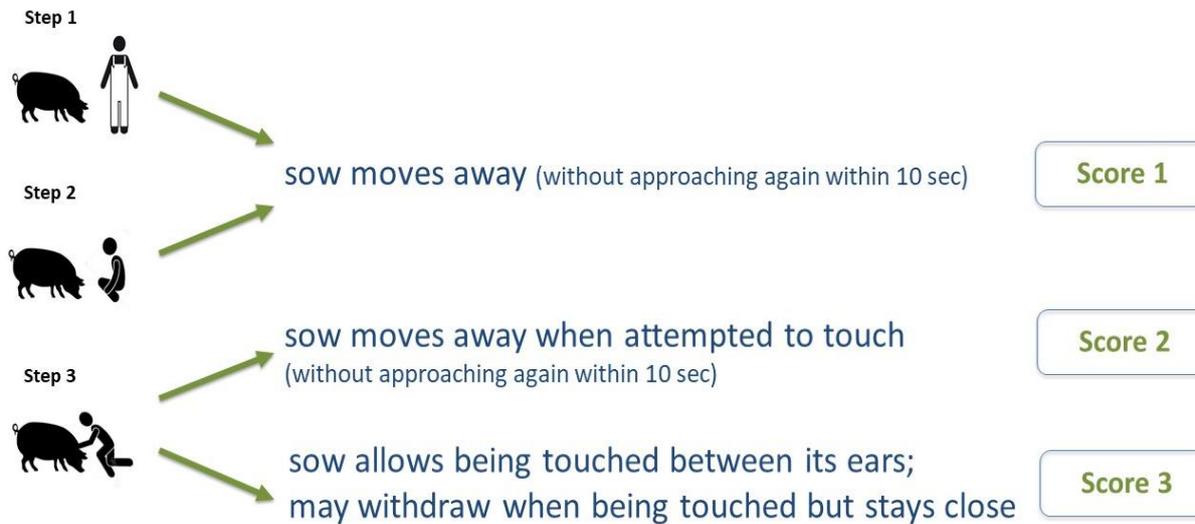
If many of the sows do not let humans approach, visits by humans are perhaps not frequent enough for the animals to know what to expect. Another possibility is that humans have previously behaved in a way that is unpleasant. For example, they were too loud or moved too suddenly and too fast.

A failure to let humans approach could also indicate that the environment in general is not stimulating enough for the animals. Pigs that are used to being surrounded by (new) stimuli are more likely to react positively to the presence of other new stimuli, including the presence of humans.

Risk factors
- Human visits are too infrequent, so the animals are not used to it
- Humans behave unpleasantly during visits
- The environment is not stimulating enough

Question – Laboured breathing

Does the sow display laboured breathing? Yes/No

Explanation

The sows should breath calmly. Laboured breathing (pumping) could indicate an infection of the respiratory system or that the climate in the environment is not optimal.

Risk factors

- Humidity (too high or too low)
- Insufficient ventilation/climate control
- Infection

Question – Body condition

Score the body condition of the sow
Scores: normal – too lean – too fat

Explanation

To determine the body condition of the sows, visually inspect the spine, hip and pin bones. If possible, also palpate these same places.

If the sow is too lean or too fat, this can be an indication of malnutrition. Either the sow eats too much or too little, or the concentration of different types of nutrients in the feed is not balanced.
A lack of exercise can lead to a sow becoming fat. This could occur, for example, if the sow is lame and walking is difficult or (almost) impossible.

Risk factors

- Composition of the feed
- Amount of feed/number of feeding moments per day
- Illness
- Lack of exercise (lameness)

Question – Shoulder lesions

Does the sow have any shoulder lesions? Yes/No

Explanation

Shoulder lesions often develop during the nursing period when the sows lie down a lot and lose a lot of weight. Sows that are too lean have an increased risk of developing shoulder lesions, most likely because fat has a protective effect. Open wounds can lead to infections. A softer floor to lie on can speed up the healing of shoulder lesions.

Risk factors

- Uncomfortable floor
- Losing too much weight during nursing

Question – Swelling of knee or hock region

Does the sow have any clear swelling at the knee or hock region?

Explanation

Count any swelling that is at least as large as the diameter of the leg at the level of the swelling, or swelling with a wound.

Swelling is a sign of an inflammation, which could be either infectious or not.

Risk factors

- Unsuitable housing
- Uncomfortable floor (insufficient amount of bedding material, presence of wet bedding material)

Question – Covered with faeces

Is the sow covered with faeces/manure? Yes/No

Explanation

"Covered" is defined as having faeces/manure on at least 50% of the skin surface on one side of the body.

If there are many pigs covered in faeces, this is a sign of unsuitable housing. For example, there might not be enough space for a large percentage of the animals to lie down in the area that is meant for this, which could lead to animals choosing to lie down in the dunging zone. The temperature is also of influence. If the temperature is higher, the pigs will choose to lie further away from each other, which means they need more space. Additionally, a high temperature could lead the pigs to roll through faeces in an attempt to cool off and lose internal heat. This is unhygienic and could lead to contamination with pathogens. Another important factor is the bedding material. If there is not enough of it or it is not changed frequently enough, it will contain more faeces.

The chance of sows being covered with faeces will increase if there are sows with liquid faeces/diarrhoea in the group. Thus, it could also indicate that there are sows with problems of the digestive system in the group.

Note that this parameter should not be confused with dirtiness: An outdoor pig soiled with mud does not necessarily indicate a welfare problem. This may be thermoregulatory behaviour (cooling off during hot weather) or a way to protect against external parasites.

Risk factors

- Unsuitable housing (not enough space to lie down, no clear functional zones, bedding material)
- The temperature is above the limit of the thermal comfort zone
- Sows with diarrhoea

Question – Skin lesions

Does the sow have:
- o Any skin wounds larger than 5cm (flank, legs)   Yes/No
- o At least 15 scratches on one side   Yes/No

Explanation

The presence of large skin wounds or scratches can be an indicator of aggression amongst the animals in the group, for example during feeding time. For the victims, the lesions can be painful and open wounds could get infected and form a serious health risk.

Skin wounds can also be a symptom of dermatitis, most often caused by *Staphylococcus* bacteria. Dermatitis is more likely to develop when the skin is already damaged, the humidity is high and the skin is covered in grease or faeces.

Risk factors
- - Social stress
- - Feeding competition
- - Unsuitable housing (too small, not enough space to avoid dominant group members)
- - Overstocking
- - Infections

Question – Skin irritation

Does the sow have any signs of skin irritation or parasites? Yes/No

Explanation

Skin irritation may be indicated by pigs scratching excessively on fittings. Signs of mange may include greyish/brownish scabs behind or in the ear, the lower limb and around the tail.

In addition, animals may be being irritated by flies or lice may be visible (typically on the udder and or perineum). The presence of parasites may indicate that the housing environment is not clean enough.

Risk factors
- - Hygiene
- - Insufficient parasite control

Question – Other lesions

Does the sow have:
- o Any ear lesions   Yes/No
- o Any tail lesions   Yes/No

Explanation

Ear- and tail lesions, which are usually caused by bites from another pig, can be painful and can also lead to infections, which form a health risk.

In addition, the presence of these lesions points to problems in the biter (stress, behavioural problems or feeding problems). Providing the animals with

enrichment could help to reduce behavioural problems by reducing boredom. One element of the feed that has been associated with biting is a mineral deficiency.

Risk factors
- Stress
- Not enough or unsuitable enrichment
- Feeding competition
- Composition of the feed (e.g. mineral deficiency)

Question – Other lesions

Does the sow have any signs of:
- Prolapse   Yes/No
- Abnormal vaginal discharge   Yes/No
- Vulva lesions   Yes/No

check at a distance of approximately 1 m

Explanation

Prolapses are protrusions of the organs such as the rectum, vagina, uterus and bladder. They can be caused by increased pressure during the pregnancy or labour. Prolapses are a risk for infections.

When sows are in heat, it is easier for bacteria to enter the uterus, because the cervix is weakened during this time. Abnormal vaginal discharge could indicate an infection.

Lesions of the vulva are usually caused by biting by group members, e.g. during feeding competition. The presence of these lesions points to problems in the biter (stress, behavioural problems or feeding problems).

Risk factors
Prolapse:
- Inflammation of the stomach or the gut
- Urinary infection
- Mycotoxins
- Vitamin deficiency
- Calcium deficiency
- Obstructed labour

Abnormal vaginal discharge:
- Hygiene while in heat/during artificial insemination
- Infections

Vulva lesions:
- Social stress
- Feeding competition
- Unsuitable/not enough enrichment
- Feed composition

Question – Lameness
Is the sow obviously lame? Yes/No
Explanation
"Obviously lame" is defined as clearly visible reduced weight bearing on one limb ("limping") up to the animal being unable to walk. Lame animals are in pain and will have difficulty reaching food and water. Lameness can also reduce the capacity for showing behaviours such as exploring or avoiding group members when there is a risk of aggression. Vitamins and minerals in the feed are an important factor. If the concentrations are too low, this could have a negative impact on bone strength and the skin quality.
Risk factors
- Unsuitable floor (slippery, too hard, damaged slats) - Insufficient amount of bedding material - Wet bedding material (slippery) - Inflamed joints - Feed composition (vitamin and/or mineral deficiencies)

Remarks

At the end of the assessment you will have the opportunity to add remarks. In this field, please record any additional information that might be relevant for the interpretation of the results of the assessment. This could be things such as a heat wave or a recent disease outbreak.

Farrowing sows

General

This section of the assessment should be completed in a location were you have access to data on the animals and the buildings.

If you have already completed an assessment in the past, you will see the previously introduced answers for some of these questions. You should check whether these answers are still correct and modify them if necessary.

The questions in this section mainly concern general information about the farm. This information is collected to get an idea of, for example, the size of your farm and the management practices that are applied, but will not be used to calculate any kind of score for your farm. If data have been collected from a large enough number of farms, this information could possibly be used (anonymously) to detect a relation between some of these factors and the behaviour or welfare of the animals. It could also be used to compare your farm more specifically to farms that are similar in size or that apply the same management practices.

The only exceptions are the questions concerning signs of sunburn and the accessibility of drinking water. The answers to these questions say something about animal behaviour or welfare.

Question – Signs of sunburn
Do you observe pigs with signs of sunburn at any point during the year? Y/N
Explanation
This occurs in white/light coloured pigs on the exposed body areas (back, ears, flank). Signs of sunburn are reddening, oedema and possibly scabs and peeling of the skin. Sunburn is very painful for the animals and is therefore a serious health risk. It will occur when the animal housing does not contain enough space with shade and the animals have no choice but to stay in the sun.
Risk factors
- Lack of areas in the shade

Question – Drinking water
Might some animals in this unit have difficulty accessing good quality drinking water at some point in time? Yes/No
Explanation
The animals could have trouble accessing drinking water for different reasons. A factor can be that there are not enough drinkers for the size of the group, but even more important is the flow rate. If this is too low, the animals need to drink for a very long time to drink enough water. Also important is the location of the drinkers. For example, if all drinking places are very close together or too close to the feeding place, the access to

some drinkers could be blocked by other sows that are eating or drinking and aggression could develop.

<table>
<tr><td>Risk factors</td></tr>
</table>

- Not enough drinkers, which could lead to competition
- The flow rate is too low (should be 1,5-2,2 L/min for pregnant sows)
- Drinkers are broken
- The drinkers are too close together or to the feeding place and cannot all be used at the same time without a risk of negative social interactions

Individual observations

For each observation, the individual sow as well as her piglets are observed.

<table>
<tr><td>Question – Thermal comfort</td></tr>
</table>

Is the sow
- Panting   Yes/No
- Shivering   Yes/No
- In lateral recumbency (during non-nursing time)   Yes/No

Explanation

Panting, shivering and lying in lateral recumbency are measures for thermal comfort.

If a large number of sows is panting or lying in lateral recumbence that could be an indication that they are too hot. A large number of shivering sows, on the other hand, could indicate that they are too cold.

Risk factors

- The temperature is above or below the limit of the thermal comfort zone
- Climate control/ventilation is not optimal
- Design of the free-range is not optimal (not enough shelter, lack of shade)
- Floor type (holds too much or not enough heat)

<table>
<tr><td>Question – Enrichment use</td></tr>
</table>

Is the sow currently using the enrichment?

Explanation

When answering this question, please take into account the types of enrichment that you selected earlier as answers to the question about the types of enrichment that are present indoors and outdoors.

Enrichment allows animals to express natural and species specific behaviour, which is very important for good animal welfare. If the enrichment is not used by many animals, this could indicate that the provided enrichment is not right for them.

Risk factors

- The enrichment that is provided is not species appropriate

- The enrichment has been present for too long and is not interesting anymore
- The enrichment is too dirty for the animals to use
- There is not enough enrichment for a group of this size

Question – Playful behaviour

Do you observe any playful behaviour in the piglets?

Explanation

There are different kinds of play behaviour. Locomotor play includes energetic movements such as twirling of the body, jumping, dropping to the floor and running. Social play is characterised by energetic interactions between two or more piglets, not including harmful fighting. Piglets can also play with objects by manipulating or holding it, shaking it energetically or carrying it around the pen.

Play behaviour in piglets is an expression of natural behaviour and it is important for the development of motor- and social skills that are important to cope with their environment as adults. Play behaviour also usually occurs when animals are in a relaxed state, meaning that a high frequency of play behaviour point to the absence of stress.

Risk factors
- Compromised health
- (Social) stress

Question – Laboured breathing

Does the sow display laboured breathing? Yes/No

Explanation

The sows should breath calmly. Laboured breathing (pumping) could indicate an infection of the respiratory system or that the climate in the environment is not optimal.

Risk factors
- Humidity (too high or too low)
- Insufficient ventilation
- Infection

Question – Frothy saliva

Does the sow have signs of frothy saliva? Yes/No

Explanation

Frothy saliva is an indicator that the sow is showing oral stereotypic behaviours, such as sham chewing. Stereotypic behaviours are a repetitive action with no clear goal.

Oral stereotypic behaviours can develop as a result of frustration or boredom. The composition of the feed and the way it is presented can be important factors for the development. Providing feed that needs to be thoroughly chewed and providing it in a way that takes more time to consume (for example spread out through the pen) could be beneficial. Once stereotypies have developed in a specific animal, the behaviour often does not disappear when the original cause is removed.

Risk factors
- Boredom (which can be a consequence of unsuitable enrichment)
- Stress
- Composition of the feed (not enough structure)
- Distribution of the feed (no need to forage, too easy to finish eating quickly, which leads to boredom)

Question – Bad general state

Is the sow in a bad general state (requiring further care)? Yes/No

Explanation

"Bad general state" is defined as animals which are obviously in pain, sick, in need of further care to avoid complications, dull or apathic (not bright, alert and responsive), isolated from the group (lying, standing, eating), with dull/sunken eyes, blue/red ears or snout, pale skin colour, rapid respiration, and animals with significant deformation or large hernia (bigger than the distance between the actual hernia and the floor).

These sows need to be assessed thoroughly and a veterinarian needs to be consulted if required. Proper care should be given.

Risk factors
- Illness
- Injuries
- Hygiene

Question – Body condition

Score the body condition of the sow
Scores: normal – too lean – too fat

Explanation

To determine the body condition of the sows, visually inspect the spine, hip and pin bones. If possible, also palpate these same places.

If the sow is too lean or too fat, this can be an indication of malnutrition. Either the sow eats too much or too little, or the concentration of different types of nutrients in the feed is not balanced.

A lack of exercise can lead to a sow becoming fat. This could occur, for example, if the sow is lame and walking is difficult or (almost) impossible.

Risk factors
- Composition of the feed
- Amount of feed/number of feeding moments per day
- Illness

- Lack of exercise (lameness)

Question – Shoulder lesions

Does the sow have any shoulder lesions? Yes/No

Explanation

Shoulder lesions often develop during the nursing period when the sows lie down a lot and lose a lot of weight. Sows that are too lean have an increased risk of developing shoulder lesions, most likely because fat has a protective effect. Open wounds can lead to infections. A softer floor to lie on can speed up the healing of shoulder lesions.

Risk factors
- Uncomfortable floor
- Losing too much weight during nursing

Question – Swelling of knee or hock region

Does the sow have any clear swelling at the knee or hock region? Yes/No

Explanation

Count any swelling that is at least as large as the diameter of the leg at the level of the swelling, or swelling with a wound.

Swelling is a sign of an inflammation, which could be either infectious or not.

Risk factors
- Unsuitable housing
- Uncomfortable floor (insufficient amount of bedding material, presence of wet bedding material)

Question – Covered with faeces

Is the sow covered with faeces/manure? Yes/No

Explanation

"Covered" is defined as having faeces/manure on at least 50% of the skin surface on one side of the body.

If there are many pigs covered in faeces, this is a sign of unsuitable housing. For example, there might not be enough space for a large percentage of the animals to lie down in the area that is meant for this, which could lead to animals choosing to lie down in the dunging zone. The temperature is also of influence. If the temperature is above the thermal comfort zone, the pigs will choose to lie further away from each other, which means they need more space. Additionally, a high temperature could lead to the pigs rolling through faeces in an attempt to cool off and lose internal heat. This is unhygienic and could lead to contamination with pathogens. Another important factor is the bedding material. If there is not enough of it or it is not changed frequently enough, it will contain more faeces.

The chance of sows being covered with faeces will increase if there are sows with liquid faeces/diarrhoea. Thus, it could also be an indicator of sows with problems of the digestive system.

Note that this parameter should not be confused with dirtiness: An outdoor pig soiled with mud does not necessarily indicate a welfare problem. This may be thermoregulatory behaviour (cooling off during hot weather) or a way to protect against external parasites.

Risk factors

- Unsuitable housing (not enough space to lie down, no clear functional zones, bedding material)
- The temperature is above the limit of the thermal comfort zone
- Sows with diarrhoea

Question – Skin lesions

Does the sow have:
- Any skin wounds larger than 5cm (flank, legs)   Yes/No
- At least 15 scratches on one side   Yes/No

Explanation

The presence of large skin wounds or scratches can be an indicator of aggression amongst the animals in the group, for example during feeding time. For the victims, the lesions can be painful and open wounds could get infected and form a serious health risk.

Skin wounds can also be a symptom of dermatitis, most often caused by *Staphylococcus* bacteria. Dermatitis is more likely to develop when the skin is already damaged, the humidity is high and the skin is covered in grease or faeces.

Risk factors

- Social stress
- Feeding competition
- Unsuitable housing (too small, not enough space to avoid dominant group members)
- Overstocking
- Infections

Question – Other lesions

Does the sow have:
- Any ear lesions   Yes/No
- Any tail lesions   Yes/No

Explanation

Ear- and tail lesions, which are usually caused by bites from another pig, can be painful and can also lead to infections, which form a health risk.

In addition, the presence of these lesions points to problems in the biter (stress, behavioural problems or feeding problems). Providing the animals with enrichment could help to reduce behavioural problems by reducing

boredom. One element of the feed that has been associated with biting is a mineral deficiency.

Risk factors
- Stress
- Not enough or unsuitable enrichment
- Feeding competition
- Composition of the feed (e.g. mineral deficiency)

Question – Skin irritation

Does the sow have any signs of skin irritation or parasites? Yes/No

Explanation
Skin irritation may be indicated by pigs scratching excessively on fittings. Signs of mange may include little red spots all over the body of the pig. In addition, animals may be being irritated by flies or lice may be visible (typically on the udder and or perineum). The presence of parasites may indicate that the housing environment is not clean enough.

Risk factors
- Hygiene
- Insufficient parasite control

Question – Other lesions

Does the sow have any signs of:
- o Prolapse   Yes/No
- o Abnormal vaginal discharge   Yes/No
- o Vulva lesions   Yes/No

check at a distance of approximately 1 m

Explanation
Prolapses are protrusions of the organs such as the rectum, vagina, uterus and bladder. They can be caused by increased pressure during the pregnancy or labour. Prolapses are a risk for infections.

When sows are in heat, it is easier for bacteria to enter the uterus, because the cervix is weakened during this time. Abnormal vaginal discharge could indicate an infection.

Lesions of the vulva are usually caused by biting by group members, e.g. during feeding competition. The presence of these lesions points to problems in the biter (stress, behavioural problems or feeding problems).

Risk factors
Prolapse:
- Inflammation of the stomach or the gut
- Urinary infection
- Mycotoxins
- Vitamin deficiency

- Calcium deficiency
- Obstructed labour

Abnormal vaginal discharge:
- Hygiene while in heat/during artificial insemination
- Infections

Vulva lesions:
- Social stress
- Feeding competition
- Unsuitable/not enough enrichment
- Feed composition

Question – Other lesions

Does the sow have any signs of:
- o Mastitis   Yes/No
- o Lesions on udder/teats   Yes/No

Explanation

If a sow has mastitis, an inflammation of the udder, the udder can be painful, red, warm and swollen. Often, the sow also shows general signs of illness, such as a fever and exhaustion. This is mostly seen in the 48 hours after farrowing. Milk release is reduced in sows with mastitis, which can lead to higher piglet mortality and a bigger difference in weight between the piglets.

Lesions of the udder and teats can also decrease the number of teats that is available to the piglets and therefore decrease milk availability. These lesions can be caused by competition with other sows.

Risk factors

Mastitis:
- Hygiene
- Insufficient amount of bedding material
- Wet bedding material
- Constipation
- Liquid faeces

Lesions on udder/teats:
- Feed composition
- Competition

Question – Lameness

Is the sow obviously lame? Yes/No

Explanation

"Obviously lame" is defined as clearly visible reduced weight bearing on one limb ("limping") up to the animal being unable to walk.
Lame animals are in pain and will have difficulty reaching food and water. Lameness can also reduce the capacity for showing behaviours such as exploring or avoiding group members when there is a risk of aggression.

Vitamins and minerals in the feed are an important factor. If the concentrations are too low, this could have a negative impact on bone strength and the skin quality.

Risk factors
- Unsuitable floor (slippery, too hard, damaged slats) - Insufficient amount of bedding material - Wet bedding material (slippery) - Inflamed joints - Feed composition (vitamin and/or mineral deficiencies)

Question – Piglets

How many piglets are observed?

Explanation
The total number of piglets that is included in the assessment is needed to calculate percentages of piglets based on the answers of other questions (e.g. the percentage of piglets that has skin lesions can be automatically calculated after counting the number of piglets with skin lesions).

Question – Thermal comfort of the piglets

Are the piglets:
- Huddling   Yes/No
- Shivering   Yes/No

Explanation
"Huddling" is defined as lying with more than half of the body in contact with another piglet (i.e. virtually lying on top of another piglet). It is not considered huddling when the piglets are lying next to each other during nursing. Answer "yes" when at least 20% of the piglets is huddling or shivering. Both huddling and shivering indicate that the piglets are too cold and trying to get warm.

Risk factors
- The temperature is below the limit of the thermal comfort zone - There is a draft at the level of the litter

Question – Breathing of the piglets

Are the piglets (at least 20%):
- Panting   Yes/No
- Pumping   Yes/No

Explanation
Panting can indicate that the piglets are too hot (as it is an indicator for thermal comfort). Laboured breathing / pumping is often a sign of a respiratory problem. Both indicators might be a sign that the climate and air quality are not optimal.

Risk factors
Panting: - The temperature is above the limit of the thermal comfort zone - Insufficient ventilation/climate control

- Design of the free-range is not optimal (not enough shelter, lack of shade)
- Floor type (holds too much heat)

Pumping:
- Humidity (too high or too low)
- Insufficient ventilation/climate control
- Infection

Question – Liquid faeces

Do you observe any signs of liquid faeces in the pen (on walls or floor)? Yes/No

Explanation

Liquid faeces are a sign of problems of the digestive system. Likely causes can be physical, such as an infection, or related to (social) stress.

Risk factors

- Diet
- General health condition
- Infections
- Hygiene
- Social stress

Question – Vitality

Count (using the + button) the number of piglets:
- That are non-vital, weak or sick   - 0 +

Explanation

Non-vital or weak piglets could be at health risk. Competition with litter mates over teats/milk could be a cause of this and piglets that are already weak will have even more trouble obtaining enough milk.

Risk factors

- Competition with littermates (not enough teats for a litter of this size)
- Infections

Question – Covered with faeces

Count (using the + button) the number of piglets:
- With faeces/manure on at least 50% of its skin   - 0 +

Explanation

"Covered" is defined as having faeces/manure on at least 50% of the skin surface on one side of the body. If there are many piglets covered in faeces, this is a sign of unsuitable housing. For example, there might not be enough space for a large percentage of the animals to lie down in the area that is meant for this, which could lead to animals choosing to lie down in the dunging zone. Another important factor is the bedding material. If there is not enough of it or it is not changed frequently enough, it will contain more faeces.

The chance of piglets being covered with faeces will increase if there are sows or piglets with liquid faeces/diarrhoea in the group. Thus, it could also indicate that there are animals with problems of the digestive system in the group.

Note that this parameter should not be confused with dirtiness: being soiled with mud (on a warm day) is normal, and does not necessarily indicate a welfare problem.

Risk factors
- Unsuitable housing (not enough space to lie down, no clear functional zones, bedding material) - Sows/piglets with diarrhoea

Question – Neurological disorders

Count (using the + button) the number of piglets with:
- ○ Signs of neurological disorders   - 0 +

Explanation
Typical signs of neurological disorders are muscle tremors, reduced coordination during locomotion or, in more severe cases, paddling of the limbs. Neurological disorders are more common in piglets that had a lower weight at birth. These symptoms can also be a consequence of infections that affect the brain.

Risk factors
- Low birth weight - Infections

Question – Splay legs

Count (using the + button) the number of piglets with:
- ○ Splay legs   - 0 +

Explanation
L'observation de splay leg se réfère à la paralysie partielle des pattes arrière, avec des membres en position écartée ce qui rend impossible pour les porcelets de se tenir debout. Il est très important pour la récupération des porcelets en splay legs qu'ils boivent assez de lait.

Risk factors
- Immaturity of the muscles and nerves in the hind legs - Low birth weight - Short gestation length - Diet of the sow (amino acid deficiency) - Slippery floors - Not enough milk

Question – Snout lesions

Count (using the + button) the number of piglets with:
- ○ Skin lesions at the snout   - 0 +

Explanation

Lesions of the snout are often caused by interaction with other piglets, such as during competition for teats.

They can also be a symptom of dermatitis, most often caused by *Staphylococcus* bacteria. Dermatitis is more likely to develop when the skin is already damaged, the humidity is high and the skin is covered in grease or faeces.

Risk factors
- Competition with littermates (not enough teats for a litter of this size)
- Infections (dermatitis)

Question – Front leg lesions

Count (using the + button) the number of piglets with:
- ○ Skin lesions at the front legs   - 0 +

Explanation
Lesions of the front legs are often sustained while lying on the floor during nursing if there is not enough milk and the piglets have to make more effort or drink for longer.

Risk factors
- Competition with littermates (not enough teats/milk for a litter of this size)

Question – Coughing and sneezing

Did you hear any coughing and/or sneezing in this group during this assessment?
- ○ Of the sow?   Yes/No
- ○ Of the piglets?   Yes/No

Explanation
Coughing and sneezing are indications of problems of the respiratory system, which could mean that the air quality in the environment is not optimal. Ventilation of the air could be an important factor, where too much ventilation could lead to too much cold air, but not enough ventilation could lead to a higher concentration of harmful particles in the air. Air that is too dry or too humid could also affect the airways.

Risk factors
- Air quality (too much or not enough ventilation)
- Humidity (too high or too low)
- Dust
- Infections

Remarks

At the end of the assessment you will have the opportunity to add remarks. In this field, please record any additional information that might be relevant for the

interpretation of the results of the assessment. This could be things such as a heat wave or a recent disease outbreak.

Results and feedback

To see the results of your assessment and receive automated feedback, upload your answers by clicking on the cloud icon. The answers can only be uploaded in a location with internet access. Before uploading your answers, please confirm whether your assessment is accurate and valid. If you select "no" , you will still receive your personal results, but your data will not be used for benchmarking.

After uploading the answers, you will receive a report in PDF format with your results by e-mail. The results are compiled by calculating percentages for many of the answers that you have given to all the questions. Each question is linked to a welfare principle, such as "good health" or "good housing". In the report, the answers of questions in the same category will be shown together to give a clearer overview of the types of aspects that you score well or less well on. If you have a low score for multiple questions in the same category, this means that improvements can be made to, for example, management practices or factors of housing related to that category that would lead to better animal welfare.

The e-mail with the report will contain a link to a more extensive version of the report on the PIGLOW website (www.piglow.eu). There you can consult all your reports and the risk factors for all welfare indicators (using your e-mail address and password of the PIGLOW app).

If you confirmed that you performed an accurate and valid assessment, you can see (under the header "reports") how your results compare to those of (anonymous) other farms. The comparison will be shown in the column "benchmarking". For each question for which benchmarking is possible, this column will contain "Pxx" where "xx" are two numbers indicating the percentage of farms that scored lower than yours. For example, P10 means that 10% of the farms have a lower score and 90% have a higher score. P70 means that 70% of the farms have a lower score and 30% have a higher score. Thus, the higher the number, the better you scored compared to other farms. However, a low percentile-score does not necessarily mean that your farm performs badly on that welfare indicator.

In addition, some indicators that are considered to be very important are also shown in a "welfare radar". In the welfare radar, all indicators are displayed on a scale of 0 to 100, where 0 is very bad and 100 is a perfect score. To this radar, you can add benchmark lines that indicate the values of the lowest scoring 10%, 50% and 90% of the farms. The closer your score comes to the outside of the radar compared to these lines, the higher you scored relative to other farms. Furthermore, you can compare the scores of your latest assessment to your own previous scores to see if your scores for any of the indicators have improved.

References

Afleidingsmateriaal voor ALLE varkens (Issue april). (2014).

Bracke, M. B. M. (2011). Review of wallowing in pigs: Description of the behaviour and its motivational basis. *Applied Animal Behaviour Science*, *132*(1–2), 1–13. https://doi.org/10.1016/j.applanim.2011.01.002

Compassion in World Farming. *GAP_Pig_Welfare_CIWF*.

Courboulay, V., Meunier-Salaün, M. C., Pol, F., & Stankowiak, M. (2019). BEEP : un outil à disposition des éleveurs pour objectiver le bien-être de leurs animaux. *Journées Recherche Porcine*, *1*, 37–42. https://pork.ahdb.org.uk/health-

De Backer, P. (2010). *Zakboek varkens*.

Decaluwé, R. (2011). Problemen met de melkgift bij zeugen. *Landbouw & Techniek*, *9*(may), 15–17.

Dippel, S., Kasperczyk, N., Leeb, C., Valros, A., de Roest, K., Spoolder, H., Gebska, M., & Butler, G. (2019). *SusPigSys: Standard operating procedure (SOP) for on-farm assessment Animal welfare Version 1.2019*.

Donaldson, T. M., Newberry, R. C., Špinka, M., & Cloutier, S. (2002). Effects of early play experience on play behaviour of piglets after weaning. *Applied Animal Behaviour Science*, *79*(3), 221–231. https://doi.org/10.1016/S0168-1591(02)00138-7

Elmore, M. R. P., Garner, J. P., Johnson, A. K., Richert, B. T., & Pajor, E. A. (2010). A flooring comparison: The impact of rubber mats on the health, behavior, and welfare of group-housed sows at breeding. *Applied Animal Behaviour Science*, *123*(1–2), 7–15. https://doi.org/10.1016/j.applanim.2009.11.012

Friedrich, L., Krieter, J., Kemper, N., & Czycholl, I. (2020). Frothy saliva—A novel indicator to assess stereotypies in sows? *Applied Animal Behaviour Science*, *222*(October 2019), 104897. https://doi.org/10.1016/j.applanim.2019.104897

Heo, J.-M., Kim, J.-C., Hansen, C. F., Mullan, B. P., Hampson, D. J., & Plusk, J. R. (2008). Effects of feeding low protein diets to piglets on plasma urea nitrogen, faecal ammonia nitrogen, the incidence of diarrhoea and performance after weaning. *Archives of Animal Nutrition*, 343–358.

Heo, J. M., Opapeju, F. O., Pluske, J. R., Kim, J. C., Hampson, D. J., & Nyachoti, C. M. (2013). Gastrointestinal health and function in weaned pigs: A review of feeding strategies to control post-weaning diarrhoea without using in-feed antimicrobial compounds. *Journal of Animal Physiology and Animal Nutrition*, *97*(2), 207–237. https://doi.org/10.1111/j.1439-0396.2012.01284.x

Hillmann, E., Mayer, C., Schön, P. C., Puppe, B., & Schrader, L. (2004). Vocalisation of domestic pigs (Sus scrofa domestica) as an indicator for their adaptation towards ambient temperatures. *Applied Animal Behaviour Science*, *89*(3–4), 195–206. https://doi.org/10.1016/j.applanim.2004.06.008

Holinger, M., Früh, B., Prunier, A., Edwards, S., Illman, G., Melisova, M., Leeb, C., & Rudolph, G. (2015). *ProPig: Improving health and welfare of pigs*.

ILVO and BoerenBond. (2019). *Dierenwelzijn scan, animal welfare self-assessment tool*. www.dierenwelzijnscan.be

Maddox-Hyttel, C., Langkjær, R. B., Enemark, H. L., & Vigre, H. (2006). Cryptosporidium and Giardia in different age groups of Danish cattle and pigs-Occurrence and management associated risk factors. *Veterinary Parasitology*, *141*(1–2), 48–59. https://doi.org/10.1016/j.vetpar.2006.04.032

Papatsiros, V., Athanasiou, L., Tzivara, A., Christodoulopoulos, G. Maragkakis, G., Tzika, E., & Tassis, P. (2012). Rectal Prolapse in Pregnant Sows due to Stall Housing. *Open Access Scientific Reports*, *1*(11), 1–5. https://doi.org/10.4172/scientificreports.5

Papatsiros, V. G. (2012). The splay leg syndrome in piglets: A review. *American Journal of Animal and Veterinary Sciences*, *7*(2), 80–83. https://doi.org/10.3844/ajavsp.2012.80.83

Pluym, L. M., Van Nuffel, A., Van Weyenberg, S., & Maes, D. (2013). Prevalence of lameness and claw lesions during different stages in the reproductive cycle of sows and the impact on reproduction results. *Animal*, *7*(7), 1174–1181. https://doi.org/10.1017/S1751731113000232

Schrader, L., Czycholl, I., Krieter, J., Leeb, C., Zapf, R., & Ziron, M. (2016a). *KTBL Tierschutzindikatoren : Leitfaden für die Praxis – Sauen*. *12617*.

Schrader, L., Czycholl, I., Krieter, J., Leeb, C., Zapf, R., & Ziron, M. (2016b). *KTBL Tierschutzindikatoren : Leitfaden für die Praxis – Saugferkel*. *12617*.

Schrader, L., Czycholl, I., Krieter, J., Leeb, C., Zapf, R., & Ziron, M. (2016c). *KTBL Tierschutzindikatoren : Leitfaden für die Praxis – Schwein Aufzuchtferkel und Mastschweine*. *51*(12617), 1–51.

Scott, K., Chennells, D. J., Campbell, F. M., Hunt, B., Armstrong, D., Taylor, L., Gill, B. P., & Edwards, S. A. (2006). The welfare of finishing pigs in two contrasting housing systems: Fully-slatted versus straw-bedded accommodation. *Livestock Science*, *103*(1–2), 104–115. https://doi.org/10.1016/j.livsci.2006.01.008

Service, N. A. D. I. (2019). *Greasy Pig Disease*.

Spoolder, H. A. M., Aarnink, A. A. J., Vermeer, H. M., van Riel, J., & Edwards, S. A. (2012). Effect of increasing temperature on space requirements of group housed finishing pigs. *Applied Animal Behaviour Science*, *138*(3–4), 229–239. https://doi.org/10.1016/j.applanim.2012.02.010

Supakorn, C., Stock, J. D., Hostetler, C., & Stalder, K. J. (2017). Prolapse Incidence in Swine Breeding Herds Is a Cause for Concern. *Open Journal of Veterinary Medicine*, *7*, 85–97. https://doi.org/10.4236/ojvm.2017.78009

Temple, D., Courboulay, V., Manteca, X., Velarde, A., & Dalmau, A. (2012). The welfare of growing pigs in five different production systems: Assessment of feeding and housing. *Animal*, *6*(4), 656–667. https://doi.org/10.1017/S1751731111001868

Turner, S. P., Nath, M., Horgan, G. W., & Edwards, S. A. (2013). Measuring chronic social tension in groups of growing pigs using inter-individual distances. *Applied Animal Behaviour Science*, *146*(1–4), 26–36. https://doi.org/10.1016/j.applanim.2013.03.012

Varkensloket. (2014). *Voeder- en drinkplaatsen*.

Vettenburg, N., Tylleman, A., Van den Bogaert, T., & Van Gansbeke, S. (2011). *Aandoeningen bij varkens*.

Watteyn, A. (2019a). *Handleiding Dierenwelzijnsscan - Biggenafdeling*.

Watteyn, A. (2019b). *Handleiding Dierenwelzijnsscan - Vleesvarkens*.

Watteyn, A. (2019c). *Handleiding Dierenwelzijnsscan - Zeugen*.

Welfare Quality®. (2009). Welfare Quality® assessment protocol for pigs (sows and piglets, growing and finishing pigs). *Welfare Quality® Consortium, Lelystad, Netherlands*, 1–123.

Zurbrigg, K. (2006). Sow shoulder lesions: Risk factors and treatment effects on an Ontario farm. *Journal of Animal Science*, *84*(9), 2509–2514. https://doi.org/10.2527/jas.2005-713