

1. Managing and updating methods for the assessment of the level of welfare of animals

INTRODUCTION

Background

Animals are more and more at the centre of ethical concerns. The Protocol on Protection and Welfare of Animals annexed to the EC Treaty in 1999 (the Treaty of Amsterdam amending the Treaty on European Union) represents a milestone for the development of the Community's animal welfare policy, highlighting the ethical dimension of this policy. This Protocol spells out the obligation to pay full regard to the welfare of animals as sentient beings when formulating and implementing the Community's policies. The legal recognition of animals as "sentient beings" has recently been reconfirmed by the Lisbon Treaty in 2007.

Farm animal welfare is now an important issue for ordinary people across Europe. Farming of animals is no longer viewed by European consumers simply as a means of food production. Instead, it is seen as fundamental to other key social goals such as food safety and quality, safeguarding environmental protection, sustainability, and enhancing the quality of life in rural areas (Gavinelli, Rhein & Ferrara, 2007) and there is clear demand for higher farm animal welfare standards (Eurobarometer, 2005; 2007; Kjaernes and Lavik, 2008).

Also farmers consider animal welfare an important aspect of animal husbandry (Bock, 2009) and they are very motivated to take good care of their animals. Farmers also realise that they are operating in a market where they have to take peoples' concerns about the welfare of farm animals into account. There is also a broadening recognition that conditions that compromise animal welfare can negatively affect production, damage specific quality aspects and jeopardise profitability (Jones, 1998).

Producers, retailers and other food supply chain actors also recognise that consumer concerns for good animal welfare represent a business opportunity that could be profitably incorporated in their commercial strategies (Roe and Buller, 2008). Animal welfare is increasingly used, particularly by retailers, as a component of product and supply chain differentiation (Eurogroup for Animals, 2007; Miele et al., 2005). In general, animal welfare is more and more used as an important attribute of an overall concept of 'food quality' (Blokhus et al. 1998; Buller et al., 2007).

The mounting interest in farm animal welfare is also reflected in a widespread demand for transparent information and provision of guarantees in relation to animal welfare across Europe. These involve visibility of production processes to all stakeholders (public, industry, government etc.) and a trustworthy way of quantifying how these processes affect animal welfare (Blokhus et al., 1998; Blokhus, 2009). To accommodate these demands and in line with the EU Commission's intention to adopt a more outcome based approach to animal welfare, scientists focused on animal / outcome based measures that reflect the actual welfare state of the animals in terms of their behaviour, fearfulness, health, physical condition etc. The fact that such measures are sensitive to variations in farm management and specific system-animal interactions make them particularly relevant. As stated in the European Commission's Action Plan for Animal Welfare 2006-2010 (European Commission 2006) efforts will be made to incorporate such specific measurable animal welfare indicators where available into existing and future Community legislation.

Harmonisation and recognition of science based animal welfare indicators and animal welfare assessment across the EU would greatly facilitate the marketing of these products (Gavinelli, Rhein & Ferrara, 2007).

A European Network of reference Centres for Animal Welfare

In January 2006 the European Commission adopted a Community Action Plan on the Protection and Welfare of Animals. The main objectives with the Action Plan were to provide greater coordination of existing resources while identifying future needs and to ensure a more consistent and coordinated approach to animal protection and welfare across Commission policy areas¹.

In the Action Plan the idea of a 'European Centre for the protection and welfare of animals' was put forward as an option to be considered. This suggestion was further elaborated upon in the communication on "Options for animal welfare labelling and the establishment of a European Network of Reference Centres for the protection and welfare of animals". In this communication the European Commission highlights the Welfare Quality® project and its work on animal based scientific indicators to assess animal welfare. The Commission points out that "a European network of reference centres [...] for the protection and welfare of animals could constitute a concrete option to provide technical support for the further development of the system"². The communication is based on an external study which includes an EU-wide stakeholder survey. The survey identifies three main problems that emphasise the need of a network of European animal welfare centres; the lack of harmonised animal welfare standards/indicators, the need for an independent source of information at EU level and the duplication of activities due to a lack of coordination at EU level. To this aim the European Commission envisages a reference centre which could serve as a coordination body for various animal welfare initiatives.

The European Parliament has also called for the establishment of a coordinated network for animal welfare with the tasks of providing the Commission, Member States, food chain actors and citizens with information and education, best practices and assessing animal welfare standards as well as "stating its views on future legislative and policy proposals and their impact on animal welfare"³.

At present there are a variety of different collaborations across the EU between research institutes and national centres working in the animal welfare field. However, in order to further support and develop initiatives in animal welfare and to support further implementation of a harmonised approach to animal based welfare assessment on a European level, the need of a more cohesive platform, a coordinating body, is apparent.

¹ Communication from the Commission to the European Parliament and Council on a Community Action Plan on the Protection and Welfare of Animals 2006-2010 (COM(2006) 13)

² Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Options for animal welfare labelling and the establishment of a European Network of Reference Centres for the protection and welfare of animals (COM(2009)0584), page 9

³ Report on evaluation and assessment of the Animal Welfare Action Plan 2006-2010 (2009/2202(INI))

The ENCAW-project

In response to European policy developments, the Swedish Centre for Animal Welfare (SCAW) has initiated the 'ENCAW-project'. The aim of the ENCAW-project is to support further European developments in this area by further defining and characterising the tasks, organisational structure and working processes of a European Network of Centres of excellence for Animal Welfare (ENCAW). The ambition is to provide a credible/realistic scenario for the establishment of such a European coordinated network for animal welfare.

As starting points for the ENCAW-project possible tasks of a European network in animal welfare were described as well as a preliminary organisation. These starting points were built on the available information including:

- Communication from the Commission to the European Parliament and Council on a Community Action Plan on the Protection and Welfare of Animals 2006-2010 (COM(2006) 13)
- Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Options for animal welfare labelling and the establishment of a European Network of Reference Centres for the protection and welfare of animals (COM(2009)0584)
- Feasibility study on animal welfare labelling and establishing a Community Reference Centre for Animal Protection and Welfare, Part 2: Community Reference Centre
- Report on evaluation and assessment of the Animal Welfare Action Plan 2006-2010 (2009/2202(INI))

Tasks envisaged in a future European Network of reference Centres for Animal Welfare can be summarised as follows:

- Indicators for animal welfare: To manage and update welfare assessment and information systems, support their implementation, inform and engage stakeholders, provide up to date assessment protocols, define conditions of use, certify training of assessors;
- Policy advice and best practices: Conduct socio-economic studies and impact assessments, provide policy advice to the EU, assess existing practices and policies;
- Education and communication: Advice and educate food chain actors (e.g. farmers, transporters, processors, abattoir personnel, assessors, food services, retailers, etc.) and consumers, explain the value of products produced with improved animal welfare standard to the general public, provide information about the measure procedures behind the indicators;
- Research: coordinate and support research on animal welfare issues, identify priorities for European strategic research investments.

Within the ENCAW-project a number of activities and pilot studies were carried out to further develop and define tasks and to gain relevant experience in related working processes. One such a pilot study focussed on how to manage and update methods for the assessment of the level of welfare of animals. The work carried out in this pilot is reported here.

The Pilot project ‘Managing and updating methods for the assessment of the level of welfare of animals’

In order to gain knowledge and experience on ENCAW’s tasks of managing and updating welfare assessment protocols and systems, including supporting practical implementation, providing up to date assessment protocols, conditions for use, certification of assessors etc. a pilot project within this area was initiated. The aim was to get first-hand experience and to provide valuable information of a foreseen task of ENCAW, while at the same time doing something of substantial value.

Correction of protocols

The work started with activities to correct the currently available Welfare Quality® (WQ) protocols for poultry, pigs and cattle (with a total of 7 different animal categories). This involved networking and connecting experts for the different animal categories. The networking was facilitated by the existence of the Welfare Quality Network which is a collaboration between former partners of the Welfare Quality® project.

A working group lead by Per Nielsen and consisting of 5 other experts on the protocols for different species, assigned by the WQNetwork General Assembly (GA) for upgrading all the protocols, had a physical meeting in Amsterdam where they thoroughly went through all protocols and addressed the obvious mistakes in the current protocols that needed to be corrected. To make the information ‘editable’ this also required the creation of new Word files from the existing PDF files. These Word files had to be corrected according to the printed versions of the protocols and due to format changes a substantial number of pictures, formulas and assessment tables had to be redone or adjusted. These Word files were then used by the experts to correct the mistakes. A new set of corrected versions were then created and transformed again in PDF format. These protocols have been placed on the Welfare Quality® Network (WQN) home page <http://www.welfarequalitynetwork.net> since September 2012 and are freely available from there.

Upgrading protocols

The WQ protocols should be seen as living documents that based on new knowledge from research projects and the experience of the people using the protocols should be upgraded and updated on a regular basis. Therefore the next task in this pilot concern the upgrading (e.g. changing definition of measures, add /exclude measures) of protocols and on the basis of that experience also define a ‘blueprint’ on the procedure for upgrading the protocols which can be used/followed in future upgrading exercises.

Three visits were made to different expert groups to discuss the cattle protocol with researchers working with the protocol and the first attempt to make a list of measures based on the comments from these researchers that needed to be addressed in the dairy protocol was completed. Based on these comments and expert opinions the working group, assigned by the WQNetwork GA, for upgrading all the protocols at the physical meeting in Amsterdam went through all protocols and address any current or new measures that need to be improved or replaced. The group also suggested members for six species groups, 3 people per species (six species in total), that have the main responsibility for working with the comments that could not be corrected without any further scientific discussions in the protocols corrected in 2012. The minutes from this meeting is attached as appendix 1.

The work in the 'species groups' was coordinated and supervised by Per Nielsen on the ground of a decision in the GA of the WQNetwork. The coordinator started a discussion on the Webtool of the WQNetwork between all species experts in the network to provide input on each discussion point and a meeting between each species group was initiated in June/July 2012, to discuss the Webtool comments. The groups wrote down pros and cons of each discussion, and a recommendation on a text for the protocol for each discussion point. The plan was to have the groups to work during the fall of 2012 by setting up Skype meetings to talk about the comments and to formulate a draft protocol by the end the year, for approval by the General Assembly. The aim was to have these protocols available around New Year. However due to other obligations the groups have not all finished their work.

Protocols getting ready for the final process

During the fall of 2013 several groups have had the time to work on the protocols and the status is (maybe refer to date or period. E.g. 'spring 2014'):

Pig group (both fattening and sows): The process is completed and the protocol is ready for an approval procedure in the Welfare Quality Network. The group has made some changes and suggestions and the presentation of the spline functions and the values used in the functions have been updated (Appendix 2).

Laying hens: The group has made a suggestion for the upgrade and the presentation of the spline functions and the values used in the functions will soon be updated.

Broiler group: The group has made arrangements for a final meeting on the 21st of March where they will finalize the work on the protocol. When the final version of the received upgraded protocol has been submitted the presentation of the spline functions and the values used in the functions will be updated.

Dairy group: The group is currently working on the upgrade and as soon as the final version of the received upgraded protocol has been submitted the presentation of the spline functions and the values used in the functions will be updated.

Beef group: The group has made a final suggestion for the upgrade and the presentation of the spline functions and the values used in the functions will soon be updated.

Veal group: The group has been working on the upgrade but is not done yet. As soon as the final version of the received upgraded protocol has been submitted the presentation of the spline functions and the values used in the functions will be updated.

The next step in the process is to prepare the upgraded protocols for the reviewing process as described below in the blue print. This work includes harmonising the design and updating the spline functions based on the comments from Isabelle Veissier. After this the protocols will be send out to the peer groups for review. The four protocols, pig, beef, broiler and laying hen, should be ready for approval at the next General Assembly in December 2014. In the meantime the groups that have not finished the first part of this process can continue their work.

Writing a blue print

An initial blue print has been produced at the first meeting in the upgrade group and this blue print will be finalized when the full procedure with upgrading the protocols has ended. The draft blue print now defines details that should be included in any proposal for a new or upgraded protocol. For example:

- A proposal should be presented to the MT. It should include the following (in accordance with the guidelines in the document 'General recommendations to reviewers of new and upgraded protocols', Appendix 3):
 - Measures should be described (and in case they replace existing measures it should be explained why new measure is better)
 - Their reliability and repeatability should be described
 - The validated needs to be backed up by scientific data
- The MT refers the documentation to two peer groups for review
- The Peer groups review and suggest improvements, which is taken up by the authors
- MT sends proposals and documentation to the General Assembly for final decisions
- After final approval the document is prepared for publication at the WQ Network public home page <http://www.welfarequalitynetwork.net>

Knowledge gained from this process

The most central obstacle for this process of upgrading the protocols has been the fact that most of the work performed in these groups has been performed on a more or less voluntary basis. This has resulted in a prolonged process since the researchers involved in this upgrade were mainly involved in their own ongoing research activities and often had a hard time in finding space in their schedule to work on the upgrade. On the other hand there have never been any complaints by the group members about what they committed themselves to do since there is a genuine interest amongst the researchers working with these protocols to actually get the protocols upgraded.

The organization and use of the webtool as an initial way of discussing problems within the protocol could have been an appropriate strategy for allowing all the members of the Welfare Quality Network to give comments and suggestions for what is needed to be addressed as well as suggestions for solutions. Unfortunately the webtool was not used as much as anticipated for the initial stage of this process. The reason for this might be that those people working on the upgrade were the same people that would have been commenting on the webtool and they might not have thought that it was important for them to have a discussion on the webtool before a physical meeting. So a suggestion for future upgrades would be to skip the webtool discussion and go directly to the upgrade process.

The working groups have on their own found a way of working that could fit all members of the group and there have been various physical and internet meetings within the groups. Since the people working with the upgrades are all busy with other tasks it has been a challenge for them to find dates to meet and this has also prolonged the process. However, one suggestion for future upgrades would be to assign one person as responsible for all the groups and have this person to work with arranging meeting, keeping notes and preparing the comments and suggestions from all groups.

Appendix 1

Meeting Upgrading Protocols working group

Schiphol, Amsterdam, 20 April 2012

Per Peetz Nielsen (chair), Antonio Velarde, Bjorn Forkman, Kees van Reenen, Thea van Niekerk, Hans Spoolder (notes)

Opening

There are four issues this WG wants to address:

1. Obvious mistakes in current protocols
 2. New measures or measures that need to be improved / replaced
 3. MCE and other aggregation aspects
 4. New protocols (horses, fur, transport – control posts work).
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1. Proposal: Have new revised protocols ready by July 1st, to get them out as PDF's. Not in print.
 2. Proposal: we think it is easier to have them as smaller documents, so split: Broilers, Layings, Sows & Piglets, Growers & Finishers, Dairy, Veal, Fattening cattle.
 3. Proposal: we need to put a NOTE in the front of the new protocols to say that you need to be retrained on some issues or measures.

Going through the protocols

Broilers

4. Everywhere where 'avoidance distance' is stated, it should be touch test.
5. The QBA score form is a laying hen form, not a broiler form. Please see Ingrid de Jong's report in which it has the improved one.
6. A five point scale is used at the abattoir for hock burns (5.1B.5), but this is impossible to do. Ingrid proposes a 'yes' vs 'no' scale, with a yes means more than 1 cm² (probably scores 2-5 in the current protocol. See Ingrid's report.
7. Breast blisters 5.1B.3.1: the pictures are incorrect. They are haemorrhages, or decolouration of the skin. The text should be changes and so should the pictures. Ingrid has pictures.
8. Figure 1.1, the spline is not correct. 5.2.1.1, Figure 5, absence of hunger. The Wageningen statisticians have made a new spline which should be added.
9. Criterium 6 Absence of injuries: a new Choquet integral has been calculated, as the original is not correct (5.2.1.6). The sub-criterion scores have to be changed based on the data provided in Ingrid's report. The problem is that experts gave the wrong.
10. Criterium 7 Absence of disease (5.2.1.7): there is a problem with using figures for culls, as these may not exist in some countries. You have to add them to total mortality. So Ingrid made a new calculation for a final score. This is analogues to what has happened in laying hens.
11. Criterium 7 Absence of disease (5.2.1.7): in the original you need a description of the causes for rejection, but in NL you only get total % of rejections, and calculated an MCE for that.
12. Foot pad dermatitis and hock burns are both scored at the abattoir and farm, so somewhere in the protocol it should state that the data from slaughter house are preferred.
13. If you have a covered veranda it is scored in the laying hen protocol, but it is missing in the broiler protocol.
14. The touch test is dominate in the outcome of the model, fast growing vs slow growing gives a lot of difference with slow growing flocks score low. This is a clear validity problem: birds which you can touch easy may be unable to walk properly! So the 'fearful' birds are really the most mobile one. Suggestion: a possible validation is by doing an active approach test counting the number of birds approaching you in a certain amount of time. But perhaps it needs more than that. It needs to be looked at because this measure has a large bearing on the final outcome.

ACTION: Hans to put Ingrid's report WQ broiler report on the WQN webtool.

ACTION: Thea will send more info by email to Per.

Pigs

15. Hospital pens are mentioned in the glossary, but we are not measuring anything there, as it was taken out. We think it should be included again in a next version.
16. Change all 'fattening pigs' to 'growing pigs'.
17. In chapter 'calculation of criterion scores' there is a rather complicated final instruction, in a bullet above 'Experts from animal sciences were consulted....' Check this with other protocols too, because it is not easy to understand and needs changing.
18. 5.1.3.1 Absence of injuries, lameness. We should change the text as 'resists' is understood in different ways by people. E.g. 'it puts minimum weight on the affected limb'?
19. 5.1.3.1 Absence of injuries. Wounds on the body is not consistent between sows and growing pigs (6.1.A5). We think we should put '2 cm' for scratches in both protocols. So copy the sow description to the growers.
20. Ruptures and hernias: please specify 'behaviour' into 'locomotion'.
21. Local infections: the text needs to be amended slightly. See proposal by Antonio in his protocol.
22. 5.1.4.4 QBA: there is a typing error that the observation time is not 10 minutes but 20 minutes. In the other protocols the number is also wrong.
23. In the maintext following Chapter 6: remove 'weaner'. Do this throughout the protocol.
24. 6.1A.1.2 Water supplies: on farms with liquid feeding the feeder is the drinker. We need to check the legislation on this, the feeder can be the drinker if the water is there all the time. But the cleanliness in liquid feeding system also needs to be discussed. Antonio to make a proposal on how to address this, and discuss this with the pig experts.
25. 6.1A.3.1 Tail biting: there is a three pint assessment score, but this is reduced to only to classifications (as 'a' and 'b' are summarised into 0). Our proposal is to delete a and b, and count c to calculate its percentage. This can be called '2' (or something else) and we feed it into the model.
26. 6.1A.3.1 Tail biting: as a discussion point we should address if old wounds are also as serious as fresh wounds. So should be added to the percentages.
27. 6.1A.3.2 Absence of diseases, scoring enteric disorders. Change the location as suggested by Antonio. For the classification: we cannot distinguish between small groups who have diarrhoea and between individuals.
28. 6.1A.4.1. Expression of social behaviours. We need to revisit the definitions given here. A species team will have to address this and make conclusions.
29. Please check the report for 'hours' and 'minutes' which in the glossary is 'h' and 'mins'.
30. 6.2.1.1 formula is wrong. Per to check with Isabelle.
31. 6.2.1.2 Table on drinkers needs to take the future discussion on liquid feeding into account.
32. 6.2.1.3 Again here it says '50' twice (both for larger & equal to; and smaller & equal to). All protocols should be checked for that.
33. 6.2.1.5 Ease of movement: it is not easy to identify the weight of the pigs (we now ask the farmer) but an experienced observer will probably estimate it by eye reasonably well.
34. 6.2.1.8 Why is there no maximum score to be reached (highest score is 97)? Discuss with Isabelle?
35. 6.2.1.12 the QBA index calculations have been changed by Isabelle. Please check these with her.
36. 6.3.3.1 the picture of the parts of the pig will be changed, so we have a picture of a carcass.
37. In the Guidelines of Annex A we should include the hospital pens.
38. The QBA lines in the Annex (page 95 in printed protocol) should be 125 mm, and a note should be made that if you copy and reduce (or increase) the size, you have to make sure the length is 125 mm. This applies to all protocols.
39. Protocol sheets should be consistent with the wording in the text.
40. Page 105: include an explanation somewhere about what a kennel is.
41. Discussion point: what are we going to do with the resource based measures forms?
42. Social and exploratory behaviour form, make consistent with table on Pregnant Sows: early Gestation. We will discuss in pig group.

ACTION: set up a discussion group on pigs, which will address: liquid feeding, tail biting, scouring / liquid manure, definition of negative and positive behaviour, how to calculate animal weights, castration and tail docking with anaesthesia, hospital pens, table of abnormal behaviour.

Beef cattle

43. 5.1.3.1 Good health. Loss of overgrown claws: they have been removed? Discussion point.
44. 5.1.3.3 Absence of pain. Discussion point: what about imported cattle which were dehorned on a different farm?
45. For prolonged absence of thirst, a graphic tree is used at 5.2.1.2 (p.49 of printed protocol), and you can only choose between clean and dirty drinkers, but you can also choose 'partly clean' at measure 5.1.1.2 Cleanliness of water points.
46. At 5.2.1.5 (p. 50) Ease of movement: for some farms the score will be below zero according to our calculations. This should be between 0 and 100. Ask Isabelle.
47. The book does not give an accurate definition of outdoor loafing area. This should be provided, preferably with a photograph.
48. 5.2.1.8 Absence of pain induced by management (p 55 printed version): the max score is 94. This should be 100.
49. 5.2.1.6 Absence of injuries (p 52 printed version): I_s should be I_i
50. Score for absence of injuries (p 53 printed): an example is given, but it is not explained how the scores for absence of injuries is calculated. It has to be checked if for beef cattle a user can calculate final scores, so the right & complete calculation has to be provided. If not, then we have to provide the necessary info.
51. Discussion point: method of assessing welfare levels: using an average, and not scoring the percentage of worse animals for example.
52. Discussion point: 5.2.1.10 Expression of other behaviours. How do you deal with the pasture history if animals come from different farms.

ACTION: we need to set up a species group for beef to discuss the discussion points.

Dairy cows

53. We have pictures of bulls in the dairy cow protocol.... (e.g. p 86 printed version).
54. Discussion: do we only look at lactating animals or should we take dry cows and heifers into account?
55. 6.1.3.2 Absence of disease, milk somatic cell count. What is the number of cows to be considered for estimating the SCC? Same for mortality and dystocia!
56. 6.1.3.3 Absence of pain induced by management. Only routine dehorning should be considered. The same for tail docking.
57. 6.2.1.2 Absence of prolonged thirst: what if 1 drinker is dirty and the rest are clean. Discussion point.
58. 6.2.1.4 Thermal comfort. Criterion is missing, so what do we do with the calculation of scores? How is this currently solved?
59. 6.2.1.5 Ease of movement. Discussion: should tethering be about the possibility to move, rather than the ease of movement? For ease of movement should we have a resource based measure such as slipperiness of the floor.

ACTION: we need to set up a species group for dairy to discuss the discussion points.

Veal calves

60. Discussion point: criterion 8 Absence of pain. Tail docking does not happen, and this point accounts for one third of the principle of Good Health (it's one of the three criteria)? Proposal is to remove it from the protocol of calves, just like the beak trimming for broilers. This is also removed.
61. Discussion point: liquid manure (same question as with pigs)
62. Discussion point: slipperiness of floors.

ACTION: we need to set up a species group for veal to discuss the discussion points.

ACTION: Kees will send the revised WQ protocol on veal to Per.

Laying hens

63. Discussion point: to what extent do we accept measures which are not validated or checked for repeatability etc. E.g. feeder space per birds does not reflect hunger at all. There are alternatives such as keel bone protrusions.
64. 6.1.1.2 Absence of prolonged thirst. If official assessment exist (by competent authorities), than we should use them. (see text suggestion Thea; this should be added to paragraphs 6.1.1.1; 6.1.1.2; 6.1.2.1; 6.1.2.3; 6.1.4.2 as indicated in text by Thea)
65. 6.1.2.1 Perches are positioned in a resting zone. These can either be put above slats or being aerial perches. We need definitions of perches and resting zones. Discussion point.
66. 6.1.2.1 Dust sheet test. A4 should be A6. All farms seems to score 1 out of 3. There's no validation on the test. Thea has pictures that we can use. But: should we use this test? Why is it different from the broiler instructions? Is this the right quantification, from 'a' to 'e'? Discussion.
67. For ease of movement 6.1.2.3 use the definition of stocking density calculation used in the EU directive 74/1999. (see text suggestion Thea)
68. 6.1.3.1 Keel bone deformation: minor deviations do not reflect fractures, so you can doubt the welfare problem. Discussion point.
69. Do we need a slaughter protocol for laying hens, to replace measures on farm? This would have several advantages including avoiding panic in the house, but also detailed data on disease. Discussion.
70. Discussion: should we develop a protocol for the earlier phases of the production? Or do we only score the laying farm? This relates e.g. at 6.1.3.1 Toe damage. Do we only refer to fresh wounds in that respect?
71. 6.1.3.2 Culls on farms: this data is not always available. Usually confounded with mortality on farms. Proposal: skip the culls on farm and include in total mortality. (see text suggestion Thea) In the MCE by WUR this was already put together.
72. Thea will send the report on WQ laying hens, including MCE's to Per.
73. 6.1.3.3 Beak trimming. Proposal: if you have a longer lower beak, it is always category 2. Also: replace middle picture of double beak trimmed bird by one with an uneven trimmed beak. Thea has pictures.
74. 6.1.4.1 Aggressive behaviour. Discussion point: this is too broad. We need better categories. Relate to plumage damage and comb pecking. Does it require separate areas of damage to be identified differently? They both fall in the same criterion but to advise the farmer it may be good to differentiate. This also means we have to redo the MCE and modelling.
75. 6.1.4.1 Plumage: we score a, b, c and go to 0, 1, 2... can we simplify? (see text suggestion Thea)
76. 6.1.4.1 Comb pecking pictures: it is difficult to see. We need an arrow to indicate the peck.
77. 6.1.4.2 Nest boxes: to what extent is this a welfare measures? Floor eggs are not mentioned. Should they be in there? Or is that not a welfare concern? Discussion. What measure do we use for nesting behaviour?
78. 6.1.4.2 The use of litter: proposal for a change in text is done by Thea and sent to Per.
79. Discussion point: the relevance of free range availability. How do we make a welfare score out of this, given the repeatability problems?
80. 6.1.4.3 Avoidance distance: for cage systems Thea will check if it is described correctly. (see text suggestion Thea) Discuss the validation.
81. 6.1.4.4 Novel object test. Proposal: put the novel object on top of the feeder. Discuss if the test says the same across different systems.
82. 6.1.4.4 QBA: 10 minutes or 20 minutes? Make this precise (or not): $7 \times 3 = 21!$
83. Annex A. Somewhere it should say that you should only use flocks of 50 weeks of age. Moulded flocks should be monitored at least 10 weeks after moulting. (see text suggestion Thea)
84. Thea provided an example Table 25. See her text.

Next steps

Proposals to the MT regarding discussion points on amendments to measures:

85. Add and change all the straightforward things in a new protocol. Ignore all the discussion points. This will make it available to everyone. Per will do that.
86. We will start a discussion on the Webtool between all species experts in the WQN to provide input on each discussion point. One 'discussion' on the tool per 'discussion point'. This is finished by end of May. Then we will set up a meeting between a small committee of 3 species people per species, to discuss the Webtool comments in June. They will write down pros and cons of each discussion, and then a recommendation on a text for the protocol for each discussion point in June. This is fed back to the WQN via the Webtool for final approval or disapproval by the end of August. In September the small species groups Skype to talk about the comments on their recommendations and they formulate a draft protocol by the end September, for approval by the MT. The MCE's and other aspects to do with statistics and aggregation of scores require a specialised group, and the MT should set this up.
 - a. Beef: Madeleine Kirchner, Eva Mainau, Xavier Boivin
 - b. Dairy: Luc Mirabito, Suzanne Waiblinger, ??? PER WILL ASK CHRISTOPH
 - c. Veal: Joop Lenssink, Kees van Reenen, Giulio Cozzi
 - d. Sows & growing pigs: Antonio Velarde, Herman Herman, Valerie Courboulay (reserve: Siobhan Mullan)
 - e. Broilers: Ingrid de Jong, Andy Butterworth, Frank Tuytens
 - f. Laying hens: Ute Knierim, Thea van Niekerk, Bjorn Forkman
 - g. Aggregation: ask MT for names.

Proposal for inclusion of new protocols (horses, mice and fur animals)

87. A proposal should be presented to the MT. It should include
 - a. Measures should be described
 - b. Their reliability and repeatability should be described
 - c. The validated needs to be backed up by scientific data
88. The MT refers the documentation to two peer groups for review.
89. The Peer groups review and suggest improvements, which is taken up by the authors.
90. MT finally decides on approval.

It was agreed that all points discussed and noted during the meeting should be proposed to the MT, and if they agree, the activities can start.

Close

Per closed the meeting by thanking us for our input, and he wished us all a safe journey home.

Appendix 2

Suggested changes in the pig protocol



Welfare Quality[®] Assessment Pprotocol for Ppigs

Version 2.1 (2013)

Comment [EMB1]: As this is the first comment, just to clarify that EMB, WU and PR are comments from Eva Mainau, Déborah Temple, Antoni Dalmau and Antonio Velarde.. Comments by Isabelle and Valerie also were included. In this case, we think the correction is not correct because the entire title of the protocol is Welfare Quality[®] assessment protocol for pigs. So, if assessment is going with A, protocol I going with P and pigs also with P.

Acknowledgement

"The present document originates from the Welfare Quality® research project which has been co-financed by the European Commission, within the 6th Framework Programme, contract No. FOOD-CT-2004-506508.

The text represents the authors' views and does not necessarily represent a position of the Commission who will not be liable for the use made of such information".

Comment [EMB2]: We think you don't have the last version, as there are changes applied in the NEN document and in the printed version that are not here, such as this one you mention or the existence of the word fattening pigs (p.24) in the document that we eliminated from the last versions we worked with NEN.

Disclaimer

Restrictions on use of the integrated Welfare Quality® system

This document presents the practical assessment protocols required to carry out a Welfare Quality® assessment. The practical application and integrity of this system depends upon the following;

- **Training and validation** in the methods and protocols is **essential**.
- Ownership or possession of these assessment documents alone does not indicate capacity to carry out assessment without adequate approved training.
- No individual or organisation can be considered capable of applying these methods in a robust, repeatable, and valid way without attending harmonised training approved by the Welfare Quality® consortium.
- The strength of the integrated approach lies in the use of the entire assessment method. Use of isolated elements of the Welfare Quality® system will not be considered as appropriate for assessing animal welfare.
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This document presents version 24 of the assessment protocol for pigs. October 1st, 2009

Comment [PPN3]: Change when ready

Foreword

The European Welfare Quality® project developed standardized ways of assessing animal welfare and a standardized way of integrating this information to enable farms and slaughterhouses to be assigned to one of four categories (from poor through to good animal welfare).

One of the innovations of the Welfare Quality® animal welfare assessment system is that it focuses more on animal-based measures (e.g. directly related to animal body condition, health aspects, injuries, behaviour, etc.). Existing approaches largely concentrate on design or management-based characteristics (e.g. size of cage or pen, flooring specifications etc.). Of course, this does not mean that resource-based or management-based factors are ignored in Welfare Quality®; and many of these are important features of the system. A particular attraction of using animal-based measures is that they show the 'outcome' of the interaction between the animal and its environment (housing design and management) and this combined outcome is assessed by the Welfare Quality® assessment system.

This protocol provides a description of the Welfare Quality® assessment procedure for pigs.

Within the Welfare Quality® project, the assessment protocols have been developed through the collaboration of a large number of research groups and institutes. A list of the contributors to Welfare Quality® can be found in Annex C. Special thanks are due to Bosse Algers, Marc Bracke, Raphaëlle Botreau, Valérie Courboulay, Helena Chaloupková, Rick D'Eath, Emma Fàbrega, Björn Forkman, Rony Geers, Nicoline Geverink, Marina Gispert, Jonathan Guy, Veerle Hautekiet, Gudrun Illmann, Veerle Lammens, Petra Lenskens, Michel Meuleman, Marie Christine Meunier-Salaün, Finn Millard, Petra Námestková, Kristyna Neuhauserová, Lotta Nordensten, Annelies van Nuffel, Kees van Reenen, Marek Spinka, Hans Spoolder, Liesbet van Steenberghe, Déborah Temple, Simon Turner, Frank Tuytens, Herman Vermeer, Kristel Vermeulen and Françoise Wemelsfelder for their work in the development of the final protocols.

This report has been edited by Antoni Dalmau and Antonio Velarde (Institut de Recerca Tecnologia Agroalimentàries, Girona), Kamara Scott and Sandra Edwards (University of Newcastle upon Tyne, Newcastle upon Tyne) for the species specific parts. Furthermore Isabelle Veissier (Institut National de la Recherche Agronomique, Paris) and Linda Keeling (Sveriges Lantbruksuniversitet, Uppsala) edited the general parts of the document, and the English edit was carried out by Andy Butterworth (University of Bristol). Isabelle Veissier also contributed to the development of the calculation systems. Gwen van Overbeke and Vere Bedaux (NEN, Netherlands Standardization Institute) supported the writing and editing of the protocol.

This protocol has been updated by Eva Mainau, Antoni Dalmau and Antonio Velarde (Institut de Recerca Tecnologia Agroalimentàries, Girona), Valerie Courboulay (FIP - The French Pork and Pig Institute) and Herman Vermeen (Wageningen U) and organized by Per Peetz Nielsen (Sveriges Lantbruksuniversitet, Uppsala).

Comment [PPN4]: New text for this update

The Welfare Quality® protocols reflect the present scientific status of the Welfare Quality® project, but will undergo an on-going process of updating and revision since these protocols are considered 'living documents'.

Prof Dr Harry J. Blokhuis (Coordinator Welfare Quality®)
Uppsala, October 2009

Please use the following citation when referring to this document:

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Table of content

- INTRODUCTION 5**
- 1. SCOPE 8**
- 2. LEGAL ASPECTS 9**
- 3. TERMS AND DEFINITIONS 10**
- 4. BACKGROUND WELFARE QUALITY® PROTOCOLS..... 12**
 - 4.1 OVERALL STRUCTURE OF THE PROJECT..... 12**
 - 4.2 BASIC PRINCIPLES 13**
 - 4.2.1 *Introduction* 13
 - 4.2.2 *Defining welfare principles and criteria* 13
 - 4.2.3 *Measures developed to check criteria* 14
 - 4.2.4 *Calculation of scores*..... 15
- 5. WELFARE QUALITY® APPLIED TO SOWS AND PIGLETS 20**
 - 5.1 COLLECTION OF DATA FOR SOWS AND PIGLETS ON FARM 20**
 - 5.1.1 *Good feeding* 21
 - 5.1.2 *Good housing*..... 22
 - 5.1.3 *Good health* 24
 - 5.1.4 *Appropriate behaviour* 32
 - 5.1.5 *Sampling and practical information*..... 37
 - 5.2 CALCULATION OF SCORES FOR SOWS AND PIGLETS ON FARM 39**
 - 5.3 COLLECTION OF DATA FOR SOWS AND PIGLETS AT SLAUGHTERHOUSE 39**
 - 5.4 CALCULATION OF SCORES FOR SOWS AND PIGLETS AT SLAUGHTERHOUSE..... 39**
- 6. WELFARE QUALITY® APPLIED TO GROWING PIGS AND FINISHING PIGS 40**
 - 6.1A COLLECTION OF DATA FOR GROWING PIGS ON FARM (MEASURED ON FARM)..... 40**
 - 6.1A.1 *Good feeding* 41
 - 6.1A.2 *Good housing* 42
 - 6.1A.3 *Good health* 44
 - 6.1A.4 *Appropriate behaviour* 51
 - 6.1A.5 *Sampling and practical information* 54
 - 6.1B COLLECTION OF DATA FOR GROWING PIGS ON FARM (MEASURED AT THE SLAUGHTERHOUSE). 56**
 - 6.1B.1 *Good feeding* 56
 - 6.1B.2 *Good housing* 57
 - 6.1B.3 *Good health* 57
 - 6.1B.4 *Appropriate behaviour* 58
 - 6.1B.5 *Sampling and practical information* 59
 - 6.2 CALCULATION OF SCORES FOR GROWING PIGS ON FARM 59**
 - 6.2.1 *Criterion-scores*..... 59
 - 6.2.2 *Principle-scores* 75
 - 6.2.3 *Overall assessment* 78
 - 6.3 COLLECTION OF DATA FOR FINISHING PIGS AT SLAUGHTERHOUSE..... 78**
 - 6.3.1 *Good feeding* 78
 - 6.3.2 *Good housing*..... 79
 - 6.3.3 *Good health* 82
 - 6.3.4 *Appropriate behaviour* 86
 - 6.3.5 *Sampling and practical information*..... 88
 - 6.4 CALCULATION OF SCORES FOR FINISHING PIGS AT SLAUGHTERHOUSE 89**
- ANNEX A: GUIDELINE FOR VISIT OF ANIMAL UNIT 90**
- ANNEX B: RECORDING SHEETS (RS) 91**

B1. RS FOR SOWS, GROWING PIGS AND PIGLETS ON FARM.....	91
B2. RS FOR FINISHING PIGS AT SLAUGHTERHOUSE	110
ANNEX C: CONTRIBUTORS TO WELFARE QUALITY®	120
COLOPHON	122

Introduction

Animal welfare is an important attribute of an overall 'food quality concept' and consumers expect their animal-related products, especially food, to be produced with respect for the welfare of animals. Recent surveys carried out by the European Commission¹ as well as studies within the Welfare Quality[®] project², confirm that animal welfare is an issue of considerable significance for European consumers and that European citizens show a strong commitment to animal welfare. In order to accommodate societal concerns about the welfare quality of animal food products as well as related market demands, e.g. welfare as a constituent aspect of product quality, there is a pressing need for reliable science based systems for assessing the animals' welfare status³.

In January 2006 the European Commission adopted a Community Action Plan on the Protection and Welfare of Animals⁴. The Action Plan outlines the Commission's planned initiatives and measures to improve the protection and welfare of animals for the period 2006-2010. The Action Plan aims to ensure that animal welfare is addressed in the most effective manner possible, in all EU sectors and through EU relations with Third Countries. Among other things, the Action Plan foresees a classification system for animal welfare practices, to differentiate between systems where minimum standards are applied, and cases where even higher standards are used. It also foresees setting up standardised indicators whereby production systems which apply higher animal welfare standards than the minimum standards get due recognition. The option of an EU label for animal welfare is also put forward, to promote products obtained in line with certain animal welfare standards.

Consumers' concern and the apparent demand for information on animal welfare was the starting point of the Welfare Quality[®] project, funded from the European Commission within the 6th EU programme. The project started in 2004 and became the largest piece of integrated research work yet carried out in animal welfare in Europe. The Welfare Quality[®] project is a partnership of 40 institutions in Europe and, since 2006, four in Latin America. The partners are based in 13 European and four Latin American countries.

The Welfare Quality[®] project set out to develop scientifically based tools to assess animal welfare. The acquired data provide feedback to animal unit managers about the welfare status of their animals, and can be translated into accessible and understandable information on the welfare status of food producing animals for consumers and others. Welfare Quality[®] also generates knowledge on practical strategies to improve animal welfare on farm and at slaughter.

In a truly integrated effort Welfare Quality[®] combined analyses of consumer perceptions and attitudes with existing knowledge from animal welfare science and thereby identified 12 criteria that should be adequately covered in the assessment systems. To address these areas of concern, it was decided to concentrate on so-called animal-based measures that address aspects of the actual welfare state of the animals in terms of, for instance, their behaviour, fearfulness, health or physical condition. Such animal-based measures include the effects of variations in the way the farming system is managed (role of the farmer) as well as specific system-animal interactions. However, it is clear that resource and management-based measures can contribute

¹ European Commission (2005). Attitudes of consumers towards the welfare of farmed animals. Eurobarometer, Brussels. 138 pp.

European Commission (2006). Communication from the Commission to the European Parliament and the Council on a Community Action Plan on the Protection and Welfare of Animals 2006-2010, COM (2006) 13 final, Brussels.

European Commission (2007). Attitudes of EU citizens towards Animal Welfare. Eurobarometer, Brussels. 82 pp.

² Kjaernes, U., Roe, E. & Bock, B. (2007). Societal concerns on farm animal welfare. In: I. Veissier, B. Forkman and B. Jones (Eds), Assuring animal welfare: from societal concerns to implementation (pp. 13-18). Second Welfare Quality stakeholder conference, 3-4 May 2007, Berlin, Germany.

³ Blokhuis, H.J., Jones, R.B., Geers, R., Miele, M. & Veissier, I. (2003). Measuring and monitoring animal welfare: transparency in the food product quality chain. *Animal Welfare*, 12, 445-455.

⁴ European Commission (2006). Communication from the commission to the European Parliament and the Council on a community action plan on the protection and welfare of animals 2006e2010, COM (2006) 13 final, Brussels.

to a welfare assessment if they are closely correlated to animal-based measures. Moreover, resource and management-based measures can also be used to identify risks to animal welfare and identify causes of poor welfare so that improvement strategies can be implemented.

Following a common approach across animal species, an integrated, standardized and, wherever possible, animal-based methodology for assessment of animal welfare was then developed. The chosen animal species, based on their economic and numeric importance, are pigs, poultry and cattle. In addition, the focus has been on the production period of the animals' life (i.e. on farm/transport/slaughter).

The present protocol describes the procedures and requirements for the assessment of welfare in pigs and is restricted to the key production animals, which are sows, piglets, and growing-finishing pigs. The document presents the collection of data for sows and piglets, procedures for the collection of data for growing pigs on farm and subsequently the procedures for the collection of finishing pig data at the slaughterhouse. With regard to the latter two, a paragraph describing the method for calculating scores is presented.

Glossary

cm	Centimetre(s)
(C-)m ²	Square (centi-)metre
e.g.	<i>exempli gratia</i> : for example
h	Hour(s)
HAR	Human-animal relationship
HPV	High pitched vocalizations (i.e. squeal/scream)
i.e.	<i>idest</i> : that is
Kg	Kilogram(s)
Min	Minute(s)
mm	Millimeters
no.	Numbers
QBA	Qualitative behaviour assessment
RS	Recording sheet
s	Second(s)
VAS	Visual analogue scale

Formatted: English (U.K.)

1 Scope

This pig protocol deals with measures related to the welfare assessment of sows, piglets growing and finishing pigs. The descriptions are intentionally kept as short as is possible and for training purposes more detailed descriptions of the measures are recommended. The information gathered covers the three major periods distinguished: the rearing period, the production period (finishing animals and sows) and the end of life of the animal, where it will be transported and slaughtered (see Figure 1).

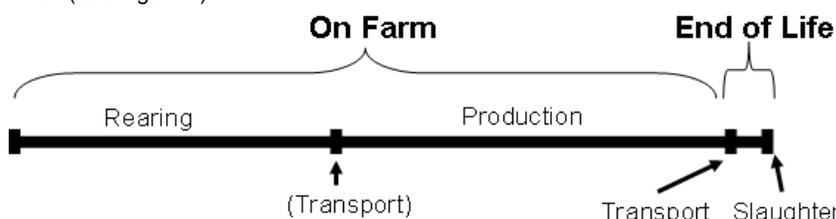


Figure 1 Schematic reproduction of the different periods in the life of production animals. These are not necessarily all covered in the protocol.

Some specific periods are not yet included in the protocols for some categories of animals:

- Transport between farms, as sometimes occurs between the rearing and production periods, is not considered;
- No data are collected during the time the animals are transported, although some measures taken at the slaughterhouse indirectly allow assessment of the welfare of finishing pigs during transport;

This is also shown in Table 1.

	Rearing	Producing	End of life
Sows and piglets	Piglets	Sows	
Growing and finishing pigs			

Included in pigs protocol Not included in pigs protocol

Table 1 Reproduction of the periods in the life of the animals which are considered in the Welfare Quality® protocols

The protocols for pigs are applicable in a wide range of animal units, be they extensive or intensive. However, there are some measures which cannot be taken on sows that are housed in stalls. This housing system is not common anymore and will be banned from 1 January 2013 on for the major part of the pregnancy period or the full pregnancy period.

When visiting a farm for professional assessment purposes, it may be appropriate to collect additional information. Such information may be useful for management support or advice for the farmer. This advisory support role must be separated from the inspection role as, in general, assessors must not involve themselves in giving prescriptive advice to clients. If additional information is collected, this may contribute to improve efficiency in the long term, by reducing the total number of visits to particular farms. However, since this document deals with the assessment system, only questions necessary for the assessment process are included. It is proposed that any additional questions aimed at advisory support are best developed independently by the advisory or management support services in each country.

2 Legal aspects

The Welfare Quality[®] protocols should only be applied to farming systems which operate within the applicable legal framework of the country. The Welfare Quality[®] protocols do not replace or supersede any existing farm assurance or legal standards. They provide an additional tool for the assessment of animal welfare using predominantly animal-based measures and as such can add valuable additional information to existing inspection programs.

The individual animal unit manager has responsibility to operate within legal requirements. It is not considered feasible or desirable to list all legal statutes relevant to animal and farm operation in Europe within this document. For those reasons, a list of current normative legal texts is not provided for within the Welfare Quality[®] protocols.

However, the current key legislative framework can be found at the webpage of EUR-lex, where the relevant treaties, legislation, case-law and legislative proposals can be consulted. If the application or interpretation of any element of this standard conflicts with legislation, current acting legislation always has priority.

3 Terms and definitions

Advisor

Person who uses the outcome of the Welfare Quality® protocols and other information to advise the animal unit manager on how to improve welfare

NOTE This is distinct from the assessor

Animal unit

Section of a farm, a transport unit or a slaughter plant that deals with a certain type of animal

NOTE An animal unit can, for example, be the section of a farm where all adult animals are kept or the section of a slaughter plant where all animals are handled and slaughtered

Animal unit manager

Person responsible for an animal unit

NOTE This can be the manager on the farm, the driver of the transport vehicle or the slaughter plant manager (or person responsible for animal care)

Animal-based measure

Measure that is taken directly from the animal

NOTE Animal-based measures can include, for instance, behavioural and clinical observations

Assessment protocol

An assessment protocol is a description of the procedures and requirements for the overall assessment of welfare

Assessor

Person in charge of collecting data using the Welfare Quality® protocols on an animal unit in order that the welfare of animals is assessed

Finishing pig (*Sus scrofa domestica*)

Former growing pig~~s~~ at the slaughterhouse, ready to be slaughtered

NOTE The weight of a finishing pig is 90 – 120kg, but locally up to 150kg

Growing pig (*Sus scrofa domestica*)

Pig raised with the purpose of meat production or reproduction, from ~~10 weeks old (weaning age)~~ ~~(25 kg)~~ until it is ready for slaughter

NOTE This includes post-weaning pigs

Hospital pen

One specific pen on the farm used for injured or sick animals

NOTE It must be empty or with lower densities than the rest of pens on the farm

Management-based measure

Measure which refers to what the animal unit manager does on the animal unit and what management processes are used

NOTE Management-based measures contain, for instance, the procedures used to protect animals from disease, pain or suffering, including for example use of anaesthetics during surgical procedures

Overall assessment of welfare

Synthesis of welfare information, which will then be used to allocate an animal unit to a welfare category

NOTE The overall assessment of welfare reflects the overall welfare state of the animals

Piglet (*Sus scrofa domestica*)

Pig from birth until weaning

Resource-based measure

Measure that is taken regarding the environment in which the animals are kept
NOTE Resource-based measures contain for instance the number of available drinkers

Sow (*Sus scrofa domestica*)

Female pig, either lactating or pregnant, from the first ~~gestation~~-insemination on and kept with the purpose of reproduction

Comment [HV5]: If we mention first "insemination" it's clearer when the first pregnancy starts. Otherwise one could start at "proven pregnancy", leaving the first 3-4 week out.

Transport unit

The transportation truck, lorry, module, etc. which is considered as part of an animal unit for assessment purposes

~~Weaner~~Growing pig (*Sus scrofa domestica*)

A young pig from the time of weaning from its mother to 10 weeks at which time (plus or minus 2 weeks) pigs are commonly moved to a different accommodation

NOTE In the commonest breeds of pigs this weight range is 5 - 350kg

Comment [HV6]: Better to mention 30 kg, because that's a limit in the EU Welfare regulations

Welfare category

Final categorization given to an animal unit that indicates the overall welfare of animals in that particular unit

NOTE This is expressed on a 4 level scale: not classified, acceptable, enhanced, and excellent

Welfare criterion

Represents a specific area of welfare concern that has to be addressed to satisfy good animal welfare

NOTE An example of a welfare criterion is "absence of prolonged hunger"

Welfare measure

Measure taken on an animal unit that is used to assess a welfare criterion

NOTE A measure can be animal-based, resource-based or management-based

Welfare principle

Collection of criteria associated with one of the following four areas: feeding, housing, health and behaviour

Welfare Quality® protocol

Description of the measures that will be used to calculate the overall assessment of welfare. The protocols also specify how the data will be collected

Welfare score

Score that indicates how well an animal unit fulfils a criterion or principle

4 Background Welfare Quality® protocols

This chapter outlines the principles and overall structure of the Welfare Quality®-protocols and how they are to be used in the overall assessment of animal welfare.

4.1 Overall structure of the project

Welfare Quality® has developed a system to enable overall assessment of welfare and the standardised conversion of welfare measures into summary information.

The welfare assessment related to a specific animal unit is based on the calculation of welfare scores from the information collected on that unit. An advisor can use the welfare assessment to highlight points requiring the animal unit manager's attention. The information can also be used to inform consumers about the welfare status of animal products or the welfare quality of the supply chain.

The species protocols contain all the measures relevant for the species and an explanation of what data should be collected, and in what way.

The species protocols address animals at different stages of their lives and/or in various housing systems. It can cover the rearing, the production, or the end of life of the animal, which includes transport and slaughter (Figure 2). At the moment there are no measures that are carried out during the actual transport process, but some effects of transport on welfare can be determined by examining the finishing pigs on arrival at the slaughterhouse. Transport measures may be added in the future.

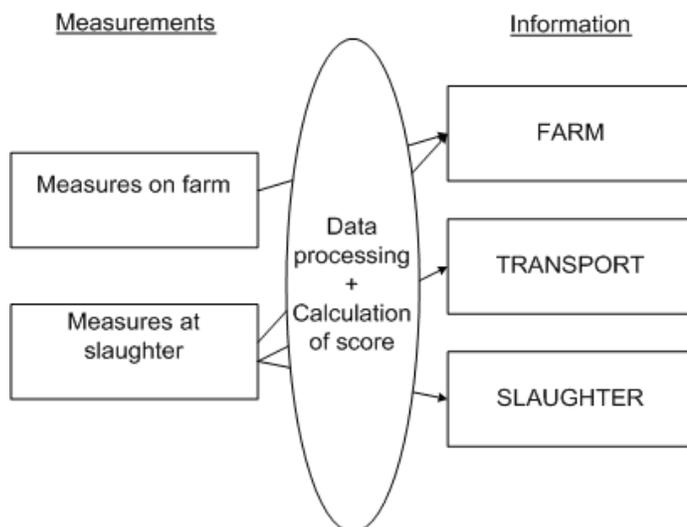


Figure 2 The different sources of information in Welfare Quality®. It is outside the scope of this document, but potential use of the output generated includes information provided to consumers, advisors and retailers.

4.2 Basic principles

4.2.1 Introduction

Welfare is a multidimensional concept. It comprises both physical and mental health and includes several aspects such as physical comfort, absence of hunger and disease, possibilities to perform motivated behaviour, etc. The importance attributed to different aspects of animal welfare may vary between different people.

The different measurable aspects of welfare to be covered are turned into welfare criteria. The criteria reflect what is meaningful to animals as understood by animal welfare science. They also have to be agreed by stakeholders in order to ensure that wider ethical and societal issues have been dealt with, and furthermore to maximize the likelihood of successful translation into practice. In the case of Welfare Quality[®] these have been systematically discussed with members of the general public and farmers, as well as with representatives of these and other stakeholder groups.

A top-down approach was used - four main welfare principles were identified and then split into twelve independent welfare criteria. Finally, measures were selected to assess these welfare criteria. In general, the principles and criteria which have been chosen are relevant for different species and throughout an animal's entire lifespan. A bottom-up approach, i.e. stepwise integration of measures, leads ultimately to the overall assessment of welfare (see Figure 3).

Animals differ in their genetics, early experience and temperament and therefore may experience the same environment in different ways. Even apparently similar environments may be managed differently by the stockperson, further affecting animals' experience of a particular situation. Because welfare is a characteristic of the individual animal, Welfare Quality[®] has based its welfare assessment essentially on animal-based measures (e.g. health and behaviour). Since resource-based measures (e.g. type of housing and stocking density) or management-based measures (e.g. breeding strategies and health plans) are a poor direct guarantee of good animal welfare in a particular situation, these measures are avoided within the protocols. However, when no animal-based measure is available to check a criterion, or when such a measure is not sensitive or reliable enough, measures of the resources or the management are used to check as much as possible that a given welfare criterion is met.

There is no gold standard measure of overall animal welfare and no available information on the relative importance animals attribute to the various welfare aspects. Welfare Quality[®] scientists are aware that the production of an overall assessment of animal welfare is by nature bound to ethical decisions, e.g. on whether we should consider the average state of animals vs. the worst ones, whether we should consider each welfare criterion separately vs. together in a more holistic approach, or whether a balance between societal aspirations for high welfare levels and the realistic achievements of such levels in practice should be achieved. Welfare Quality[®] scientists did not decide upon these ethical issues themselves. They consulted experts, including animal scientists, social scientists, and stakeholders, and the methodology for overall assessment was then adjusted according to their opinions; that is that all of the parameters used in the scoring model were optimised so as to best match expert opinions.

4.2.2 Defining welfare principles and criteria

Each welfare principle is phrased in such a way that it communicates a key welfare question. Four main principles are identified: good feeding, good housing, good health, appropriate behaviour. They correspond to the questions:

- Are the animals properly fed and supplied with water?
- Are the animals properly housed?
- Are the animals healthy?
- Does the behaviour of the animals reflect optimized emotional states?

Each principle comprises two to four criteria. Criteria are independent of each other and form an exhaustive but minimal list. Welfare principles and criteria are summarized in Table 2.

Welfare principles	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

Table 2 The principles and criteria that are the basis for the Welfare Quality®-assessment protocols.

More detailed definitions of welfare criteria are described below.

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 disease, i.e. animal unit managers should maintain high standards of hygiene and care.
8. Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration, ~~dehorning~~).
9. Animals should be able to express normal, non-harmful, social behaviours (e.g. grooming).
10. Animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging or exploring.
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.

Comment [VC7]: We could delete this in the pig protocol!

4.2.3 Measures developed to check criteria

Whenever possible, the final Welfare Quality® assessment measures have been evaluated with respect to their validity (does the measure reflect some aspect of the actual welfare of animals), reliability (acceptable inter or intra observer repeatability and robustness to external factors e.g. time of day or weather conditions) and their feasibility. A further important aspect of this data collection is that value judgements are minimized, i.e. the assessor counts or classifies animals according to a simple series of categories illustrated by pictures or video clips. Hence measures in the protocols do not require veterinary diagnostic expertise or specialist animal behaviour knowledge to be accurately recorded. Some measures which were initially proposed did not meet these conditions and were dropped from the scheme early in the evaluation process, whereas other measures have been accepted in anticipation of further improvements and refinements. This latter concession is because at least one measure per criterion is needed to assess overall

animal welfare. For some criteria, it has been necessary to include resource- and/or management-based measures because no animal-based measure was sufficiently sensitive or satisfying in terms of validity, reliability, or feasibility.

NOTE It is important to remember that research is continuing to identify new and better measures and that Welfare Quality[®] protocols will be updated in the light of new knowledge.

4.2.4 Calculation of scores

Once all the measures have been performed on an animal unit, a bottom-up approach is followed to produce an overall assessment of animal welfare on that particular unit: first the data collected (i.e. values obtained for the different measures on the animal unit) are combined to calculate criterion-scores; then criterion-scores are combined to calculate principle-scores; and finally the animal unit is assigned to one welfare category according to the principle-scores it attained (Figure 3). A mathematical model has been designed to produce the overall assessment.

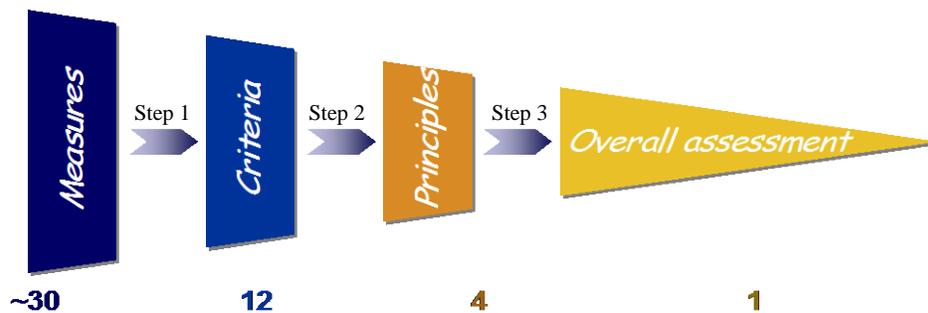


Figure 3 Bottom-up approach for integrating the data on the different measures to an overall assessment of the animal unit.

Calculation of criterion-scores

Although this is not generally the case, some measures may be related to several criteria (e.g. low body condition score can originate from hunger or disease, or both). In order to avoid double counting, measures have been allocated to only one criterion, except in very few cases where we could distinguish the way they were interpreted (e.g. access of cattle to pasture is used to check the ease of movement criterion, especially for animals which are tethered in winter, and the expression of other behaviour criterion).

The data produced by the measures relevant to a given criterion are interpreted and synthesized to produce a criterion-score that reflects the compliance of the animal unit to this criterion. This compliance is expressed on a '0' to '100' value scale, in which:

- '0' corresponds to the worst situation one can find on an animal unit (i.e. the situation below which it is considered there cannot be further decrements in welfare).
- '50' corresponds to a neutral situation (i.e. level of welfare is not bad but not good).
- '100' corresponds to the best situation one can find on a farm (i.e. the situation in which it is considered there cannot be further improvements in welfare).

Because the total number of measures, the scale on which they are expressed, and the relative importance of measures varies between and within criteria and also between animal types, the calculation of scores varies accordingly. In general there are three main types of calculation:

- When all measures used to check a criterion are taken at farm level and are expressed in a limited number of categories, a decision tree is produced. An example is provided in Explanation box 1.
- When a criterion is checked by only one measure taken at individual level, this scale generally represents the severity of a problem and the proportion of animals observed can be calculated (e.g. percentage animals walking normally, percentage moderately

lame animals, percentage severely lame animals). In that case a weighted sum is calculated, with weights increasing with severity. An example is provided in Explanation box 2.

- When the measures used to check a criterion lead to data expressed on different scales (e.g. percentage animals lying outside the lying area, or average latency to lie down expressed in seconds), data are compared to an alarm threshold that represents the limit between what is considered abnormal and that considered to be normal. Then the number of alarms is used as the measure value. An example is provided in Explanation box 3.
- When the measures to check a criterion are taken at group level, the score attributed to the animal unit is equal to the worst score obtained at group level as long as the group(s) concerned contain at least 15% of the observed animals ~~are in groups that obtain this score or a lower one.~~

Experts from animal sciences were consulted to interpret the raw data in terms of welfare. When necessary, alarm thresholds were defined by consultation with them. Then experts were asked to score virtual farms. In the situations where weighted sums were to be calculated, this consultation was used to define weights that produce the same ranking of farms as the one given by experts. This exercise showed that experts do not in general follow a linear reasoning, e.g. for a given disorder a 10 % increase does not yield the same decrement in expert scores at the bottom of the [0,100] scale (where most animals get this disorder) than at the top of the scale (when most animals are normal). It is therefore necessary to resort to non-linear functions to produce criterion-scores, in this case I-spline functions. Briefly, I-spline functions allow calculation of portions of curves so as to obtain a smooth representative curve. They are expressed in the form of cubic functions (Explanation box 2).

When a criterion was composed of very different measures which experts found difficult to consider together, blocks of measures were aggregated using Choquet integrals (Explanation box 4).

Comment [VC8]: In pig protocol, it concerns "thermal comfort". The observer controls 150 pigs and 10 pens . If the pen contains 25 pigs he controls 15 pigs and this count for 10% of the whole observation.

Comment [EMB9]: Comment from Isabelle Vessier. Please, check if it is correct or not.

Comment [PPN10]: Rephrase so something that is easier to understand, clarify!!!
Check with other protocols

Comment [PPN11]: Not in other protocols. Might be added to the upgraded protocols

Explanation box 1: Decision tree as applied to absence of prolonged thirst in growing pigs

Thirst is not assessed directly on animals because signs of dehydration can be detected only in extreme cases. Rather, the number of drinking places, their functioning and their cleanliness are assessed. The recommended number of pigs is calculated (10 pigs per functioning drinking place and 5 for a drinking place of reduced capacity). If there are more pigs in the pen than recommended then the number of drinking places is considered insufficient. Thereafter, cleanliness of drinkers and whether pigs have access to two drinkers in the same pen is considered. The following decision tree is applied:



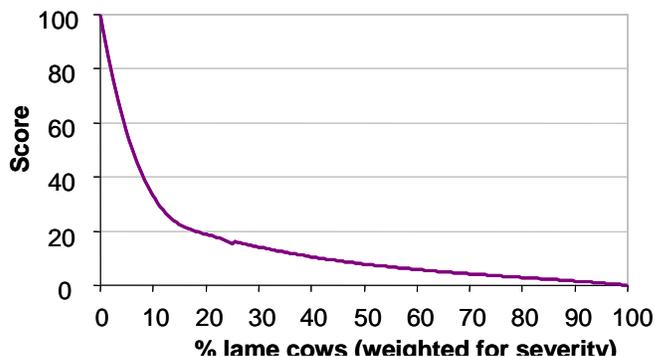
Explanation box 2: Weighted sum and I-spline functions as applied to lameness in dairy cows

The % of animals moderately lame and the % of animals severely lame are combined in a weighted sum, with a weight of 2 for mild lameness and 7 for severe lameness. This sum is then transformed into an index that varies from 0 to 100:

$$\text{Index for lameness } I = \left(100 - \frac{2(\% \text{mild}) + 7(\% \text{severe})}{7} \right)$$

This index is computed into a score using I-spline functions:

$$\begin{aligned} \text{When } I \leq 65 & \text{ then Score} = (0.0988 \times I) - (0.000955 \times I^2) - (5.34 \times 10^{-5} \times I^3) \\ \text{When } I \geq 65 & \text{ then Score} = 29.9 - (0.944 \times I) - (0.0145 \times I^2) + (1.92 \times 10^{-5} \times I^3) \end{aligned}$$



Explanation box 3: Use of alarm thresholds applied to absence of diseases in broilers

In broiler chicken the following disorders are checked on the farm or at slaughter: ascites, dehydration, septicaemia, hepatitis, pericarditis, subcutaneous abscesses. The incidence of each disorder is compared to an alarm threshold, defined as the incidence above which a health plan is required at the farm level.

Disorder	Alarm Threshold (%)
Ascites	1
Dehydration	1
Scepticaemia	1.5
Hepatitis	1.5
Pericarditis	1.5
Subcutaneous abscess	1

When the incidence observed on a farm reaches half the alarm threshold, a warning is attributed. The number of alarms and warnings detected on a farm are calculated. They are used to calculate a weighted sum finally transformed into a score using I-spline functions (as in the example shown in Explanation box 2).

Calculation of principle-scores from criterion-scores

Criterion-scores are synthesized to calculate principle-scores. For instance, the scores obtained by an animal unit for absence of injuries, absence of disease, and absence of pain due to management procedures are combined to reflect compliance of this unit with the principle 'good health'. Animal and social scientists were consulted, and considered some criteria to be more important than others (e.g. in most animal types, 'Absence of disease' is considered to be more

important than 'Absence of injuries' which in turn is more important than 'Absence of pain induced by management procedures'). Nevertheless, synthesis does not allow compensation between scores (e.g. absence of disease does not compensate for injuries and vice versa). A specific mathematical operator (Choquet integral) was used to take into account these two lines of reasoning. In short, the Choquet integral calculates the difference between the minimum score and the next minimum score and attributes a weight (called 'capacity') to that difference. This process is repeated until the highest score is reached. In the species-specific sections, only the 'capacities' are given (μ_x for the capacity of a criterion x, μ_{xy} for the capacity of a group made of 2 criteria x and y, etc.). An example of the calculation of principle-scores is provided in Explanation box 4.

Explanation box 4: Use of a Choquet integral to calculate the principle-scores for 'Good health'.

'Good health' integrates 3 criteria; 'Absence of injuries', 'Absence of disease', and 'Absence of pain induced by management procedures'. First the scores obtained by a farm for the 3 criteria are sorted in increasing order. The first criterion-score is considered, and then the difference between that score and the next criterion-score is multiplied by the 'capacity' (see explanation below) of the group made of all criteria except the one that brings the lowest score. Following this, the difference between the last but one score and the next score is multiplied by the 'capacity' of the group made by the combined criteria except those that bring the two lowest scores. This can be written as follows:

$$\text{Principle-score} = \begin{cases} S_6 + (S_7 - S_6)\mu_{78} + (S_8 - S_7)\mu_8 & \text{if } S_6 \leq S_7 \leq S_8 \\ S_6 + (S_8 - S_6)\mu_{78} + (S_7 - S_8)\mu_7 & \text{if } S_6 \leq S_8 \leq S_7 \\ S_7 + (S_6 - S_7)\mu_{68} + (S_8 - S_6)\mu_8 & \text{if } S_7 \leq S_6 \leq S_8 \\ S_7 + (S_8 - S_7)\mu_{68} + (S_6 - S_8)\mu_6 & \text{if } S_7 \leq S_8 \leq S_6 \\ S_8 + (S_6 - S_8)\mu_{67} + (S_7 - S_6)\mu_7 & \text{if } S_8 \leq S_6 \leq S_7 \\ S_8 + (S_7 - S_8)\mu_{67} + (S_6 - S_7)\mu_6 & \text{if } S_8 \leq S_7 \leq S_6 \end{cases}$$

Where S_6 , S_7 , and S_8 are the scores obtained by a given farm for Criterion 6 (Absence of injuries), 7 (Absence of disease), and 8 (Absence of pain induced by management procedures)
 μ_6 μ_7 μ_8 are the capacities of Criterion 6, 7 and 8
 μ_{67} is the capacity of the group made of criteria 6 and 7, etc.

Assignment of animal units to the welfare categories

The scores obtained by an animal unit on all of the welfare principles are used to assign that farm to a welfare category. At this stage, both animal scientists, social scientists and stakeholders, were consulted. The stakeholders were members of the Advisory committee of Welfare Quality®. Four welfare categories were distinguished to meet stakeholders' requirements:

- Excellent:** the welfare of the animals is of the highest level.
- Enhanced:** the welfare of animals is good.
- Acceptable:** the welfare of animals is above or meets minimal requirements.
- Not classified:** the welfare of animals is low and considered unacceptable.

'Aspiration values' are defined for each category. They represent the goal that the farm should try to achieve to be assigned to a given category. The excellence threshold is set at 80, the one for enhanced at 55 and that for acceptability at 20. But, just as criteria do not compensate each other

within a principle (see above), 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 excellent, enhanced etc. but also what can realistically be achieved in practice. Therefore, a farm is considered 'excellent' if it scores more than 55 on all principles and more than 80 on two of them while it is considered 'enhanced' if it scores more than 20 on all principles and more than 55 on two of them. Farms with 'acceptable' levels of animal welfare score more than 10 on all principles and more than 20 on three of them. Farms that do not reach these minimum standards are not classified (Figure 4). An indifference threshold equal to 5 is applied: For instance, 50 is not considered significantly lower than 55.

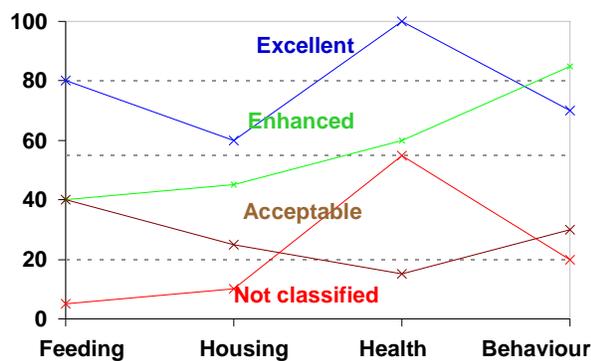


Figure 4 Examples of farms in the four welfare categories.

Software has been developed to calculate welfare scores and to produce the overall assessment of animal units. For more information, contact the Welfare Quality[®] consortium, represented by its coordinator (contact: Anke.delorm@wur.nl).

Final comments

The following sections are specific to the animal species covered in this document. They are structured to present firstly the measures collected on farms, secondly the measures collected at slaughter that apply to welfare assessment on farm, thirdly the calculation of scores needed for overall assessment, and finally the measures collected at slaughter that apply to assessment of the welfare of the animals during transport and slaughter.

It should be emphasised that scientific research will continue to refine measures and that the Welfare Quality[®] protocols will be updated in the light of new knowledge. **Training and validation** in the methods and protocols **is essential** and no individual or organisation can be considered capable of applying these methods in a robust, repeatable, and valid way without attending harmonised training approved by the Welfare Quality[®] consortium.

5 Welfare Quality[®] applied to sows and piglets

The assessment of welfare should be a multi-disciplinary process since the assessment of a variety of different parameters can provide a more comprehensive assessment of an animal's welfare in any given system. To this end, the Welfare Quality[®] project utilizes physiological, health and behavioural aspects to assess the welfare of sows and piglets on farm.

In this chapter, a description of each measure for sows and piglets is given, followed by information about the sample size and the order in which the different measures should be carried out.

Before commencing farm visits, assessors will have been fully trained in all the measures that are to be assessed using photographs, video clips and practical 'on farm' training. For some of the health measures, this training will involve recognition of symptoms of certain conditions/diseases; however it is imperative that this document is not used as a diagnostic tool to identify individual health conditions, but rather as a tool to highlight the presence of health problems affecting the welfare of animals. The assessor should not enter into discussions with the animal unit manager on the prevalence or severity of different diseases on their farm; this is a matter for the animal unit manager and the herd veterinarian. Additionally, in general, the role of the assessor is to assess, and not to advise directly.

Trained assessors will use either animal-based, management-based or resource-based measures to achieve a representative assessment of sow and piglet welfare of each farm. Many different measures are assessed, and most are scored according to a three-point scale ranging from 0 to 2. The assessment scales have been selected so that a score 0 is awarded where welfare is good, a score 1 is awarded (where applicable) where there has been some compromise on welfare, and a score 2 is awarded where welfare is poor and unacceptable. In some cases a binary (0/2 or Yes/No) or a cardinal scale (e.g. cm or m²) is used.

The assessor should prepare and start the visit according to the description provided for in Annex A ('Guidelines for visit to the animal unit'). Data can be recorded with aid of Annex B ('Recording Sheets').

5.1 Collection of data for sows and piglets on farm

	Welfare criteria		Measures
Good feeding	1	Absence of prolonged hunger	Sows: Body condition score Piglets: Age of weaning
	2	Absence of prolonged thirst	Sows and piglets: Water supply
Good housing	3	Comfort around resting	Sows: Bursitis, shoulder sores Sows and Piglets: Absence of manure on the body
	4	Thermal comfort	Sows and Piglets: Panting, huddling
	5	Ease of movement	Sows: Space allowance, farrowing crates
Good health	6	Absence of injuries	Sows and piglets: Lameness Sows: Wounds on the body, vulva lesions
	7	Absence of disease	Sows and piglets: Mortality, coughing, sneezing, pumping, rectal prolapse, scouring Sows: Constipation, metritis, mastitis, uterine prolapse, skin condition, ruptures and hernias, local infections Piglets: Neurological disorders, splay leg

Comment [EMB12]: Please, check consistency: vulva or vulval? Andy Butterworth corrected it in the last version, but we don't remember which was the final decision.

Comment [HV13]: I would say "vulva" like in "ear wounds" or "leg problems"

Comment [PPN14]: We are using Vulva and Vulval in this document. I am not sure when Vulva or Vulval should be used and it seems like we need some input from an English native speaker

Comment [HV15]: In my opinion ruptures are open wounds, but it might be clearer with only the word "hernia"

Comment [VC16]: Hernias are OK but I don't really see what covers "rupture" for pigs: (is it only a synonym of hernia): I think we should delete it for a better understanding. do you have a definition of it

Comment [PPN17]: See if I find other ruptures in the text. Done

	8	Absence of pain induced by management procedures	Sows: Nose ringing and tail docking Piglets: Castration, tail docking and teeth clipping
Appropriate behaviour	9	Expression of social behaviours	Sows: Social behaviour
	10	Expression of other behaviours	Sows: Stereotypes, exploratory behaviour
	11	Good human–animal relationship	Sows: Fear of humans
	12	Positive emotional state	Sows and piglets: Qualitative Behaviour Assessment (QBA)

5.1.1 Good feeding

5.1.1.1 Absence of prolonged hunger

<i>Title</i>	Body condition score
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	Make sure all sows are standing up. View the sow from behind and also whilst standing alongside her. Consider how visible the bones are. The spine, hip and pin bones are visually inspected and then palpated. Assess the sow's condition according to the classification shown below.
<i>Classification</i>	Individual level: 0 – It takes firm pressure with the palm of the hand of the assessor to feel the hip bones and backbone 1 – The hip bones and backbone are easily felt without any pressure on the palms, or the sow appears visually obese and it is impossible to feel the hip bones and backbone even by pushing down with a single finger 2 – The sow appears visually very thin, with hips and backbone very prominent

<i>Title</i>	Age of weaning
<i>Scope</i>	Management-based measure: Piglets
<i>Sample size</i>	Animal unit
<i>Method description</i>	The animal unit manager is asked about weaning management of the piglets (the average age of weaning is recorded). This can be corroborated by the assessor during the course of the visit while assessing ten litters of different ages which are sampled for a variety of different animal-based measures; during this time the assessor may notice if weaning age is significantly different to that stated by the animal unit manager (because there may be a lack of older piglets).
<i>Classification</i>	Average age of weaning in days

5.1.1.2 Absence of prolonged thirst

<i>Title</i>	Water supply
<i>Scope</i>	Resource-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5

<i>Method description</i>	<p>These are the two aspects that will be taken into account (cleanliness /functionality). Water supply will be considered hygienic when the drinker places are without faeces and without mould. If one of these aspects is insufficient it will be classified as 2 (i.e. inadequate).</p> <p>This can be corroborated by the assessor during the course of the visit when assessing resource-based measures. The assessor will record the type of drinker (pipe, bowl or trough), and (when possible) also its length, width, height, cleanliness and whether the drinkers are functioning (or not) will be considered. In addition, the risk of injuries due to drinkers will be checked.</p>
<i>Classification</i>	<p>0 – Water facilities are adequate 2 – Water facilities are inadequate</p>
<i>Optional additional information</i>	Note that there are more aspects (than functioning/working and hygiene) regarding watersupply which is recorded in Annex B (at the time of the visit).

5.1.2 Good housing

5.1.2.1 Comfort around resting

<i>Title</i>	Bursitis (pressure injuries)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Make sure all sows to be scored are standing up. Stand less than 1 meter away from one side of the observed sow. Choose the side with the optimal view for observation.</p> <p>A bursa is a fluid filled sac that develops as a result of a pressure injury on the weight-bearing points of the legs. Bursae are most prevalent in the hock region of the hind limbs, although they can occur in other locations.</p> <p>One side of the animal is visually inspected for evidence of bursae on both the fore and hind limbs. Each sow will be individually scored according to the following categorization:</p> <ul style="list-style-type: none"> • small bursae: comparable in size to a grape; 1.5–2.0 cm diameter • large bursa: >2.0–5.0 cm diameter • extremely large bursa: this might be comparable to a tangerine; 5.0-7.0 cm diameter
<i>Classification</i>	<p>Individual level: 0 – No evidence of bursae 1 – One or several small bursae on the same leg or one large bursa 2 – Several large bursae on the same leg, or one extremely large bursae, or any bursa that is eroded</p>

<i>Title</i>	Shoulder sores (pressure injuries)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Make sure all sows to be scored are standing up and score sows in different stages of lactation. Stand less than 1 meter away from the observed sow.</p> <p>To assess shoulder lesions both shoulders should be visually examined.</p>

<i>Classification</i>	Individual level: 0 – No evidence of a shoulder lesion. 1 – Evidence of an old injury (scar tissue formed), or a recent injury which is healing, or reddening of the area without penetration of the tissue 2 – An open wound/lesion
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<i>Title</i>	Manure on the body
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Make sure all sows and piglets to be scored are standing up. The presence of manure/faeces on the body is visually assessed on one side of the body. Choose the side with the optimal view for observation. Note that this parameter should not be confused with dirtiness. An outdoor pig soiled with mud is perfectly normal, and does not necessarily indicate a welfare problem.</p>
<i>Classification</i>	Sows/individual level: 0 – Up to 10% of the body surface is soiled 1 – 10% to 30% of the body surface is soiled 2 – More than 30% of the body surface is soiled Piglets/individual level: 0 –Up to 10% of the body surface is soiled 2 – More than 10% of the body surface is soiled Piglets/group level: 0 – No pigs in the litter with soiled body surface 1 – Up to 50% of piglets in the litter have a soiled body surface 2 – More than 50% of piglets in the litter have a soiled body surface

5.1.2.2 Thermal comfort

<i>Title</i>	Panting
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Since panting behaviour is best observed in resting animals, wait 10 minutes<u>min</u> to allow animals to settle when first entering the room.</p> <p>Panting is defined as breathing rapidly in short gasps and carried out by breathing through the mouth. A respiratory rate of more than 28 breaths per minute in sows and more than 55 breaths per minute in piglets is considered as panting. While looking at the flanks, the number of breaths per minute is counted.</p>
<i>Classification</i>	Sows/individual level: 0 – No panting 2 – Evidence of panting Piglets/group level: 0 – No panting 1 – Up to 20% of resting piglets in the litter display panting 2 – More than 20% of resting piglets in the litter display panting

<i>Title</i>	Huddling
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Since huddling behaviour is best observed in resting animals, wait 10 minutes to allow animals to settle when first entering the room. Huddling behaviour in piglets will only be considered when piglets have more space available to them than they are occupying.</p> <p>The definition of huddling is when a pig is lying with more than half of its body in contact with another pig (i.e. virtually lying on top of another pig). It is not considered huddling when an individual is just side by side and alongside another animal.</p> <p>Estimate the number of huddling animals.</p>
<i>Classification</i>	<p>Sows/individual level: 0 – No huddling 2 – Huddling</p> <p>Piglets/group level: 0 – No huddling behaviour observed 1 – Up to 20% of resting piglets in the litter display huddling behaviour 2 – More than 20% of resting piglets in the litter display huddling behaviour</p>

5.1.2.3 Ease of movement

<i>Title</i>	Space allowance
<i>Scope</i>	Resource-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The same pens/area where the groups of animals are assessed for health measures will be considered.</p> <p>A sub sample of pens for both pregnant and lactating sows is selected. As part of the resource-based measures, the number of animals in each pen and the dimensions of the pen are recorded. Space allowance is calculated as the area provided to animals divided by the number of animals multiplied by their weight.</p>
<i>Classification</i>	Space allowance expressed in m²/sow

<i>Title</i>	Farrowing crates
<i>Scope</i>	Resource-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The crate size is considered adequate when the sows have comfortable space for both standing and lying down.</p> <p>For stall housed pregnant sows, the size of the stall will be recorded during the course of the visit when assessing the resource-based measures.</p>
<i>Classification</i>	<p>0 – Crate is adequate for the size of the sow 2 –Crate is inadequate for the size of the sow</p>

5.1.3 Good health

5.1.3.1 Absence of injuries

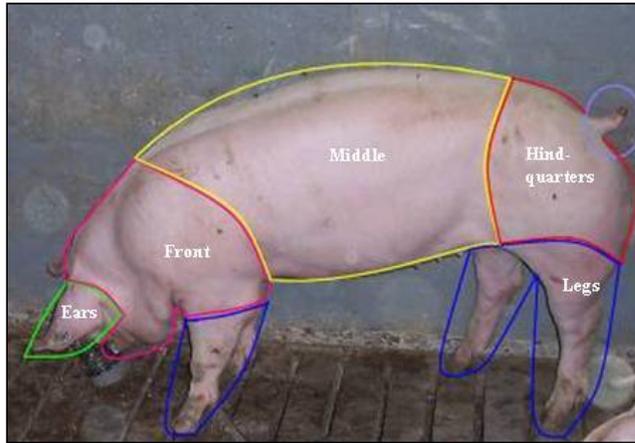
<i>Title</i>	Lameness
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The assessor must ensure that, before starting the observation, the sow has been walking a certain distance.</p> <p>The sows are observed from the front, side and back, whilst ensuring that the assessor can approach to not further than 4 meters away. Additionally, the assessor should have a clear and unobstructed view of the moving sow.</p> <p>For piglets, the assessor should ensure that there is as clear and unobstructed a view as is possible, to observe the moving piglets.</p> <p>Lameness is the inability to use one or more limbs in a normal manner. It can vary in severity from reduced ability or inability to bear weight to total recumbency.</p> <p>Assess the individual sows and group of piglets according to the classification below.</p>
<i>Classification</i>	<p>Sows/individual level:</p> <p>0 – Normal gait, or the animal has difficulties walking but is still using all its legs, the stride may be shortened and/or there may be a swagger of the caudal part of the body when walking</p> <p>1 – The animal is severely lame; it put a minimum of weight on the affected limb(asymmetric walking)</p> <p>2 – There is no weight-bearing on the affected limb, or the animal is unable to walk</p> <p>Piglets/group level:</p> <p>0 – All piglets in the litter have a normal gait</p> <p>1 – One piglet in the litter displays moderate lameness (difficulty in walking but still using all of its limbs)</p> <p>2 – More than 1 piglet in the litter displays moderate lameness, or at least 1 piglet in the litter displays severe lameness (minimum weight bearing on the affected limb; no weight bearing on the affected limb; unable to walk)</p>

<i>Title</i>	Wounds on body
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Where sows are housed in groups, animals in different stages of pregnancy should be sampled, since fighting and mounting behaviour are frequent amongst newly weaned sows. Where there are different types of systems on a farm, sows should be sampled representatively from these.</p> <p>The assessor shall maintain a distance of approximately 0.5 m from the animal at all times.</p> <p>Wounds on the body are visually assessed by inspecting one side of the sow's body. Choose the side with the optimal view for observation. The tail zone is not considered here. Each body region will be assigned with a score. Wounds on the body can be scratches (surface penetration of the epidermis) or wounds (penetration of the muscle tissue). Where scabs have formed, they will count as a single lesion if they form a continuous line. When assessing the size of a wound, consider its</p>

largest dimension.

The sow's body is considered in five separate regions:

1. Ears
2. Front (head to back of shoulder)
3. Middle (back of shoulder to hind-quarters)
4. Hind-quarters
5. Legs (from the accessory digit upwards).



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In order to standardize the assessment use the following method:

- A scratch longer than 2 cm will be considered as 1 lesion,
- 2 parallel scratches with up to 0.5 cm space between them will be considered as 1 lesion,
- A small wound (less than 2 cm) will be considered as 1 lesion,
- A bleeding wound between 2 and 5 cm, or a healed wound of more than 5 cm will be considered as 5 lesions, A deep and open wound of more than 5 cm will be considered as 16 lesions.

The assessor must assess each sow's region **on one side** according to the following scale:

- a** – No visible skin injuries, or up to 4 lesions visible
- b** – 5 to 10 lesions visible
- c** – 11 to 15 lesions visible.

Comment [HV18]: One side!

<i>Classification</i>	<p>Individual level:</p> <p>0 – All body regions with an individual score 'a'</p> <p>1 – Any body region with an individual score 'b' and/or a maximum of 1 body region with an individual score 'c'</p> <p>2 – Two or more body regions with an individual score 'c', or at least one body region that has more than 15 lesions.</p>
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<i>Title</i>	Vulva lesions
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5

Comment [HV19]: I prefer to keep "vulva lesions"

Comment [EMB20]: Vulval? Please, check consistency

<i>Method description</i>	All animals to be scored must be standing up. Observed from behind, the vulva is examined for evidence of fresh injuries (detectable because of the presence of blood or red lesions) and older injuries (scar tissue and/or a deformed vulva).
<i>Classification</i>	Individual level: 0 – No damage to the vulva, or small lesions (less than 2 cm), or scar tissue visible 1 – Injury larger than 2 cm visible, but in the process of healing (scab or crust formed), or a deformed vulva 2 – Any injury larger than 2 cm that is bleeding

5.1.3.2 Absence of disease

<i>Title</i>	Mortality
<i>Scope</i>	Management-based measure: Sows and piglets
<i>Sample size</i>	Animal unit
<i>Method description</i>	Mortality is defined as the 'uncontrolled' death of animals (as distinct from culling/euthanasia). The animals may die from, for example septicaemia, respiratory disease, acute infection or dehydration. Any animal which is 'found dead' on the floor in the house, or out on the field is considered a mortality. This also counts for piglets; however note that stillborns are not considered. The animal unit manager is asked about mortality management on the farm based on data collected from farm records. Using house records of animal numbers placed, minus number died (but not including those actively culled). Number of animals placed in house from previous animal unit (A) Total number of animals which died and were found dead (but were not actively culled) during the last 12 months (M) Calculate the percentage mortality using the following equation: Percentage of mortality = (M/A) x 100
<i>Classification</i>	Percentage of mortality on farm during the last 12 months

<i>Title</i>	Coughing (respiratory disorders)
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	Sows must be observed for a period of five minutes and the number of sows with prolonged coughing recorded. A sow coughing only once within the time period will not be recorded as having a coughing problem. Piglets must be observed for a period of five minutes , during which the number of coughs is recorded.
<i>Classification</i>	Sows/individual level: 0 – No evidence of coughing 2 – Evidence of coughing Piglets/group level: Number of coughs

<i>Title</i>	Sneezing (respiratory disorders)
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Sows must be observed for a period of five minutes and the number of sows with prolonged sneezing recorded. A sow sneezing only once within the time period will not be recorded as having a sneezing problem.</p> <p>Piglets must be observed for a period of five minutes, during which the number of sneezes is recorded.</p>
<i>Classification</i>	<p>Sows/individual level: 0 – No evidence of sneezing 2 – Evidence of sneezing</p> <p>Piglets/group level: Number of sneezes</p>

<i>Title</i>	Pumping(laboured breathing)
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Pumping is defined as when the pig's breathing is heavy and laboured, and it is easy to see the chest rising and falling with each breath.</p> <p>Sows and litters must be observed for a period of five minutes and the number of sows and piglets with laboured breathing recorded.</p>
<i>Classification</i>	<p>Sows/individual level: 0 – No evidence of laboured breathing 2 – Evidence of laboured breathing</p> <p>Piglets/group level: 0 – No pigs in the litter display evidence of laboured breathing 1 – One pig in the litter displays evidence of laboured breathing 2 – More than one pig in the litter is displaying evidence of laboured breathing</p>

<i>Title</i>	Rectal prolapse (enteric disorders)
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>A rectal prolapse is when internal tissue extrudes from the rectum. As a rectal prolapse is either present or absent, score the sows or piglets presenting this problem.</p> <p>The animals should be examined from the rear; checking for the presence of swelling or extrusion of tissue from the rectum. Note that the first visible sign of a rectal prolapse is often blood on the faeces.</p>
<i>Classification</i>	<p>Sows/individual level: 0 – No evidence of prolapse 2 – Evidence of prolapse</p> <p>Piglets/group level: 0 – No piglets in the litter with prolapse 2 – One or more piglets in the litter with prolapse</p>

<i>Title</i>	Scouring (enteric disorders)
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<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>If pregnant sows are housed in groups the measure for scouring cannot be made at the individual animal level, but only at the pen level.</p> <p>Scouring is considered to occur when the faeces become more fluid in consistency than is normal.</p> <p>Identify parts of the pen where the dung is fresh and visible. Scouring is considered to occur when the faeces become more fluid than normal. Assess if liquid manure is present in the pen.</p>
<i>Classification</i>	<p>Pen level:</p> <p>0 – No evidence of scouring in the pen</p> <p>2 – Evidence of scouring in the pen</p>

<i>Title</i>	Constipation (enteric disorders)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The presence of hard and solid faeces, similar to rabbit droppings, are indicative of constipation.</p> <p>Check for hard and solid faeces. If sows are contained within a farrowing crate, the manure at the back of the crate should be examined for evidence of hard solid faeces. In the case of other systems, check around the nesting area.</p>
<i>Classification</i>	<p>Pen level:</p> <p>0 – No evidence of solid faeces</p> <p>2 – Evidence of solid faeces</p>

<i>Title</i>	Metritis (reproductive disorders)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The sow should be standing up during inspection.</p> <p>Metritis is an infection of the uterus resulting in a vulval discharge.</p> <p>The area around the vulval and the floor behind the sow are visually examined for evidence of a milky white discharge.</p>
<i>Classification</i>	<p>Individual level:</p> <p>0 – No evidence of a vulval discharge</p> <p>2 – Evidence of a vulval discharge</p>

<i>Title</i>	Mastitis (reproductive disorders)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The sow's udder must be inspected for swelling and redness. Also examine the body condition of the piglets.</p> <p>If the assessor suspects that a sow's udder is inflamed from the visual inspection or if thin piglets are observed, the udder should be gently palpated. If the sow is suffering from mastitis, the udder will feel hard and hot.</p>
<i>Classification</i>	Individual level:

	0 – No evidence of mastitis 2 – Inflammation of the udder
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<i>Title</i>	Uterine prolapse (reproductive disorders)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The sow shall be examined from behind for the presence of a uterine prolapse.</p> <p>A uterine prolapse is defined as when the uterus or a part of the uterus extrudes from the vagina.</p>
<i>Classification</i>	Individual level: 0 – No evidence of uterine prolapse 2 – Evidence of uterine prolapse

<i>Title</i>	Skin condition
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Assess one side of the body. Choose the side with the optimal view for observation.</p> <p>Certain diseases can cause characteristic inflammation or discoloration of the skin.</p> <p>The sow should be visually examined while looking for evidence of skin inflammation or discoloration.</p>
<i>Classification</i>	Individual level: 0 – No evidence of skin inflammation or discoloration 1 – Some, but less than 10% of the skin inflamed, discoloured or spotted 2 – More than 10% of the skin is inflamed, discoloured or spotted

<i>Title</i>	Ruptures and Hernias
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The sow must be observed from the front, back and side.</p> <p>Hernias and ruptures occur when there is protrusion of a bodily structure or organ through the wall that normally contains it, resulting in a lump under the skin in the umbilical or inguinal area (see photographic illustration).</p> <p>The presence of umbilical or inguinal hernia is recorded.</p>
<i>Classification</i>	Individual level: 0 – No evidence of rupture or hernia 1 – Small rupture or hernia 2 – Very large rupture or hernia with a bleeding lesion which is touching the floor when the animal is standing up, or affecting its locomotion



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<i>Title</i>	Local infections
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	The sow is observed from the front, back and side. The presence of swellings and abscesses is assessed. Note that swellings and abscesses shall not be confused with wounds on the body, which are considered separately.
<i>Classification</i>	Individual level: 0 – No visible swelling or abscesses 1 – Some swelling visible but no evidence of inflammation, or 1 small abscess visible 2 – More than 1 small abscess, or any abscess that is open and exuding pus, or a large unopened abscess (~ 5 cm diameter).

<i>Title</i>	Neurological disorders (tremor)
<i>Scope</i>	Animal-based measure: Piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	Clinical signs of neurological disorders include muscle tremors, and in more severe cases, paddling of the limbs. All the piglets in the litter must be observed for symptoms of neurological disorders.
<i>Classification</i>	Group level: 0 – No piglet in the litter with evidence of a neurological problem 1 – One piglet in the litter with evidence of a neurological problem 2 – More than one piglet in the litter with evidence of neurological problem

<i>Title</i>	Splay leg
<i>Scope</i>	Animal-based measure: Piglets
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	Splay leg causes slight or partial paralysis of the hind limbs, resulting in an inability to stand and the hind limbs being spread (splayed) apart. All piglets in the litter must be visually examined for the presence of

	splay leg.
<i>Classification</i>	Group level: 0 – No piglet in the litter with splay legs. 1 – One piglet in the litter with splay legs 2 – More than 1 piglet in the litter with splay legs.

5.1.3.3 Absence of pain induced by management procedures

<i>Title</i>	Nose ringing and tail docking (mutilations)
<i>Scope</i>	Management-based measure: Sows
<i>Sample size</i>	Animal unit
<i>Method description</i>	The animal unit manager is asked about mutilation management for nose ringing and tail docking. The assessor records whether mutilations are carried out on farm and whether anaesthetic and analgesics are used during the procedure.
<i>Classification</i>	0 – No mutilations are performed 1 – Mutilations are carried out with use of anaesthetics 2 – Mutilations are carried out but without use of anaesthetics and analgesics

Comment [HV21]: Shouldn't this be an "and" ? Definition is not clear

<i>Title</i>	Castration, tail docking and teeth clipping (mutilations)
<i>Scope</i>	Management-based measure: Piglets
<i>Sample size</i>	Animal unit
<i>Method description</i>	The animal unit manager is asked about mutilation management with regard to tail docking (what proportion of the piglets is tail docked, at what age the procedure is performed, and whether anaesthetic and analgesics are used during the procedure), castration (what proportions of male piglets are castrated, at what age the procedure is carried out, and whether anaesthetic and analgesia are used during the procedure), and what proportions of piglets have their teeth clipped or ground.
<i>Classification</i>	0 – No mutilations are performed 1 – Mutilations are carried out with use of anaesthetics 2 – Mutilations are carried out but without use of anaesthetics or analgesics

Comment [HV22]: See previous remark

5.1.4 Appropriate behaviour

5.1.4.1 Expression of social behaviours

<i>Title</i>	Social behaviour (positive and negative)
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	Observations should take place in the morning when animals are more active. If animals are not fed <i>ad libitum</i> , observations are made outside the feeding period, at least one hour after the morning meal. Before starting the assessment, the assessor should enter the room, record the number of animals per pen/group and ensure that all the animals are standing up. If necessary, clap the hands and disturb the pigs by touching them. 5 - 10 minutes later make the observations from the passageway. The behaviours recorded are: <ul style="list-style-type: none"> Negative social behaviour (N), defined as an aggressive behaviour, including biting, or aggressive social behaviour with

	<p>a response from the disturbed animal.</p> <ul style="list-style-type: none"> • Positive social behaviour (P), defined as sniffing, nosing, licking, and moving gently away from the animal without aggressive or flight reaction from this individual. • Animals not showing positive or negative social behaviour or exploratory behaviour shall be recorded as resting (R) or as 'other' (O), which is defined 'other active behaviours', such as eating, drinking or air sniffing. <p>From the passageway, the behaviour of all the active animals should be recorded using five scan samples made at two minute intervals. A summary is calculated on the scoring sheet (line "total") (see RS in Annex B): the figures provided are the sum of each behaviour.</p>
<i>Classification</i>	<p>Group level: Number of animals showing positive social behaviours and Number of animals showing negative social behaviours</p>

5.1.4.2 Expression of other behaviours

<i>Title</i>	Stereotypies
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The assessment should be made in the morning, as this is the period when the animals are more active; however the assessor should avoid the period around feeding (this will be specific to each farm).</p> <p>Stereotypical behaviour is defined as a sequence of invariant motor acts, which provide no obvious gain or purpose for the animal. The stereotypes evaluated are sham chewing (where the sow has nothing in its mouth), tongue rolling, teeth grinding, bar/trough/drinker biting, floor licking.</p> <p>The presence of stereotyped behaviour should be observed. Each sow in the group should be observed for a period of 15 s. If, after 15 s, the assessor is unsure whether the sow is displaying stereotyped behaviour, increase the length of the observation period to one minute. In groups containing more than 10 sows, enter the pen and identify (mark) the sub-sample of sows that will be assessed with stock marker spray. Eight minutes later, mark another batch of sows as before. Assess the first batch, then the second batch, and if necessary mark a third batch and so on.</p>
<i>Classification</i>	<p>Individual level: 0 – No stereotyped behaviour observed 2 – Stereotyped behaviour observed</p>

<i>Title</i>	Exploratory behaviour
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>Observations should take place in the morning when animals are more active. However, observations are made outside the feeding period, at least one hour after the morning meal if pigs are ration fed. Before starting the assessment the assessor should enter the room, record the number of animals per pen/group and ensure that all animals</p>

	<p>stand up. If necessary, clap the hands and disturb the pigs by touching them. From 5 to 10 minutes later make the observations from the passageway. It is important not to move during the observation in order to avoid a reaction from the animals.</p> <p>The behaviours recorded are:</p> <ul style="list-style-type: none"> • Investigation of the pen (S) is defined as sniffing, nosing, licking or chewing any features within the pen. • Exploring enrichment material (E) is defined as play/investigation towards straw or other enrichment material. These parameters are assessed at the same time as social behaviours. • Animals not showing exploratory or positive and negative social behaviour should be recorded as resting (R) or 'other' (O), which is defined as 'other active behaviour', such as eating, drinking or air sniffing. <p>From the passageway, the behaviour of all the active animals should be recorded using five scan samples made at two minute intervals.</p>
<i>Classification</i>	<p>Group level: Number of animals exploring the pen (S) and Number of animals exploring material (E)</p>

5.1.4.3 Good human–animal relationship

<i>Title</i>	Fear of humans
<i>Scope</i>	Animal-based measure: Sows
<i>Sample size</i>	Sample size according to § 5.1.5
<i>Method description</i>	<p>The human–animal relationship (HAR) should be assessed in the early part of the visit; avoid the period around feeding. Before starting the measure, walk up and down in front of the sows alerting them to the presence of the assessor. Do this only at the start of the measure; there is no need to walk up and down before making the assessment on each individual sow.</p> <p>On farms where there are both stalls (sow stalls or feeding stalls) and group housing, it may be more convenient to sample animals in stalls given that there is no possibility that sampling will be associated with feeding cues. Since sows may be housed in stalls or in groups, two different approaches are required.</p> <p>Sows in stalls: The sows should be standing up. If they are not, walk behind the stalls and attempt to rouse them into a standing position. Again, some sows may lie down before the assessment; if possible avoid these animals and choose another sow, but when this is not possible one can proceed with the test even if the animal is lying down. The measure is comprised of three individual stages; <u>Stage 1:</u> Select the sow and move to the 'start' position, which should be approximately 0.5 meters away (depending on the space available) and slightly to the right hand side of the sow. Remain there, motionless and in with a relaxed posture, with hands by ones side, for 10 seconds. If the sow does not react proceed to stage 2. <u>Stage 2:</u> Slowly move from the 'start' position towards the sow in a</p>

	<p>diagonal direction, looking at the sow without staring. Keep arms and hands close to ones body. Once at the head end of the sow, crouch down in front of her and remain motionless for 10 s. If the sow does not react proceed to stage 3.</p> <p><u>Stage 3:</u> Reach out and attempt to touch the sow between the ears for 10 s. Ensure that while reaching out through the bars the assessor is able to quickly and safely withdraw the hand, in case the sow makes a sudden movement.</p> <p>Sows in groups: Most ideal would be to enlarge the area available for the assessment, as increasing the area may increase the ease with which the test can be carried out. However, this must not be attempted without the animal unit manager's knowledge and approval. If it is possible to increase the pen area, allow sows to acclimatize to the larger space for at least ten minutes. In large groups it may be necessary to identify sows that have already been assessed with a stock marker spray (only with the unit managers' approval). The measure is comprised of three individual stages; <u>Stage 1:</u> Enter the pen and walk slowly and steadily around the perimeter of the pen. Then move to the 'start' position, which is approximately 0.5 meters away from the test sow (depending on the space available) and remain motionless for 10 s. If the sow does not react proceed to stage 2. <u>Stage 2:</u> Slowly and steadily approach the head end of the sow, then crouch down and remain motionless for 10 s. If the sow does not react proceed to stage 3. <u>Stage 3:</u> Reach out and attempt to touch the sow between the ears and maintain contact for 10 s. If at any point the sow moves away from the assessor due to interruption or distraction, apparently unrelated to fearfulness (e.g. if another sow interferes with the assessment), follow the subject to another location and continue with the test. Continue from the beginning of the stage which was interrupted, but do not repeat any previous completed stages. A sow moving away three times in succession, although not apparently fearful, is scored as 'withdrawing' for that stage.</p>
<i>Classification</i>	<p>Individual level: 0 – The sow allows the assessor to touch her between the ears without any withdrawal response, or the sow withdraws when it is attempted to touch her between the ears but then approaches. 1 – The sow withdraws initially but then approaches when the assessor is at the start stage or when the assessor is crouched down in front of the sow (stage 1 and 2), or when the assessor attempts to touch the sow between the ears, she withdraws and stays withdrawn (stage 3) . 2 – The sow withdraws when the assessor is at the start position, or the sow withdraws and remains withdrawn when the assessor crouches down in front of her.</p>

5.1.4.4 Positive emotional state

<i>Title</i>	Qualitative Behaviour Assessment (QBA)
<i>Scope</i>	Animal-based measure: Sows and piglets
<i>Sample size</i>	Animal unit (depending on number of observation points, see <i>method description</i>)
<i>Method</i>	Qualitative Behaviour Assessment (QBA) considers the expressive

<p><i>description</i></p>	<p>quality of how animals behave and interact with each other and the environment i.e. their 'body language'.</p> <p>Select between one and eight observation points (depending on the size and structure of the farm) that together cover the different areas of the farm. Decide the order to visit these observation points, wait a few minutesmin to allow the animals to return to undisturbed behaviour. Watch the animals that can be seen well from that point and observe the expressive quality of their activity at group level. It is likely that the animals will initially be disturbed, but their response to this can be included in the assessment. Total observation time shall not exceed 20 minutesmin, and so the time taken at each observation point depends on the number of points selected for a farm:</p> <table border="1" data-bbox="402 751 1117 926"> <tr> <td><i>Number of observation points</i></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td><i>Duration of observation per observation point in minutesmin</i></td> <td>10 20</td> <td>10</td> <td>6.5</td> <td>5</td> <td>4</td> <td>3.5</td> <td>3</td> <td>2.5</td> </tr> </table> <p>When observation at all selected points has been completed, find a quiet spot and score the 20 descriptors using the visual analogue scale (VAS). Please note that scoring is not done during observation, and that only one integrative assessment is made per farm.</p> <p>Each VAS is defined by its left 'minimum' and right 'maximum' point. 'Minimum' means that at this point, the expressive quality indicated by the term is entirely absent in any of the animals you have seen. 'Maximum' means that at this point this expressive quality is dominant across all observed animals. Note that it is possible to give more than one term a maximum score; animals could for example be both entirely calm and content.</p> <p>To score each term, draw a line across the 125 mm scale at the appropriate point. The measure for that term is the distance in millimetres from the minimum point to the point where the line crosses the scale. Do not skip any term.</p> <p>Please be aware when scoring terms that start with a negative pre-fix, such as "unsure" or "uncomfortable". As the score gets higher, the meaning of the score gets more negative, not more positive.</p> <p>The terms used for the QBA applied to sows and piglets are:</p> <ul style="list-style-type: none"> • Active • Relaxed • Fearful • Agitated • Calm • Content • Tense • Enjoying • Frustrated • Sociable • Bored • Playful • Positively occupied • Listless • Lively • Indifferent • Irritable • Aimless • Happy • Distressed 	<i>Number of observation points</i>	1	2	3	4	5	6	7	8	<i>Duration of observation per observation point in minutesmin</i>	10 20	10	6.5	5	4	3.5	3	2.5
<i>Number of observation points</i>	1	2	3	4	5	6	7	8											
<i>Duration of observation per observation point in minutesmin</i>	10 20	10	6.5	5	4	3.5	3	2.5											
<p><i>Classification</i></p>	<p>Farm level: Continuous scales for all body language parameters from minimum to maximum.</p>																		

Optional additional information	QBA rating scales and parameters (see Recording Sheets Annex B)
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5.1.5 Sampling and practical information

Different number of animals must be sampled according to each measure; these are summarized in Table 3. However, the number of animals in each pen must be recorded for all litters and group-housed sows. Some farms may still house sows in stalls; where this is the case, ensure that these animals are representatively sampled. For some measures there will be a requirement to sample at specific stages of pregnancy; full details on that aspect are given in Table 3, as well as in the 'Selecting sows for assessment' section of this paragraph.

There is a variety of recording sheets for different measures (see Annex B). For each measure there are instructions on which recording sheet to use. Each recording sheet has an area to record notes which may be useful at a later date.

Table 3 Order of information collected, sample size and time required. Summary of the sample size required for each measure according to the stage of production.

Information collected	No. of pregnant sows to sample	No. of lactating sows to sample	No. of litters to sample	Time required	
Management-based measures ^Y	–	–	–	25 minutesmin	
Qualitative behaviour assessment (QBA)	–	–	–	20 minutesmin	
Fear of humans	20 ^{E,L}	–	–	30 minutesmin	
<i>Clinical measures:</i>					
Wounds on the body	30 ^{E,M,L}	10 ^W	–	150 minutesmin	
Vulval lesions	30 ^{M,L}	10 ^W	–		
Body condition score	30 ^{M,L}	10 ^W	–		
<i>Health measures:</i>					
Coughing	30 ^{E,M,L}	10	10 ^X		
Sneezing	30 ^{E,M,L}	10	10 ^X		
Pumping	30 ^{E,M,L}	10	10 ^X		
Rectal prolapsed	30 ^{E,M,L}	10	10 ^X		
Scouring	30	10	10		
Constipation	–	10	–		
Absence of manure on the body	30 ^{E,M,L}	10	10 ^X		
Mastitis	–	10	–		
Metritis	30 ^S	10 ^{F1}	–		
Uterine prolapsed	–	10 ^{F2}	–		
Lameness	30 ^{E,M,L}	–	10 ^X		
Skin condition	30	10	–		
Ruptures and hernias	30	10	–		
Local infections	30	10	–		
Neurological disorders	–	–	10 ^X		
Splay leg	–	–	10 ^X		
Bursitis	30	10	–		
Shoulder sores	–	10 ^{W,F}	–		
Huddling	30	10	10 ^X		
Panting	30	10	10 ^X	35 minutesmin	
<i>Behaviour:</i>					

Stereotypies	40 ^{E,M,L}	–	–	20 <i>minutes</i> <i>min</i>
Social behaviour ¹	–	–	–	20
Exploratory behaviour ¹	–	–	–	<i>minutes</i> <i>min</i>
Resource-based measures ²	–	–	–	30 <i>minutes</i> <i>min</i>
Total time				330 min. (5.5 <i>hoursh</i>)

Y: All management-based measures are included here

E: sample in early pregnancy

M: sample in mid-pregnancy

L: sample in late pregnancy

S: sample around service

W: sample around time of weaning

F1: sample within two days after farrowing

F2: sample within week after farrowing

X: litters of different ages

1: The total number of pens to be recorded will depend on the group size in each pen: Small groups (<15 sows): record 4 pens, large groups (> 40 sows): record 1 pen, intermediate groups: record 2 pens. If sows are housed in a large group where it is not possible to view every sow, the assessor must estimate the number of animals observed.

2: For pregnant sows, 6 pens must be sampled and for lactating sows and piglets, 5 pens. However, in case of electronically fed pigs with big pens (around 200 sows) only 1 or 2 pens should be assessed.

Selecting sows for assessment

The same sows should be used for as many different measures as possible, as it is time-consuming entering many different pens and selecting many different sows. Use the following guidelines when deciding which sows to sample:

- Identify 30 sows to sample, 10 in each of the three stages of pregnancy-non-lactating sows (early, mid- and late gestation, each lasting 40 days), that can be used for the majority of the measures. Although for some measures the stage of pregnancy is not relevant, the use of this sampling methodology ensure a correct representative sample and simplifies the assessment
- For the assessment of the human-animal relationship, use the sows already selected in early and late gestation.
- For the assessment of stereotypies, use the 30 sows selected above, plus an additional three sows in both early and late gestation and an additional four sows in mid-gestation.
- Metritis is to be assessed in sows around the time of service and at farrowing (15 sows at each point); the sows selected around the time of service may have to differ from the original group of 10 selected sows in early pregnancy gestation.
- For both social and exploratory behaviour (assessed at the same time) the total number of pens to be recorded will depend on the group size in each pen. For small groups (< 15 sows): record 4 pens; for large groups (> 40 sows): record 1 pen; for intermediate groups: record 2 pens. If sows are housed in a large group where it is not possible to view every sow, the number of animals that are observed shall be estimated.
- For the measurement of stereotype behaviour the following selection guidelines should be followed: where animals are housed in small groups (10 pigs or less), it is not necessary to mark the sows. The proportion of sows in first gestation shall not exceed 20% of the total number sampled. Where sows are housed in groups, a minimum of two pens must be observed. In small stable groups (< 10 sows), all of the animals must be observed. Where sows are housed in stalls, approximately equal numbers of sows in each of the three stages of pregnancy should be assessed.

Selecting sows in pens

Where sows of similar stages of pregnancy are housed in relatively small pen groups (≤ 6 sows per pen), select all of the sows in a pen (where feasible), as opposed to sample only one or two animals in many different pens.

Comment [PPN23]: We had a discussion about when a gestation starts and came up with this definition

Comment [HV24]: Use pregnancy or gestation, but not both

Where sows of similar stages of pregnancy are housed in several larger pen groups (≥ 6 sows per pen) sample a representative number of sows from the different pens. For example, if for each stage of pregnancy there are two pens, each containing 25 sows, one shall sample five sows from each pen for each of the three stages of pregnancy.

Alternatively, sows of similar stages of pregnancy may be housed in large pens (≥ 100 sows). In such cases the selection of sows must be randomized. To select sows randomly, the assessor must enter the pen and select the first sow in sight as the 'starting sow'. The assessor shall complete all the necessary measures on this sow, then move to the sow whose head is the fourth away (facing) from the 'starting sow' and make the necessary assessments. Continue in this manner until all the necessary sows have been sampled.

On some farms, sows may be housed in large groups containing animals of different stages of pregnancy. In such cases it would be too time-consuming for the assessor to firstly identify the sows by stage of pregnancy and to then randomly select sows for the assessment. On such farms, the selection of sows must be completely random, using the randomized sampling strategy described above.

As sows in large pens are selected randomly, it is possible that the assessor will observe, but not assess, a sow suffering from poor welfare. It is important that there is no bias towards selecting such sows, as this would mean that the selection of sows would no longer be random. Instead, the assessor shall make a note of the sow's ID and a brief description of the nature of the problem. The assessor can use the recording sheets in Annex B to record any animals which he/she feels should have been moved to hospital accommodation, or even euthanized.

Distribution of pens:

Ensure that you do not sample only adjacent pens within a room or building. On many farms sows in different stages of pregnancy may be housed within the same building (or even room), and are likely to be distributed equally across the building/room. However, when there are many small pens to sample within a building or room, pens at either end of the building (and in the middle if necessary) should be selected.

On farms where animals at the same stage are housed in different buildings, ensure that animals in all of the different types of buildings have been sampled.

More information on the procedure for the assessor can be found in Annex A ('Guidelines for the visit to the animal unit').

5.2 Calculation of scores for sows and piglets on farm

As yet, this is not included in the protocol.

5.3 Collection of data for sows and piglets at slaughterhouse

~~As yet, this is not included in the protocol.~~ [This will not be included in this protocol](#)

5.4 Calculation of scores for sows and piglets at slaughterhouse

~~As yet, this is not included in the protocol.~~ [This will not be included in this protocol](#)

Comment [PPN25]: 5.3 and 5.4 will probably never be developed and we therefore suggest to change the text

6 Welfare Quality[®] applied to growing pigs and finishing pigs

The assessment of welfare should be a multi-disciplinary process since assessment on a variety of different parameters can provide a more comprehensive assessment of an animal's welfare in any given system. To this end, the Welfare Quality[®]-project utilizes physiological, health and behavioural aspects to assess the welfare of growing pigs on farm and at the slaughterhouse.

In this chapter a description of each measure for growing and finisher pigs is given, followed by additional information about the sample size and the order in which the different measures have to be carried out.

Before commencing farm visits, assessors have to be fully trained for all the measures that have to be assessed using photographs, video clips and practical 'on farm' training. For some of the health measures, this training will involve recognition of symptoms of certain conditions/diseases; however it is imperative that this document is not used as a diagnostic tool to identify individual health conditions, but rather as a tool to highlight the presence of health problems affecting the welfare of animals. The assessor should not enter into discussions with the animal unit manager on the prevalence or severity of different diseases on their farm; this is a matter for the animal unit manager and the herd veterinarian. Additionally, in general, the role of the assessor is to assess, and is not to advise directly.

Trained assessors will use either animal-based, management-based, and resource-based measures to achieve a representative welfare assessment for each farm and slaughterhouse. Many different measures are assessed, however most are scored according to a three-point scale ranging from 0 to 2. The assessment scales have been selected so that a score 0 is awarded where welfare is good, a score 1 is awarded (where applicable) where there has been some compromise on welfare, and a score 2 is awarded where welfare is poor and unacceptable. In some cases a binary (0/2 or Yes/No) or a cardinal scale (e.g. m²) is used.

The assessor should prepare and start the visit according to the description provided in Annex A ('Guidelines for visit to the animal unit'). Data can be recorded with aid of Annex B ('Recording Sheets').

6.1A Collection of data for growing pigs on farm (measured on farm)

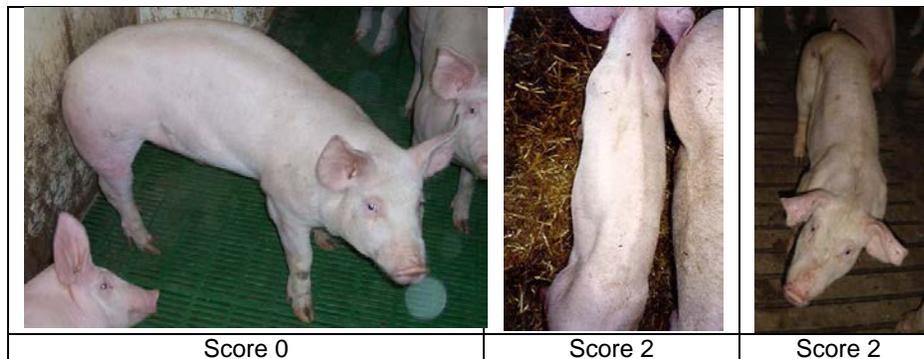
	Welfare criteria		Measures
Good feeding	1	Absence of prolonged hunger	Body condition score
	2	Absence of prolonged thirst	Water supply
Good housing	3	Comfort around resting	Bursitis, absence of manure on the body
	4	Thermal comfort	Shivering, panting, huddling
	5	Ease of movement	Space allowance
Good health	6	Absence of injuries	Lameness, wounds on the body, tail biting
	7	Absence of disease	Mortality, coughing, sneezing, pumping, twisted snouts, rectal prolapse, scouring, skin condition, ruptures and hernias
	8	Absence of pain induced by management procedures	Castration, tail docking
Appropriate behaviour	9	Expression of social behaviours	Social behaviour

	10	Expression of other behaviours	Exploratory behaviour
	11	Good human–animal relationship	Fear of humans
	12	Positive emotional state	Qualitative Behaviour Assessment (QBA)

6.1A.1 Good feeding

6.1A.1.1 Absence of prolonged hunger

<i>Title</i>	Body condition score
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	The spine, hip and pin bones of the pigs to be scored are visually inspected, considering how visible the bones are. Animals with visible spine, hip and pin bones will be scored as lean pigs. Individual level: 0 – Animal with a good body condition 2 – Lean animals
<i>Classification</i>	Herd level: Percentage of pigs with poor condition (i.e. score 2)



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6.1A.1.2 Absence of prolonged thirst

<i>Title</i>	Water supply
<i>Scope</i>	Resource-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	These are the three aspects that will be taken into consideration in each pen of pigs observed: <ul style="list-style-type: none"> • the number of drinking places • the functioning of the drinkers • the cleanliness of drinkers: drinkers will be considered hygienic when without faeces and without mould in the water A drinking place will be considered as the space occupied by one pig while it is drinking without being disturbed. The number of places can be one place per drinker for individual drinkers, but can also be several

	<p>'places' per 'long' drinker. In the case of liquid fed pigs, the feeder will also be considered as <u>aa</u> drinking place <u>if clean water (water without traces of food) is available in the through at the time of assessment.</u></p> <p>The information provided by the manager can be corroborated by the assessor during the course of the visit. Doing so, the assessor will assess the type of drinker (pipe, bowl or <u>trough</u>), its length (when possible), cleanliness and functioning.</p>
<i>Classification</i>	<p>Group level: Number of drinking places and Functioning of drinkers 0 – The drinkers function correctly 2 – The drinker don't function properly and Cleanliness of drinkers 0– Clean 2– Dirty</p>
<i>Optional additional information</i>	Note that there are more aspects (in addition to functioning and hygiene) regarding water <u>supply</u> which is recorded in Annex B (at the time of the visit).

Comment [PPN26]: We added this to clarify that the through can only be considered a drinking place if it contains non-contaminated water

6.1A.2 Good housing

6.1A.2.1 Comfort around resting

<i>Title</i>	Bursitis
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>The assessor should take a position inside the pen up to a maximum distance of 1 meter from the animal and visually examine one side of the animal for the presence of bursitis. Choose the side with the optimal view for observation.</p> <p>A bursa is a fluid filled sac that develops as a result of a pressure injury on the weight-bearing points of the legs. Bursae are most prevalent in the hock region of the hind limbs, although they can occur in other locations.</p> <p>Each <u>pig-leg</u> will be individually scored according to the following categorization:</p> <ul style="list-style-type: none"> • small bursae: in growers comparable in size to a grape; 1.5–2.0 cm • large bursa: in growers this is comparable in size to a walnut; >2.0–5.0 cm diameter • extremely large bursa: in growers this is comparable in size to a tangerine; >5.0–7.0 cm diameter <p>Individual level (based on the worst scored leg): 0 – No evidence of bursae/swelling <u>in any leg</u> 1 – One or several small bursae on the same leg or one large bursa <u>on the same leg</u> 2 – Several large bursae on the same leg, or one extremely large bursa or any bursae that are eroded <u>on the same leg</u></p>
<i>Classification</i>	<p>Herd level: Percentage of pigs with scored as 0</p>

Comment [EMB27]: Please, check the consistency of "scored as" or "score"

Comment [PPN28]: I have changed this to ' .. of pigs with score..'

	Percentage of pigs with scores as-1 Percentage of pigs with scores as-2
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<i>Title</i>	Manure on the body
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>To make the assessment the assessor should stay within the pen and must have an unobstructed view of one side of the body.</p> <p>The presence of manure/faeces on the body should be visually assessed on one side of the body. Choose the side with the optimal view for observation.</p> <p>Note that this parameter should not be confused with dirtiness– an outdoor pig soiled with mud is perfectly normal, and does not necessarily indicate a welfare problem.</p> <p>Pigs are scored individually according to the proportion of the body side soiled:</p> <p>0 – Up to 20% of the body surface is soiled 1 – More than 20% but less than 50% of the body surface is soiled 2 – Over 50% of the body surface is soiled</p>
<i>Classification</i>	<p>Herd level:</p> <p>Percentage of pigs with scoresas-0 Percentage of pigs with scoresas-1 Percentage of pigs with scoresas-2</p>

6.1A.2.2 Thermal comfort

<i>Title</i>	Shivering
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Since shivering is best observed in resting animals; wait a moment to allow animals to settle when first entering the room. The assessor should stay outside the pen.</p> <p>Shivering is defined as the slow and irregular vibration of any body part, or of the body as a whole.</p> <p>Visually examine the selected group of animals and estimate the number of pigs that are shivering.</p>
<i>Classification</i>	<p>Group level:</p> <p>0 – No pigs in the pen/group are observed shivering 1 – Up to 20% of pigs in the pen are observed shivering 2 – More than 20% of pigs in the pen are observed shivering</p>

<i>Title</i>	Panting
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Since panting is best observed in resting animals, wait a moment to allow the animals to settle when first entering the room. The assessor must stay outside the pen.</p> <p>The definition of panting is breathing rapidly in short gasps carried out</p>

	with the mouth. Visually examine the selected group of animals and estimate the number of pigs that are panting.
<i>Classification</i>	Group level: 0 – No pigs in the pen/group observed are panting 1 – Up to 20% of pigs in the pen observed are panting 2 – More than 20% of pigs in the pen observed are panting

<i>Title</i>	Huddling
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	Since huddling is only observed in resting animals, wait a moment to allow the animals to settle when first entering the room. The assessor must stay outside the pen. The definition of huddling is when a pig is lying with more than half of its body in contact with another pig (i.e. virtually lying on top of another pig). It is not considered huddling when an individual is just side by side with another animal. The proportion of animals showing the behaviour will be considered in relation to the number of resting pigs (hence not in relation to the total animals of the pen/group).
<i>Classification</i>	Group level: 0 – No pigs in the pen/group are displaying huddling behaviour 1 – Up to 20% of resting pigs in the pen/group are displaying huddling behaviour 2 – More than 20% of resting pigs in the pen are displaying huddling behaviour

6.1A.2.3 Ease of movement

<i>Title</i>	Space allowance
<i>Scope</i>	Resource- and management-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	Ask the animal unit manager about the number of pigs in every pen/room/building. After the health measures, the assessor will assess the length and width of the area provided to the animals. Before the health measures are assessed, the assessor will count the total number of animals inside the pens/group of animals. The assessor will also ask the farmer about the average weight of pigs in the pens (in case of doubt the weight can be calculated with 700 g/day(age) between the weight of 8 – 115 kg). Space allowance is calculated as the area provided to animals divided by the number of animals.
<i>Classification</i>	Group level: Space allowance expressed in m ² /100 kg animal

Comment [PPN29]: This was added to ease the space allowance. The 700g/day might have to be evaluated at a later stage

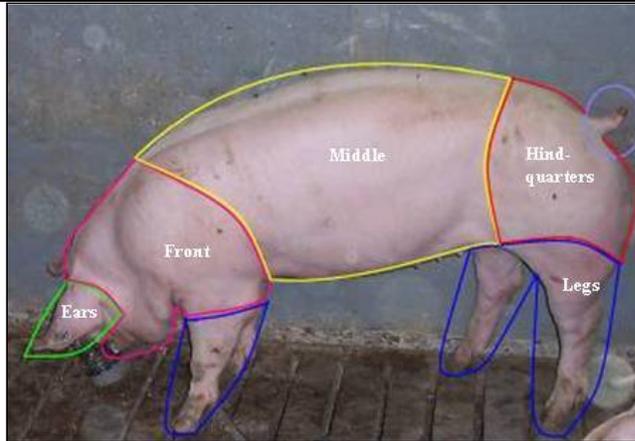
6.1A.3 Good health

6.1A.3.1 Absence of injuries

<i>Title</i>	Lameness
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<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>The assessor must ensure that the pig has walked a certain distance before starting the assessment. Furthermore the assessor should have a clear and unobstructed view of the moving animal.</p> <p>Lameness is the inability to use one or more limbs in a normal manner. It can vary in severity from reduced mobility or inability to bear weight, to total recumbency.</p> <p>The assessor must assess the pig walking. Lameness shall first be considered at the individual pig level according to the scale below, and then on a group level.</p> <p>Individual level: 0 – Normal gait or difficulty in walking, but still using all legs; swagger of caudal body while walking; shortened stride 1 – Severely lame, minimum weight-bearing on the affected limb and 2 – No weight-bearing on the affected limb, or not able to walk</p>
<i>Classification</i>	<p>Herd level: Percentage of animals affected with lameness score 0 Percentage of animals affected with lameness score 1 Percentage of animals affected with lameness score 2</p>

<i>Title</i>	Wounds on the body
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>The assessor must maintain a distance of approximately 0.5 m from the animal at all times.</p> <p>Wounds on the body should be visually assessed by inspecting one side of the pig's body. Choose the side with the optimal view for observation. The tail zone is not considered here.</p> <p>Wounds on the body can present as either surface penetration of the epidermis or penetration of the muscle tissue. At the same time, it can be defined as scratches or wounds, respectively.</p> <p>The pig's body is considered according to five separate regions:</p> <ol style="list-style-type: none"> 1. Ears 2. Front (head to back of shoulder) 3. Middle (back of shoulder to hind-quarters) 4. Hind-quarters 5. Legs (from the accessory digit upwards).



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Each zone will be considered separately according to this standardization:

- A scratch longer than 2 cm will be considered as 1 lesion, 2 parallel scratches with up to 0.5 cm space between them will be considered as 1 lesion,
- A small wound (less than 2 cm) will be considered as 1 lesion,
- A bleeding wound between 2 and 5 cm, or a healed wound more than 5 cm will be considered as 5 lesions. A deep and open wound of more than 5 cm will be considered as 16 lesions.

The assessor must assess each sow's region according to the following scale:

- a – No visible skin injuries, or up to 4 lesions visible
- b – 5 to 10 lesions visible
- c – 11 to 15 lesions visible

Individual level:

- 0** – All body regions with an individual score 'a'
- 1** – Any body region with an individual score 'b' and/or maximum of one body region with an individual score 'c'
- 2** – Two or more body regions with an individual score 'c', or at least one body region that has more than 15 lesions.

<i>Classification</i>	<p>Herd level: Percentage of pigs with wounds with scores scored as 0 Percentage of pigs with wounds with scores scored as 1 Percentage of pigs with wounds with scores scored as 2</p>
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<i>Title</i>	Tail biting
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	All animals to be scored should be standing up. The assessor should have a clear and unobstructed view of the pig's tail.

Comment [PPN30]: 1.6.1A.3.1 Tail biting: as a discussion point we should address if old wounds are also as serious as fresh wounds. So should be added to the percentages. **[HV]** yes take all wounds together. If a tail is shorter and healed you cannot see the difference between a bitten or docked tail.

Comment [PPN31]: See my suggestions for changing the text below

	<p>Tail biting is a parameter related to damage of the tail, ranging from superficial bites along the length of the tail to absence of the tail.</p> <p>The assessor should assess according to the following scale: 0 – No evidence of tail biting or Indication of superficial biting along the length of the tail, but no evidence of fresh or old blood or of any swelling (red areas on the tail are not considered as wounds unless associated with fresh or old blood); 2 – Fresh blood, fresh or old, is visible on the tail; there is evidence of some swelling and infection; part of the tail tissue is missing and a crust has formed</p>
<i>Classification</i>	<p>Herd level: Percentage of pigs with a-score 2</p>

6.1A.3.2 Absence of disease

<i>Title</i>	Mortality
<i>Scope</i>	Management-based measure: Growing pigs
<i>Sample size</i>	Animal unit
<i>Method description</i>	<p>Mortality is defined as the 'uncontrolled' death of animals (as distinct from culling/euthanasia). The animals may die from, for example, septicaemia, respiratory disease, acute infection or dehydration. Any animal which is 'found dead' on the floor in the house, or out on the field is considered a mortality.</p> <p>The animal unit manager is asked about mortality management on the farm based on data collected from farm records. Using house records of animal numbers placed, minus number died (but not including those actively culled).</p> <p>Number of animals placed in house from previous animal unit (A) Total number of animals which died and were found dead (but were not actively culled) during the last 12 months (M)</p> <p>Calculate the percentage mortality using the following equation: Percentage of mortality = $(M/A) \times 100$</p>
<i>Classification</i>	Percentage of mortality on farm during the last 12 months

<i>Title</i>	Coughing (respiratory disorders)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Directly after making the animals to stand up, during the 5 minute waiting period before doing the social and exploratory behaviour assessment, coughing and sneezing can be assessed.</p> <p>Coughing will be assessed at a total of 6 points of observations inside the farm and it is preferable that from each point of observation at least two pens can be observed (usually corresponding to approximately 20–40 animals per point of observation).</p> <p>Coughing will be assessed for 5 minutes per observation point. The total number of pigs observed (in the group or in the pen) will be considered. The number of coughs occurring during five minutes is</p>

	recorded.
<i>Classification</i>	Group level: Average frequency of coughs per animal during 5 minutes min

<i>Title</i>	Sneezing (respiratory disorders)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Directly after making the animals to stand up, during the 5 minute waiting period before doing the exploratory and social behaviour scan sampling, coughing and sneezing can be assessed.</p> <p>Sneezing will be assessed at a total of 6 points of observation inside the farm and it is preferable that from each point of observation at least two pens can be observed (usually corresponding to approximately 20–40 animals per observation point).</p> <p>Sneezing will be assessed during 5 minutesmin per observation point. The total number of pigs observed (in the group or in the pen) sneezing during five minutesmin is recorded.</p>
<i>Classification</i>	Group level: Average frequency of sneezes per animal during 5 minutes min

<i>Title</i>	Pumping (laboured breathing)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Pumping is defined as when the pig's breathing is heavy and laboured, and it is easy to see the chest rising and falling with each breath.</p> <p>The assessor must score the number pigs presenting with pumping.</p>
<i>Classification</i>	Individual level: 0 – Percentage of pigs with no evidence of laboured breathing 2 – Percentage of pigs with evidence of laboured breathing

<i>Title</i>	Twisted snouts
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Twisted snouts are characteristic of atrophic rhinitis, and can vary in severity from a slight deformity of the snout to severe nasal distortion.</p> <p>The assessor must score the pigs presenting twisted snouts at the individual level.</p>
<i>Classification</i>	Individual level: 0 – Percentage of pigs with no evidence of twisted snouts 2 – Percentage of pigs with evidence of twisted snouts

<i>Title</i>	Rectal prolapse (enteric disorders)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	A rectal prolapse is when internal tissue extrudes from the rectum. As rectal prolapse is either present or absent, score the number of pigs presenting this problem. Note that the first visible sign of a rectal prolapse is often blood on the faeces.

	The assessor will score the pigs presenting rectal prolapse at individual level.
<i>Classification</i>	Individual level: 0 – Percentage of pigs with no evidence of rectal prolapse 2 – Percentage of pigs with evidence of rectal prolapse

<i>Title</i>	Scouring (enteric disorders)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	The measure for scouring cannot be carried out at the individual animal level, so the assessor must identify areas in the pen where the dung is visible and fresh and then make the assessment. The number of animals in the pen should be recorded. Scouring is considered to occur when the faeces become more fluid in consistency than normal. Scouring will be assessed based on visible and fresh dung on the floor of the pen, or from the surroundings of the area pigs use to defecate in extensive conditioner from the surroundings of the area where pigs are kept in extensive conditions.
<i>Classification</i>	Group level: 0 – No liquid manure visible 1 – Some liquid manure visible 2 – All faeces visible is liquid manure

Comment [PPN32]: Changed for clarification

<i>Title</i>	Skin condition
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	Assess one side of the body. Choose the side with the optimal view for observation. Certain diseases can cause characteristic inflammation or discolouration of the skin. Each animal should be visually inspected individually. It is important to consider the total zone affected in relation to the rest of the body not affected.
<i>Classification</i>	Individual level: 0 – No evidence of skin inflammation or discolouration 1 – Up to 10% of the skin is inflamed, discoloured or spotted 2 – More than 10% of the skin has an abnormal colour or texture Herd level: Percentage of pigs scored as 2

<i>Title</i>	Ruptures and h Hernias
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	Observe the animal from the front, back and side.

	<p>Hernias and ruptures occur when there is protrusion of a body structure or organ through the wall that normally contains it, resulting in a lump under the skin in the umbilical or inguinal area (see photographic illustration).</p> <p>The presence of umbilical or inguinal hernias is assessed.</p>
<i>Classification</i>	<p>Individual level:</p> <p>0 – No hernia/rupture</p> <p>1 – Hernias or ruptures present, but the affected area is not bleeding, not touching the floor and not affecting locomotion</p> <p>2 – Bleeding lesions, hernias/ruptures and/or hernias/ruptures touching the floor</p> <p>Herd level</p> <p>Percentage of pigs with scores scored as 0</p> <p>Percentage of pigs with scores scored as 1</p> <p>Percentage of pigs with scores scored as 2</p>



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6.1A.3.3 Absence of pain induced by management procedures

<i>Title</i>	Castration (mutilation)
<i>Scope</i>	Management-based measure: Growing pigs
<i>Sample size</i>	Animal unit
<i>Method description</i>	The animal unit manager is asked about mutilation management with regard to castration (what proportions of pigs are castrated). Furthermore ask whether anaesthetics are used during the procedure.
<i>Classification</i>	<p>0 – No castration</p> <p>1 – Castration with use of anaesthetics</p> <p>2 – Castration without use of anaesthetics</p>

<i>Title</i>	Tail docking (mutilation)
<i>Scope</i>	Management-based measure: Growing pigs
<i>Sample size</i>	Animal unit
<i>Method description</i>	The animal unit manager is asked about mutilation management regarding tail docking (what proportions of pigs are tail docked). Furthermore ask whether anaesthetics are used during the procedure.
<i>Classification</i>	0 – No tail docking

	1 – Tail docking with use of anaesthetics 2 – Tail docking without use of anaesthetics
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6.1A.4 Appropriate behaviour

6.1A.4.1 Expression of social behaviours

<i>Title</i>	Social behaviour (negative and positive)
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Observations should take place in the morning when the animals are more active. If animals are not fed ad libitum, observations are made outside the feeding period, at least one hour after the morning meal. Before starting the assessment, the assessor needs to enter the room and ensure that all animals are standing up. If necessary, clap the hands and wait 5 minutes before making observations from the passageway. These 5 minutes can be used to assess coughs and sneezes.</p> <p>The behaviours recorded are:</p> <ul style="list-style-type: none"> • Negative social behaviour (N) is defined as an aggressive interaction, including biting or any social behaviour with a response from the disturbed animal. • Positive social behaviour (P) is defined as sniffing, nosing, licking and moving gently away from the animal without an aggressive or flight reaction from this individual. • Animals not showing positive or negative social behaviour or exploratory behaviour shall be recorded as resting (R) or 'other' (O), which is defined 'other active behaviour', such as eating, drinking or air sniffing. <p>From the passageway, the behaviour of the active animals should be recorded using five consecutive scans with a two minute intervals between scans. A summary is calculated on the scoring sheet (line "total"): the figures in RS of Annex B are the sum of each behaviour.</p> <p>Group level: Number of active sample points (= number of scans multiplied by the number of animals observed) and Number of sample points during which a positive social behaviour was observed and Number of sample points during which a negative social behaviour was observed</p>
<i>Classification</i>	<p>Herd level: Number of sample points when a social behaviour was observed out of the total of active behaviours observed and Proportion of sample points when a negative behaviour was observed from the total sample points when social behaviour was observed</p>

6.1A.4.2 Expression of other behaviours

<i>Title</i>	Exploratory behaviour
<i>Scope</i>	Animal-based measure: Growing pigs

<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>Observations should take place in the morning when animals are more active. However, observations should be made outside the feeding period, at least one hour after the morning meal if pigs are ration fed. Before starting the assessment the assessor needs to enter the room and ensure that all of the animals are standing up. If necessary, clap the hands and wait 5 minutes before making observations from the passageway. These 5 minutes can be used to assess respiratory disorders in the animals.</p> <p>The behaviours recorded are:</p> <ul style="list-style-type: none"> • Investigation of the pen (S) is defined as sniffing, nosing, licking or chewing all features of the pen. • Exploring enrichment material (E) is defined as play/investigation towards straw or other enrichment material. • Animals not showing exploratory, positive or negative social behaviour shall be recorded as resting (R) or 'other' (O), which is defined other active behaviours, such as eating, drinking or air sniffing. <p>From the passageway, the behaviour of all the active animals should be recorded using five scan samples made at two minute intervals. A summary is calculated on the scoring sheet (line "total" on the RS) : the figures in RS of Annex B are the sum of each behaviour.</p> <p>Group level: Number of sample points (= number of scans multiplied by the number of animals observed) Number of sample points when exploration of pen features was observed Number of sample points when exploration of enrichment material was observed</p>
<i>Classification</i>	<p>Herd level: Proportion of sample points when exploration of pen features and enrichment material was observed from the total sample points when an active behaviour was observed and Proportion of sample points when exploration of enrichment material was observed from the total sample points when an active behaviour was observed</p>

6.1A.4.3 Good human–animal relationship

<i>Title</i>	Fear of humans
<i>Scope</i>	Animal-based measure: Growing pigs
<i>Sample size</i>	Sample size according to § 6.1A.5
<i>Method description</i>	<p>It will be considered whether the animals show a panic response towards humans or not. Panic is defined as animals fleeing, or facing away from the assessor or huddling in the corner of the pen.</p> <p>Firstly, the assessor should enter the pen, or stand next to the group of animals in extensive conditions, and then walk around the group very slowly.</p> <p>Then, the assessor arrives at the starting point and must stop and wait for 30 s. After 30 s the assessor must change direction and walk around</p>

	<p>the pen/group of animals very slowly, considering the response of the animals to this second contact. When walking through the group the assessor shall not initiate any physical interactions or talk to the animals. Limited physical contact may occur during walking, such as a gentle touch when pigs are ahead of the assessor and therefore very close.</p> <p>Group level: 0 – Up to 60% of the animals showing a panic response 2 – More than 60% of the animals showing a panic response.</p>
<i>Classification</i>	<p>Herd level: Percentage of pens with panic scored as 2</p>

6.1A.4.4 Positive emotional state

<i>Title</i>	Qualitative Behaviour Assessment (QBA)																		
<i>Scope</i>	Animal-based measure: Growing pigs																		
<i>Sample size</i>	Animal unit (depending on number of observation points, see method description)																		
<i>Method description</i>	<p>Qualitative Behaviour Assessment (QBA) considers the expressive quality of how animals behave and interact with each other and the environment i.e. their 'body language'.</p> <p>Select between one and eight observation points (depending on the size and structure of the farm) that together cover the different areas of the farm. Decide the order to visit these observation points, wait a few <u>minutes</u> to allow the animals to return to undisturbed behaviour. Watch the animals that can be seen well from that point and observe the expressive quality of their activity at group level. It is likely that the animals will initially be disturbed, but their response to this can be included in the assessment. Total observation time shall not exceed 20 <u>minutes</u>, and so the time taken at each observation point depends on the number of points selected for a farm:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: right;"><i>Number of observation points</i></td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: right;"><i>Duration of observation per observation point in minutes</i></td> <td style="text-align: center;">240</td> <td style="text-align: center;">10</td> <td style="text-align: center;">6.5</td> <td style="text-align: center;">5</td> <td style="text-align: center;">4</td> <td style="text-align: center;">3.5</td> <td style="text-align: center;">3</td> <td style="text-align: center;">2.5</td> </tr> </table> <p>When observation at all selected points has been completed, find a quiet spot and score the 20 descriptors using the visual analogue scale (VAS). Please note that scoring is not done during observation, and that only one integrative assessment is made per farm.</p> <p>Each VAS is defined by its left 'minimum' and right 'maximum' point. 'Minimum' means that at this point, the expressive quality indicated by the term is entirely absent in any of the animals you have seen. 'Maximum' means that at this point this expressive quality is dominant across all observed animals. Note that it is possible to give more than one term a maximum score; animals could for example be both entirely calm and content.</p> <p>To score each term, draw a line across the 125 mm scale at the</p>	<i>Number of observation points</i>	1	2	3	4	5	6	7	8	<i>Duration of observation per observation point in minutes</i>	240	10	6.5	5	4	3.5	3	2.5
<i>Number of observation points</i>	1	2	3	4	5	6	7	8											
<i>Duration of observation per observation point in minutes</i>	240	10	6.5	5	4	3.5	3	2.5											

Comment [HV33]: This situation will only occur when lactating and pregnant sows are in 1 groups, but this will be very rare. Even in a larger group you should use more observation points. My idea: skip this column.

Comment [PPN34]: Harmonize with other protocols and maybe ask the Scottish lady if we can change this

	<p>appropriate point. The measure for that term is the distance in millimetres from the minimum point to the point where the line crosses the scale. Do not skip any term.</p> <p>Please be aware when scoring terms that start with a negative pre-fix, such as “_unsure_” or “_uncomfortable_”. As the score gets higher, the meaning of the score gets more negative, not more positive.</p> <p>The terms used for the QBA applied to growing pigs:</p> <ul style="list-style-type: none"> • Active • Relaxed • Fearful • Agitated • Calm • Content • Happy • Tense • Enjoying • Frustrated • Sociable • Bored • Playful • Distressed • Positively occupied • Listless • Lively • Indifferent • Irritable • Aimless
<i>Classification</i>	<p>Herd level: Continuous scales (in mm) for all body language parameters from minimum to maximum.</p>
<i>Optional additional information</i>	<p>QBA rating scales and parameters (see Annex B Recording Sheets)</p>

6.1A.5 Sampling and practical information

Table 4 Order of recorded measures, sample size, place and time required.

Information collected	Sample size	Place	Time required
Management-based measures ^Y	–	Animal unit manager	10 <u>minutes</u> <u>min</u>
Qualitative behaviour assessment (QBA)	2 to 8 Points of observation	PENS C	20 <u>minutes</u> <u>min</u>
Coughing	6 Points of observation Intensive farm: Minimum 2 pens Extensive farm: 40–60 animals	PENS A or B	30 <u>minutes</u> <u>min</u>
Sneezing			
Social behaviour	3 Points of observation 50–60 animals/point	PENS A	60 <u>minutes</u> <u>min</u>
Exploratory behaviour			
<i>Outside the pen:</i>	150 pigs from 10 different pens/groups (15 pigs per pen/group). When >15 animals per pen/group, 15 animals per pen/group will be randomly chosen and marked before assessment. If there are less than 10 pens/groups, the number of pigs inspected inside each pen/group should be increased until reaching a total of 150 animals	PENS B	170 <u>minutes</u> <u>min</u>
Huddling			
Shivering			
Panting			
<i>Inside the pen:</i>			
Fear of humans			
Body condition			
Bursitis			
Absence of manure on the body			
Wounds on the body			
Tail biting			
Lameness			
Pumping			
Twisted snouts			
Rectal prolapse			
Scouring			
Skin condition			
Ruptures and hernias			
Water supply	–	PENS B	20 <u>minutes</u> <u>min</u>
Space allowance	–	PENS B	20 <u>minutes</u> <u>min</u>
		Total time	330 <u>minutes</u><u>min</u> (5.5 <u>hours</u><u>h</u>)

Y: All management-based measures are included here

Selecting growing pigs for assessment

The same growing pigs should be used for as many different measures as possible, as it is time-consuming entering many different pens and selecting lots of different pigs. Use the following guidelines when deciding which pigs to sample:

- For the clinical measures the same animals can be used to assess all measures.
- For the resource-based measures assess the sample that is selected for the health measure in 'outside the pen'-measures, presented in Table 4 ('pens B').

- For social and exploratory behaviours: This method must be applied at three different stages of the growing/fattening period when it is possible: at the beginning of the period but at least one week after mixing to avoid the effect of the establishment of social hierarchy; at the end of the growing period when the space allowance is reduced and in the mid growing period (around 70 kg live weight). Usually, four adjacent pens will be observed per observation point. For post-weaning pigs, a single evaluation, at least 2 weeks after weaning, in the middle of the rearing period may be enough. In this case, also the pens must be adjacent. The pens should be chosen after a presentation of the layout of the room by the animal unit manager and before entering the room.
- The number of pens observed per room is related to the number of pigs per pen (intensive) group of animals (extensive). For small groups (<15 pigs): 4 pens/groups can be recorded; for large groups (>40 pigs): 1 pen/group is recorded. When the pen size is too large to see all the animals, observations must be made in order to see the feeding area, a part of the resting area and the dunging area. In between (from 15 to 40 pigs): 2 pens are recorded. In order to avoid the effect of location of the pens in the room in intensive conditions, pens must be located on both sides of the corridor and near the door or at the back. Therefore, the choice of pens may change from one room to another to give good overall spatial representation (i.e. pens observed at the beginning of the growing period are near the door, on both sides of the corridor; around 70 kg, pens at the back of the room are observed; and at the end of the growing period, pens located in the middle of the room are observed).

6.1B Collection of data for growing pigs on farm (measured at the slaughterhouse)

These measures are indicators of diseases and are performed at the slaughterhouse – but they reflect disease conditions indicating the farm life of the pigs and are not reflections of the slaughter process. Therefore they are used in the calculation of scores together with the previous on farm assessment, and jointly form the basis for the overall assessment for growing pigs on farm.

For all of the measures in paragraph 6.1B the percentage of affected animals will be calculated, it is therefore important to record the number of pigs that were taken to slaughter (and observed at slaughter) (see Annex B).

	Welfare criteria		Measures
Good feeding	1	Absence of prolonged hunger	This criterion is recorded on farm
	2	Absence of prolonged thirst	This criterion is recorded on farm
Good housing	3	Comfort around resting	This criterion is recorded on farm
	4	Thermal comfort	This criterion is recorded on farm
	5	Ease of movement	This criterion is recorded on farm
Good health	6	Absence of injuries	This criterion is recorded on farm
	7	Absence of disease	Pneumonia, pleurisy, pericarditis, white spots in the liver
	8	Absence of pain induced by management procedures	This criterion is recorded on farm
Appropriate behaviour	9	Expression of social behaviours	This criterion is recorded on farm
	10	Expression of other behaviours	This criterion is recorded on farm
	11	Good human-animal relationship	This criterion is recorded on farm
	12	Positive emotional state	This criterion is recorded on farm

6.1B.1 Good feeding

6.1B.1.1 Absence of prolonged hunger

This criterion is recorded on farm
 6.1B.1.2 Absence of prolonged thirst
 This criterion is recorded on farm

6.1B.2 Good housing

6.1B.2.1 Comfort around resting
 This criterion is recorded on farm
 6.1B.2.2 Thermal comfort
 This criterion is recorded on farm
 6.1B.2.3 Ease of movement
 This criterion is recorded on farm

6.1B.3 Good health

6.1B.3.1 Absence of injuries
 This criterion is recorded on farm
 6.1B.3.2 Absence of disease

<i>Title</i>	Pneumonia (slaughter checks)
<i>Scope</i>	Animal-based measure: Finishing pigs
<i>Sample size</i>	Sample size according to § 6.1B.5
<i>Method description</i>	<p>This measure is assessed after slaughter, evaluating the lungs. Pneumonia is defined as lungs with inflammatory processes on the surface and with consolidation. This measure will be taken after the evisceration of the animals and will be assessed preferably when the liver, lungs and heart have not been separated. Furthermore, assessment is carried out before any further manipulation of these organs has been carried out (for example, meat inspection incisions).</p> <p>The organs are assessed by visual inspection and by palpation and scored as shown below.</p> <p>Individual level: 0 – No evidence of pneumonia 2 – Evidence of pneumonia</p>
<i>Classification</i>	<p>Herd level: Percentage of pigs slaughtered affected by pneumonia</p>

<i>Title</i>	Pleurisy (slaughter checks)
<i>Scope</i>	Animal-based measure: Finishing pigs
<i>Sample size</i>	Sample size according to § 6.1B.5
<i>Method description</i>	<p>This measure is assessed after slaughter, observing the lungs.. Pleurisy is defined as an inflammation of the pleurae. It can lead to adhesions of the lungs with the pleura. When pleurisy is present the lungs appear partially or totally destroyed (with a lost part). The lost part is fixed to the carcass, but carcasses will not be examined to assess this parameter.</p> <p>This measure will be taken after the evisceration of the animals and will be assessed preferably when the liver, lungs and heart have not been separated. Furthermore, assessment is carried out before any further manipulation of these organs has been carried out (for example, meat inspection incisions).</p> <p>Pleurisy is assessed by visual inspection and palpation and scored as shown below.</p> <p>Individual level:</p>

	0 – No evidence of pleurisy 2 – Evidence of pleurisy
<i>Classification</i>	Herd level: Percentage of pigs slaughtered affected by pleurisy

<i>Title</i>	Pericarditis (slaughter checks)
<i>Scope</i>	Animal-based measure: Finishing pigs
<i>Sample size</i>	Sample size according to § 6.1B.5
<i>Method description</i>	<p>This measure is assessed after slaughter. Pericarditis is defined as an adhesion between the heart and the pericardium.</p> <p>This measure will be taken after the evisceration of the animals and will be assessed preferably when the liver, lungs and heart have not been separated. Furthermore, assessment is carried out before any further manipulation of these organs has been carried out (for example, meat inspection incisions).</p> <p>Pericarditis is assessed by visual inspection and palpation and scored as shown below.</p> <p>Individual level: 0 – No evidence of pericarditis 2 – Evidence of pericarditis</p>
<i>Classification</i>	Herd level: Percentage of pigs slaughtered affected by pericarditis

<i>Title</i>	White spots on liver (slaughter checks)
<i>Scope</i>	Animal-based measure: Finishing pigs
<i>Sample size</i>	Sample size according to § 6.1B.5
<i>Method description</i>	<p>This measure is assessed after slaughter. This measure is defined as presence of white spots in the liver, indicative of the transhepatic migration of the larvae of <i>Ascaris suum</i>.</p> <p>This measure will be taken after the evisceration of the animals and will be assessed preferably when the liver, lungs and heart have not been separated. Furthermore, assessment is carried out before any further manipulation of these organs has been carried out (for example, meat inspection incisions).</p> <p>White spots on liver are assessed by visual inspection and palpation and scored as shown below.</p> <p>Individual level: 0 – No evidence of white spots 2 – Evidence of white spots</p>
<i>Classification</i>	Herd level: Percentage of pigs slaughtered showing white spots on the liver

6.1B.3.3 Absence of pain induced by management procedures

This criterion is recorded on farm

6.1B.4 Appropriate behaviour

6.1B.4.1 Expression of social behaviours

This criterion is recorded on farm

6.1B.4.2 Expression of other behaviours

This criterion is recorded on farm
 6.1B.4.3 Good human–animal relationship
 This criterion is recorded on farm
 6.1B.4.4 Positive emotional state
 This criterion is recorded on farm

6.1B.5 Sampling and practical information

Details of the selection are given in Table 5, as well as in ‘Selecting finishing pigs for slaughterhouse assessment’ section of paragraph 6.3.5.

There is a variety of recording sheets for different measures (see Annex B). For each measure there are instructions on which recording sheet to use. Each recording sheet has an area to record any relevant notes that may be useful at a later date.

Table 5 Order of measures, sample size, place and time required.

Information collected	Sample size	Place	Time required
Pneumonia	60 samples divided in 3 batches of 20 with time break in between	After slaughter	45 minutes min
Pleurisy			
Pericarditis			
White spots on liver			

The slaughter checks will preferably be combined with wounds on the body from the slaughterhouse assessment (see paragraph 6.3). If this is not possible due to slaughterhouse management, the assessor should take the hygienic measurements accordingly. Note that in spite of the location where these slaughter checks are assessed, they are included in assessment calculation for on farm life.

6.2 Calculation of scores for growing pigs on farm

6.2.1 Criterion-scores

6.2.1.1 Absence of prolonged hunger

The % lean animals is turned into a score using an I-spline function as follows (Figure 5):

Let I = 100 - % lean animals

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	80
a when I < knot	0
a when I > knot	-2417.66265377312
b when I < knot	0.010525633643345
b when I > knot	90.672874481587000
c when I < knot	-0.000131570420562
c when I > knot	-1.133410923387120
d when I < knot	0.000062487164478
d when I > knot	0.004784484439560

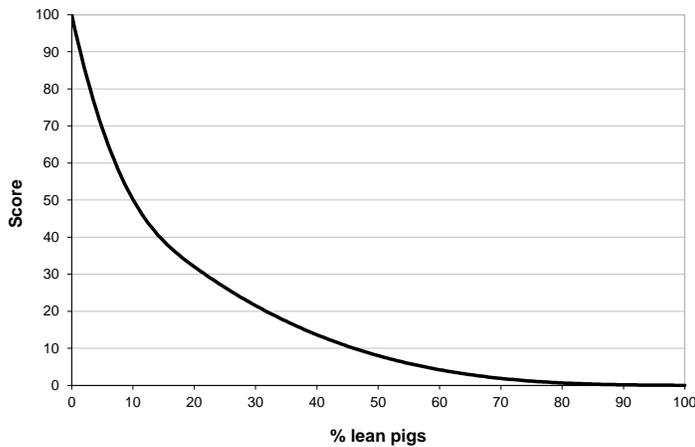


Figure 5 Calculation of scores for absence of hunger according to % lean animals.

6.2.1.2 Absence of prolonged thirst

In each group observed, the number of drinking places, the functioning of drinkers and their cleanliness are taken into account.

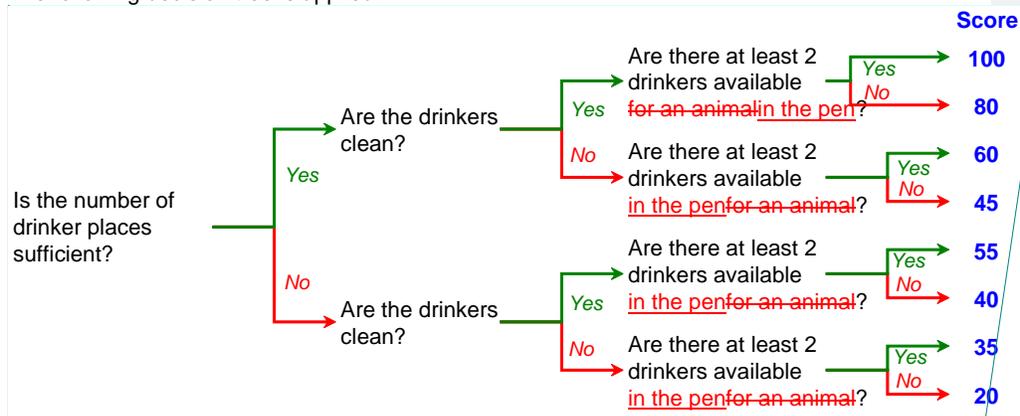
The recommended number of pigs per drinking place is set at 1015.

When drinkers do not function properly then the number of drinking places is divided by two (= actual number of drinking places).

Then the recommended number of pigs is calculated (= actual number of drinking places x 150) and the number of animals in the pen is compared to that recommendation. If there are more pigs than recommended then the number of drinking places is considered not sufficient.

It is checked whether there are two drinkers available in a pen.

The following decision tree is applied:



Comment [PPN35]: Based on the fact that a lot of farmers have a pen size of more than 10 pigs (12-15), and would not be able to get a score higher than 40 with one drinker in the pen. A pig drinks for about 10-15 minutes per day so this should be sufficient
Do this need to be checked with someone else or can we change this?

Comment [HV36]: 2 or more drinkers for an animal: "FOR A GROUP OF ANIMALS"?

Then the score attributed to the whole animal unit is equal to the worst score obtained at group level on the condition that this represents at least 15% of the animals observed from the whole animal unit.

6.2.1.3 Comfort around resting

Two partial scores are calculated, one for bursitis and one for manure on the body, before being combined into a criterion score.

Partial score for bursitis:

The % pigs affected by bursae scored 1 (*%bursae1*) or scored 2 (*%bursae2*) are used to calculate an index:

$$\text{Index } I_b = 100 - \left(\frac{(\%bursae1) + 2(\%bursae2)}{2} \right)$$

I_b is computed into a score using I-spline functions (Figure 6):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	50
a when I < knot	0
a when I > knot	33.977363785966900
b when I < knot	1.321299311368010
b when I > knot	-0.717342515656887
c when I < knot	-0.026425986227392
c when I > knot	0.014346850311162
d when I < knot	0.000266107294916
d when I > knot	-0.000005711615332

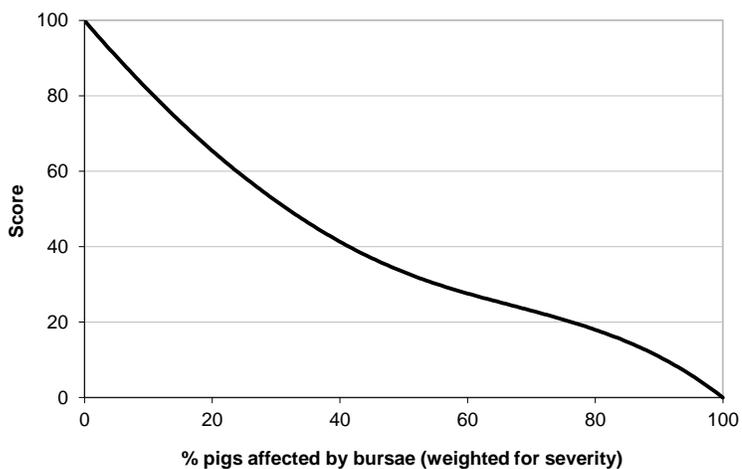


Figure 6 Calculation of partial scores for bursitis according to % pigs affected by bursae (weights: 0.5 for pigs affected by mild lesions (bursae score 1) and 1 for pigs affected by severe lesions (bursae score 2)).

Partial score for manure on the body:

The % of dirty (scored 1) and very dirty pigs (scored 2) are used to calculate an index:

$$\text{Index } I_m = \left(100 - \frac{2(\% \text{dirty}) + 7(\% \text{verydirty})}{7} \right)$$

I_m is computed into a score using I-spline functions (Figure 7):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	20
a when I < knot	0
a when I > knot	76.822378591649000
b when I < knot	12.305736520094100
b when I > knot	0.782379731347556
c when I < knot	-0.583701466453992
c when I > knot	-0.007533627016466
d when I < knot	0.009623073242404
d when I > knot	0.000020275918438

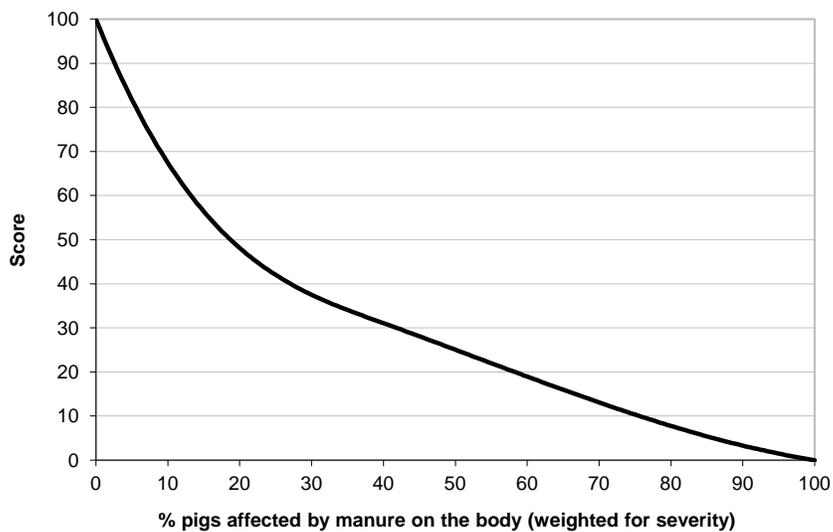


Figure 7 Calculation of partial scores for manure on the body according to % dirty pigs (weights: 0.3 for dirty pigs and 1 for very dirty pigs).

Criterion score

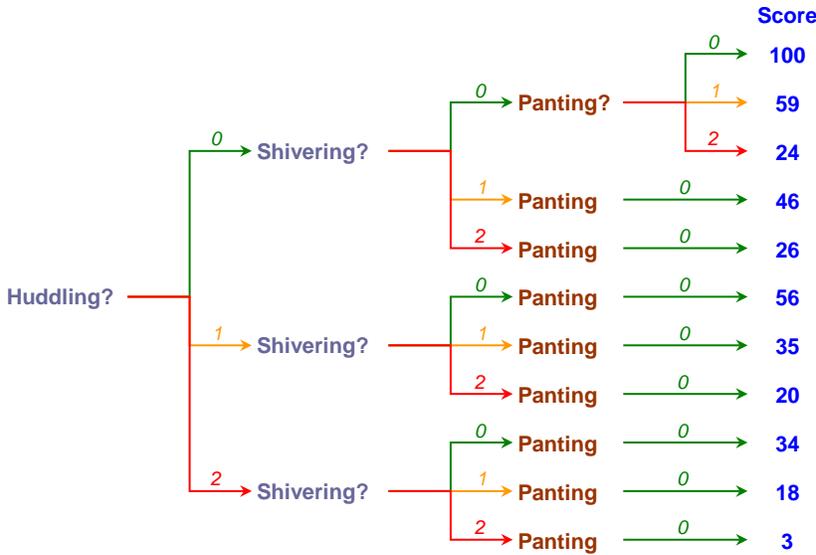
The two partial scores S_b and S_m are combined using a Choquet integral with the following parameters:

μ_b	μ_m
0.07	0.16

With b, bursitis and m, manure on the body.

6.2.1.4 Thermal comfort

The three scores (0, 1, or 2) obtained by a group for huddling, shivering, and panting are merged into one score following a decision tree:



Then the score attributed to the whole animal unit is equal to the worst score obtained at group level on the condition that this represents at least 15% of the animals observed from the whole animal unit.

6.2.1.5 Ease of movement

The following index is calculated from the space allowance:

$$I = (100 \times (\text{space_allowance} - 0.3)) / (10 - 0.3) = (10.3 \times (\text{space_allowance})) - 3.09$$

where space allowance is expressed in $\text{m}^2 / 100 \text{ kg pigs}$

0.3 $\text{m}^2 / 100 \text{ kg}$ is considered the very minimal space allowance and 10 $\text{m}^2 / 100 \text{ kg}$ is considered the maximum.

I_i is computed into a score using I-spline functions (Figure 8):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	20
a when $I < \text{knot}$	0
a when $I > \text{knot}$	76.822378591649000
b when $I < \text{knot}$	12.305736520094100

Comment [VC37]: We should precise the way to evaluate the weight of the pigs. The discussion we had on the webtool concluded that if we get the age of the animals (that should be done easily) we use mean average daily gain from weaning to 115kg. If the farmer has technical results, we could ask him for these data, or we could use the following (to be discussed) weaning / finishing (8-115 kg) : 700 g/d For higher slaughter weight, maybe we need specific data (see Spain or Italy !)

Comment [PPN38]: Added text to 6.1A.2.3 for explanation

b when l > knot	0.782379731347556
c when l < knot	-0.583701466453992
c when l > knot	-0.007533627016466
d when l < knot	0.009623073242404
d when l > knot	0.000020275918438

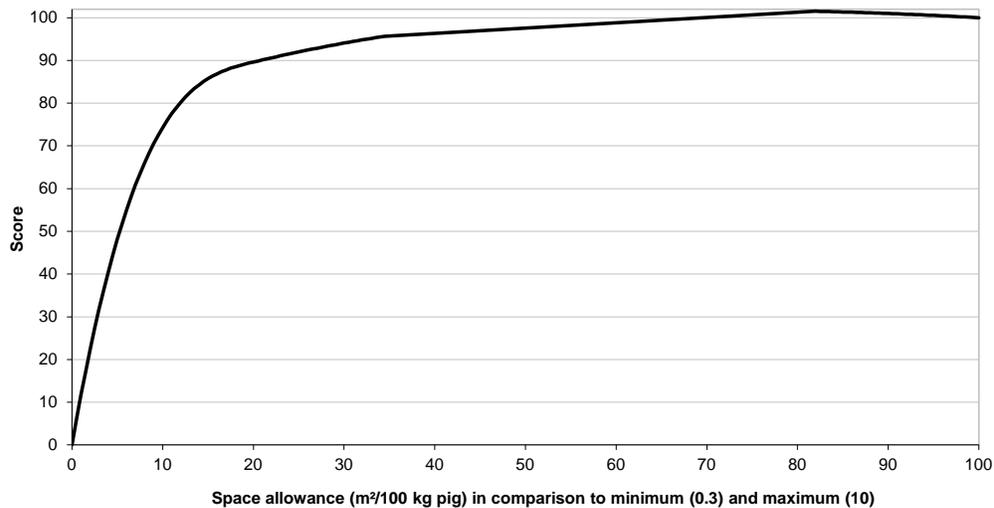


Figure 8 Calculation of scores for ease of movement according to space allowance.

6.2.1.6 Absence of injuries

Three partial scores are calculated:

- One for lameness
- One for wounds on body
- One for bitten tails

These are then combined to form the criterion-score

Partial score for lameness

The % of animals moderately lame (i.e. scored 1 for lameness) and the % of animals severely lame (i.e. scored 2 for lameness) are combined in a weighted sum to form an index I_l :

$$\text{Index for lameness } I_l = \left(100 - \frac{4(\% \text{ moderate}) + 10(\% \text{ severe})}{10} \right)$$

Comment [VC39]: moderate and not "mod erate"

I_l is computed into a score using I-spline functions (Figure 9):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than that value.

The values for a, b, c, d and the knot are:

knot	85
a when I < knot	0
a when I > knot	11011.684370690600000
b when I < knot	0.126718182836579
b when I > knot	388.774395393797000
c when I < knot	-0.001490802149959
c when I > knot	-4.573816345394790
d when I < knot	0.000041719104234
d when I > knot	0.017972407249480

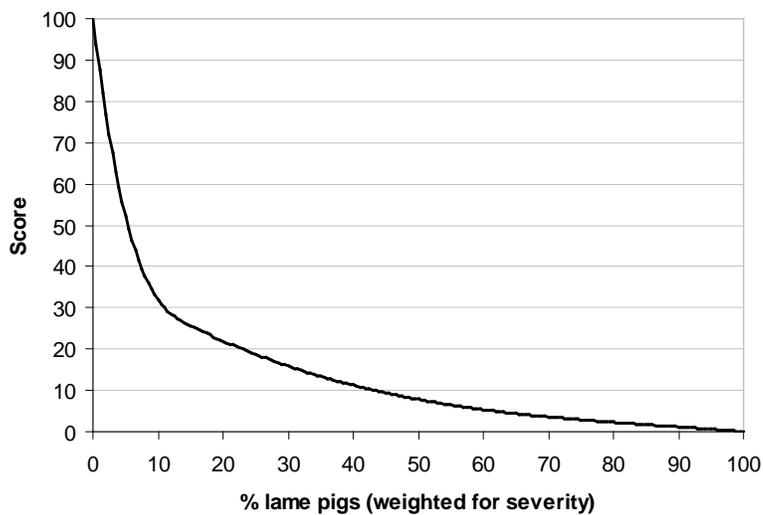


Figure 9 Calculation of partial scores for lameness according to % lame pigs (weights: 0.4 for moderate lameness and 1 for severe lameness).

Partial score for wounds on the body

The % of animals moderately injured (ie scored 1 for wounds on body) and the % of animals severely injured (i.e. scored 2 for wounds on body) are combined in a weighted sum to form an index I_w :

$$\text{Index for wounds on the body } I_w = \left(100 - \frac{2(\% \text{ moderate}) + 3(\% \text{ severe})}{3} \right)$$

Comment [VC40]: moderate and not "mod erate"

I_t is computed into a score using I-spline functions (Figure 10):

A spline function is used to compute the index into a score, with the general formula:

Score = $a + b \times I + c \times I^2 + d \times I^3$
 with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	40
a when I < knot	0
a when I > knot	9.398133791697010
b when I < knot	1.141432854762210
b when I > knot	0.436572820345361
c when I < knot	-0.027627289948251
c when I > knot	-0.010005789087212
d when I < knot	0.000293848295488
d when I > knot	0.000147002454976

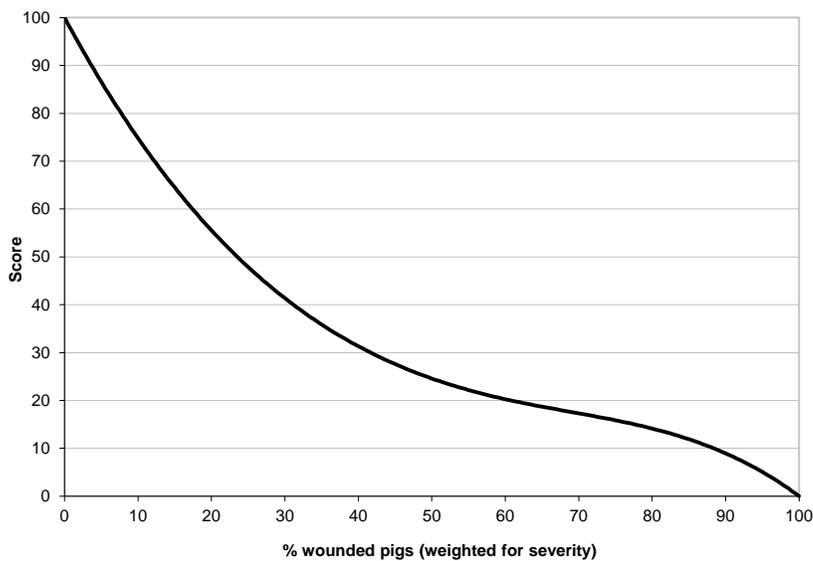


Figure 10 Calculation of partial scores for wounds on body according to % affected pigs (weights: 0.67 for pigs scored 1 and 1 for pigs scored 2).

Partial score for bitten tails:

The % of animals with bitten tail (score 2) is transformed into a score using I-spline functions:

Let I_t = 100 - % of pigs with bitten tail

I_t is computed into a score using I-spline functions (Figure 11):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than that value.

The values for a, b, c, d and the knot are:

knot	70
a when I < knot	0
a when I > knot	-648.041059862716000
b when I < knot	0.296484842012364

b when $l > \text{knot}$	28.069672934034000
c when $l < \text{knot}$	-4.573816345394790
c when $l > \text{knot}$	-0.400995325317394
d when $l < \text{knot}$	0.017972407249480
d when $l > \text{knot}$	0.001951026523043

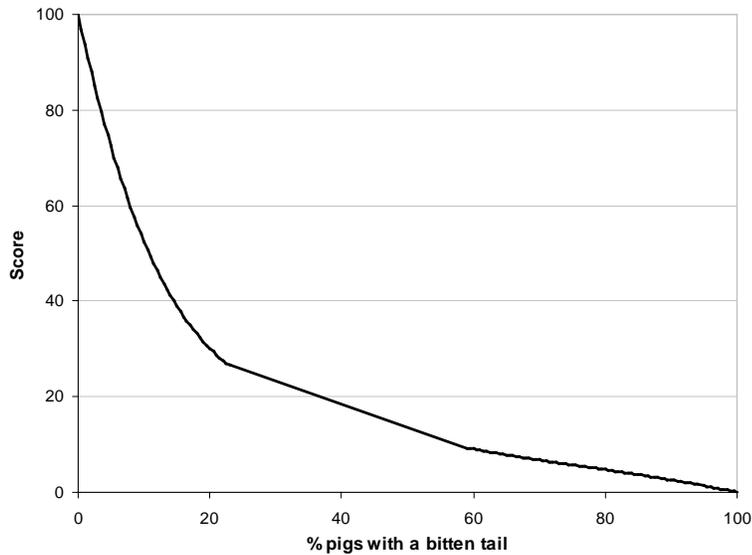


Figure 11 Calculation of partial scores for bitten tails according to % affected pigs.

Score for absence of injuries:

The three partial scores S_l , S_w , S_t are combined into a single criterion score using a Choquet integral. The parameters of the Choquet integral are:

μ_l	μ_w	μ_t
0.29	0.00	0.00

μ_{lw}	μ_{lt}	μ_{wt}
0.37	0.29	0.00

With l, lameness; w, wounds on body and t, bitten tails.

6.2.1.7 Absence of disease

The frequency of symptoms is compared to 'warning and alarm' thresholds as follows:

Area	Symptom	Warning threshold	Alarm threshold
Respiratory area	coughing (frequency per pig and 5 min)	15	46
	sneezing (frequency per pig and 5 min)	27	55
	% pigs with twisted snout	1.1	3.5
	% pigs pumping	1.8	5
	% slaughter pigs with pleuritis	28	55
	% slaughter pigs with pericarditis	5	20
	% slaughter pigs with pneumonia	2.7	6
Digestive area	% pigs in herd with rectal prolapse	0.7	2.5
	% pens in herd with liquid faeces	6	15
Liver	% slaughter pigs with white spots on liver (parasites)	10	23
Skin	% pigs with 10% or more skin inflamed	3.1	8
Ruptures and Hernias	% pigs with hernias/ ruptures not bleeding, not touching the floor	2.4	5
	% pigs with hernias/ ruptures bleeding or touching the floor	0.6	1.5
Mortality	% mortality	2.6	4.5

The symptoms are grouped into 6 areas (see table above).

The severity of problems is estimated per area:

- if in an area, the frequency of one symptom is above the warning threshold and the others are below, then a warning is attributed to the area
- if in an area, the frequency of one symptom is above the alarm threshold, then an alarm is attributed to the area
- if neither, then no problem is recorded

An index is calculated as:

$$I = \left(\frac{100}{6} \times \left(6 - \frac{6(\text{warnings}) + 10(\text{alarms})}{10} \right) \right)$$

Where *warnings* is the number of areas with a warning
alarms is the number of areas with an alarm

Then the index *I* is transformed into a score according to I-spline functions as follows (Figure 12):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when *I* is lower or equal to a specific value (called knot) vs. equal or higher than that value.

The values for a, b, c, d and the knot are:

knot	10
------	----

a when I < knot	0
a when I > knot	-1.489146428465390
b when I < knot	0.032168507646494
b when I > knot	0.478912436184085
c when I < knot	0.048729701963174
c when I > knot	0.004055309109452
d when I < knot	-0.001476101601143
d when I > knot	0.000013044827315

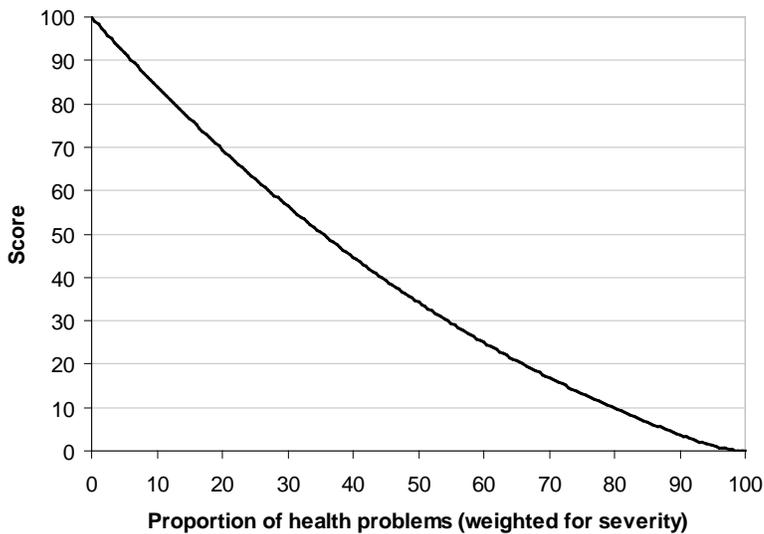
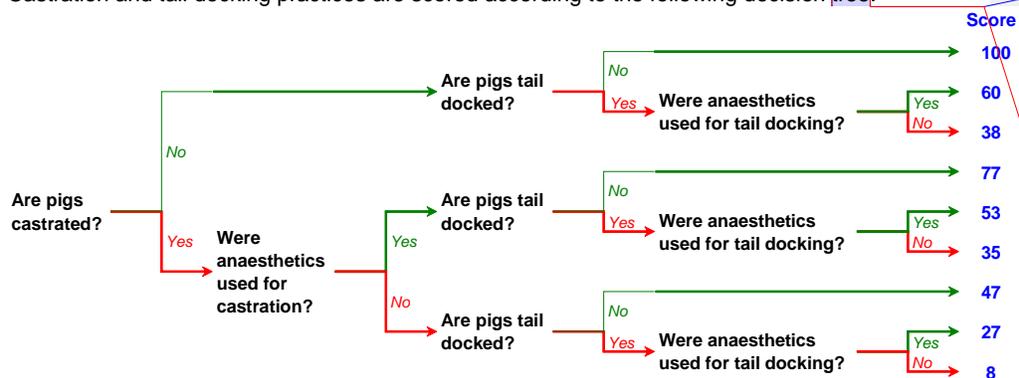


Figure 12 Calculation of scores for absence of disease according to the proportion of warnings and alarms (weights: 0.6 for warnings and 1 for alarms).

6.2.1.8 Absence of pain induced by management procedures

Castration and tail docking practices are scored according to the following decision tree:



Comment [pr41]: I wonder if the measure castration with the use of anaesthetics is pertinent considering that a farmer is not allowed to perform anaesthesia himself; on the other side, analgesia is implemented in different countries and gives a "partial" better welfare. Maybe we should have Anaesthesia and/or analgesia instead of anaesthesia

Comment [PPN42]: Check with other trees and see if we can change this (Isabelle)

6.2.1.9 Expression of social behaviours

An index **I** is calculated from the proportion of negative social behaviour out of all social behaviour:

$$I = 100 \times (1 - [\text{proportion of negative social_behaviour}])$$

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	70
a when I < knot	0
a when I > knot	-32.920351461943600
b when I < knot	1.342650483659710
b when I > knot	2.753522674690420
c when I < knot	-0.018771834469507
c when I > knot	-0.038927151306783
d when I < knot	0.000150861898558
d when I > knot	0.000246839597064

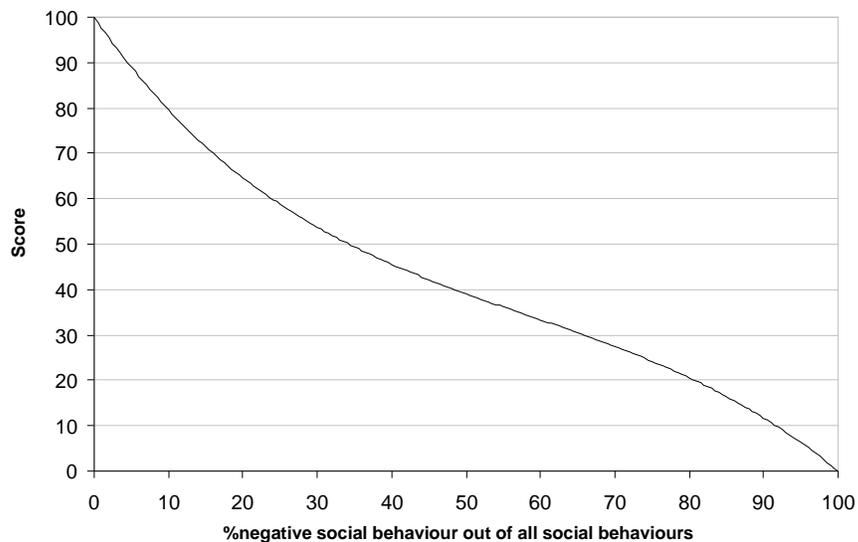


Figure 13 Calculation of scores for expression of social behaviour according to the proportion of social behaviour out of pigs' activities (I_s) and the proportion of negative social behaviour out of all social behaviour.

6.2.1.10 Expression of other behaviours

An index is calculated from the ratio of sample points when exploration of pen features is observed from the total sample points when an active behaviour is observed ($\%pen$) and the ratio of sample points when exploration of enrichment material is observed from the total sample points when an active behaviour is observed ($\%material$):

$$\text{Index for exploration } I = \left(\frac{(\%pen) + 2(\%material)}{2} \right)$$

I is transformed into a score using I-spline functions (Figure 14):

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2 + d \times I^3$$

with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	60
a when $I <$ knot	0
a when $I >$ knot	65.704701934795900
b when $I <$ knot	2.217863809115800
b when $I >$ knot	-1.067371286956990
c when $I <$ knot	-0.029761203445058
c when $I >$ knot	0.024992714813929
d when $I <$ knot	0.000195293713355
d when $I >$ knot	-0.000108894721379

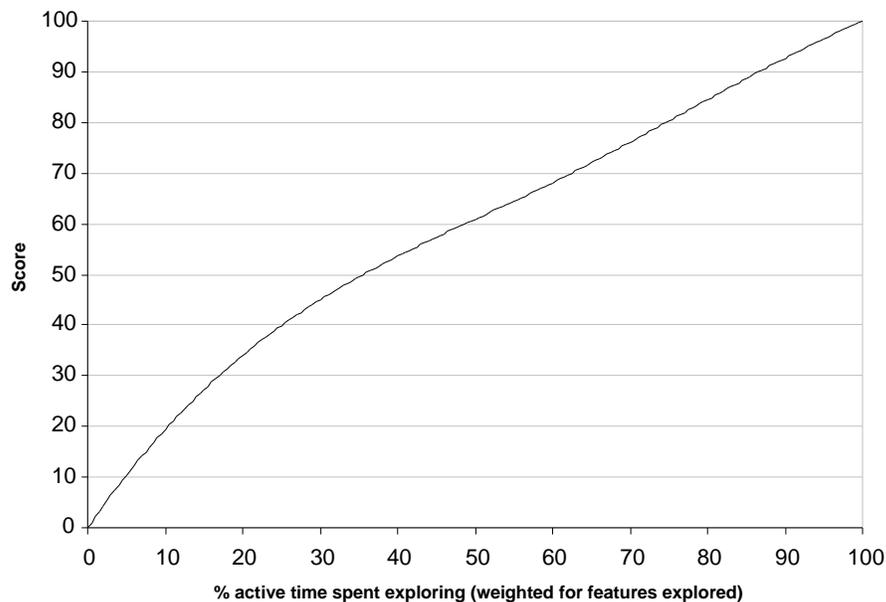


Figure 14 Calculation of scores for the expression of other behaviours according to the % of activity spent in exploration (weights: 0.5 for exploration of pen features and 1 for exploration of enrichment material).

6.2.1.11 Good human-animal relationship

The % pens where a panic reaction (score 2) is observed is transformed into a criterion score using I-spline functions (Figure 15):

Let $I = 100 - (\% \text{ pens scored as } 2)$

A spline function is used to compute the index into a score, with the general formula:

Score = $a + b \times I + c \times I^2 + d \times I^3$
 with a, b, c, d differing when I is lower or equal to a specific value (called knot) vs. equal or higher than this value.

The values for a, b, c, d and the knot are:

knot	10
a when $I < \text{knot}$	0
a when $I > \text{knot}$	5.384935965111640
b when $I < \text{knot}$	2.032699108847380
b when $I > \text{knot}$	0.417218319312017
c when $I < \text{knot}$	-0.156565461473302
c when $I > \text{knot}$	0.004982617480710
d when $I < \text{knot}$	0.005388003022458
d when $I > \text{knot}$	0.000003067057297

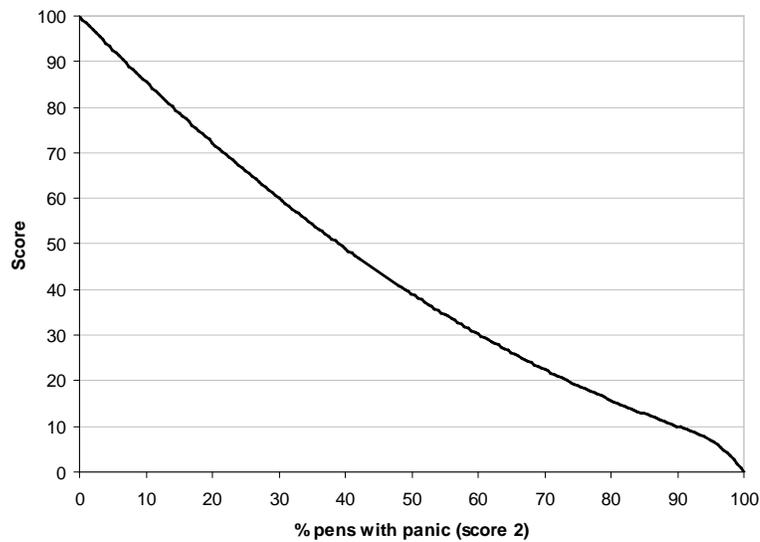


Figure 15 Calculation of scores for good human-animal relationship according to the % of pens where a panic reaction is observed.

6.2.1.12 Positive emotional state

The values (between 0 and 125) obtained by a farm for the 20 terms of the Qualitative Behaviour Assessment are turned into an index thanks to a weighted sum:

$$IndexI = -4.5367 + \sum_{k=1}^{20} w_k N_k$$

with N_k , the value obtained by a farm for a given term k
 w_k , the weight attributed to a given term k

The weights of the various terms in this sum are:

Terms	Weights
Active	0.01228
Relaxed	0.01087
Fearful	0.00475
Agitated	-0.00711
Calm	0.01122
Content	0.01184
Tense	-0.00971
Enjoying	0.01030
Frustrated	-0.01496
Sociable	0.00544
Bored	-0.01230
Playful	0.00463
Positively occupied	0.01193
Listless	-0.01448
Lively	0.01002
Indifferent	-0.00747
Irritable	-0.00883
Aimless	-0.01193
Happy	0.01193
Distressed	-0.00175

This index is then transformed into a score using I-spline functions (Figure 16) as follows:

A spline function is used to compute the index into a score, with the general formula:

$$\text{Score} = a + b \times I + c \times I^2$$

with a, b, c differing when I is lower or equal to a specific value (called knot) vs. equal or higher than that value.

The values for a, b, c, d and the knot are:

knot	0
a when I < knot	50
a when I > knot	50
b when I < knot	8.75
b when I > knot	11.6667
c when I < knot	0.3125
c when I > knot	-0.55556

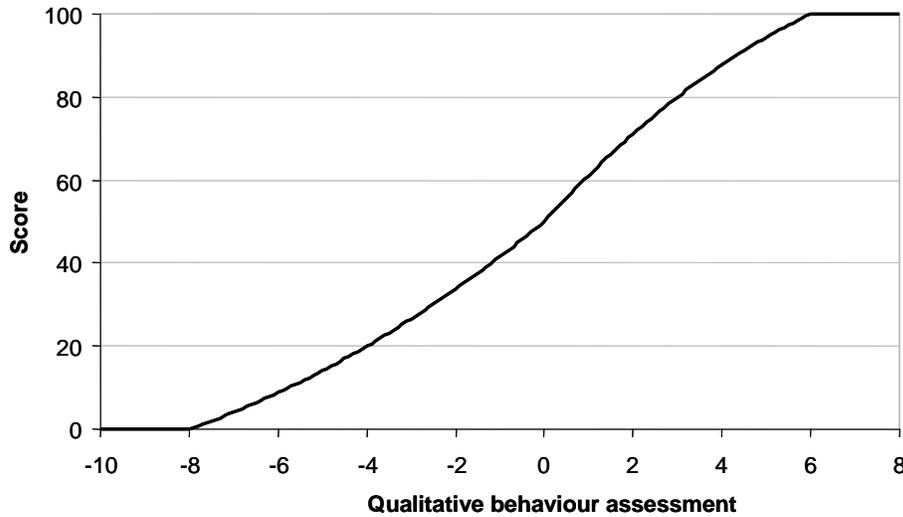


Figure 16 Calculation of scores for positive emotional state according to the values the farm obtained for the various terms used in qualitative Behaviour Assessment (combined in a weighted sum).

6.2.2 Principle-scores

Criterion-scores are combined to form principle-scores using Choquet integrals. The parameters of the integrals are given below for each principle.

Principle Good feeding

μ_1	μ_2
0.05	0.28

with 1, Absence of prolonged hunger and 2, Absence of prolonged thirst.

Principle Good housing

μ_3	μ_4	μ_5
0.20	0.11	0.16

μ_{34}	μ_{35}	μ_{45}
0.26	0.33	0.25

with 3, Comfort around resting; 4, Thermal comfort; 5, Ease of movement.

Principle Good health

μ_6	μ_7	μ_8
0.04	0.20	0.09

μ_{67}	μ_{68}	μ_{78}
0.31	0.09	0.20

with 6, Absence of injuries; 7, Absence of disease; 8, Absence of pain induced by management procedures.

Principle Appropriate behaviour

μ_9 0.17	μ_{10} 0.01	μ_{11} 0.01	μ_{12} 0.10
μ_{910} 0.22	μ_{911} 0.17	μ_{912} 0.27	
μ_{1011} 0.13	μ_{1012} 0.18	μ_{1112} 0.22	
μ_{91011} 0.53	μ_{91012} 0.63	μ_{91112} 0.52	μ_{101112} 0.48

with 9, Expression of social behaviours; 10, Expression of other behaviours; 11, Good human-animal relationship; 12, Positive emotional state.

The principle-scores are always intermediate between the lowest and the highest values obtained at criterion level. Interactions between criteria are substantial within all principles except 'Appropriate behaviour', hence the principle-scores will always be closer to the minimum criterion-scores than to the maximum criterion-scores. Interactions between criteria is limited for Principle 'Appropriate behaviour', leading to compensation between behavioural criteria.

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

- Within principle "Good feeding", Criterion "Absence of prolonged thirst" is considered more important than Criterion "Absence of prolonged hunger".
- Within principle "Good housing", Criterion "Ease of movement" and Criterion "Comfort around resting" are considered more important than Criterion "Thermal comfort".
- Within principle "Good health", Criterion "Absence of disease" is considered more important than Criterion "Absence of injuries" which in turn is considered more important than Criterion "Absence of pain induced by management procedures".
- Within principle "Appropriate behaviour", the order of importance of criteria are: "Positive emotional state" (most important), "Good human-animal relationship", "Expression of social behaviours" and "Expression of other behaviours" (least important).

Examples of principle-scores resulting from criterion-scores are provided in Tables 6 to 9 below.

Table 6 Examples of scores for "Good feeding" according to combinations of Criterion-scores for "Absence of prolonged hunger" and "Absence of prolonged thirst".

Criteria		Principle
Absence of hunger	Absence of thirst	Good Feeding
40	60	46
50	50	50
60	40	41
75	25	28

Table 7 Examples of scores for "Good housing" according to combinations of Criterion-scores for "Comfort around resting", "Thermal comfort", and "Ease of movement".

Criteria			Principle
Comfort around resting	Thermal comfort	Ease of movement	Good housing

25	50	75	35
25	75	50	34
50	25	75	37
75	25	50	38
40	50	60	44
40	60	50	44
50	40	60	45
50	50	50	50
50	75	25	34
75	50	25	37
50	60	40	44
60	40	50	45
60	50	40	45

Table 8 Examples of scores for “Good health” according to combinations of criterion-scores for “Absence of injuries”, “Absence of disease”, and “Absence of pain induced by management procedures”.

Absence of injuries	Criteria		Principle
	Absence of disease	Absence of pain induced by management procedures	Good health
25	50	75	32
25	75	50	35
50	25	75	30
75	25	50	28
40	50	60	43
40	60	50	44
50	40	60	42
50	50	50	50
50	75	25	38
75	50	25	34
50	60	40	45
60	40	50	41
60	50	40	44

Table 9 Examples of scores for “Appropriate behaviour” according to combinations of Criterion-scores for “Expression of social behaviours”, “Expression of other behaviours”, “Good human-animal relationship”, and “Positive emotional state”.

Expression of social behaviours	Criteria			Principle
	Expression of other behaviours	Good human-animal relationship	Positive emotional state	Appropriate behaviour
35	50	50	65	42
35	50	65	50	44
35	65	35	65	42
35	65	50	50	40

35	65	65	35	42
50	35	50	65	39
50	35	65	50	44
50	50	35	65	43
50	50	50	50	46
50	50	65	35	50
50	65	35	50	43
50	65	50	35	45
65	35	35	65	43
65	35	50	50	43
65	35	65	35	45
65	50	35	50	40
65	50	50	35	47
65	65	35	35	46

6.2.3 Overall assessment

The synthesis of the four principle-scores into an overall assessment is carried out in a similar way for all animal types. The overall assessment is explained in Chapter 4.

6.3 Collection of data for finishing pigs at the slaughterhouse

	Welfare criteria		Measures
Good feeding	1	Absence of prolonged hunger	Food provision
	2	Absence of prolonged thirst	Water supply
Good housing	3	Comfort around resting	Flooring, bedding
	4	Thermal comfort	Shivering, panting, huddling
	5	Ease of movement	Slipping, falling, stocking density of lorries, stocking density of lairage pens
Good health	6	Absence of injuries	Lameness, wounds on body
	7	Absence of disease	Sick animals, dead animals
	8	Absence of pain induced by management procedures	Stunning effectiveness
Appropriate behaviour	9	Expression of social behaviours	<i>This criterion is not applied in this situation</i>
	10	Expression of other behaviours	<i>This criterion is not applied in this situation</i>
	11	Good human–animal relationship	High pitched vocalizations
	12	Positive emotional state	Reluctance to move, turning back

6.3.1 Good feeding

6.3.1.1 Absence of prolonged hunger

Title	Food provision
Scope	Resource-based measure: Finishing pigs. This measure is assessed at lairage.
Sample size	Sample size according to § 6.3.5

<i>Method description</i>	The assessor will assess the pens with the longest lairage times and check on the availability of food for the pigs in these lairage pens.
<i>Classification</i>	<p>0 – Animals stay in the lairage for less than 3 h in absence of food provision or more than 3h with food present.</p> <p>1 – Animals stay in the lairage pens more than 3 h and less than 12 h and during that time no food is provided.</p> <p>2 – Animals stay in the lairage more than 12 h and no food is provided.</p>

6.3.1.2 Absence of prolonged thirst

<i>Title</i>	Water supply
<i>Scope</i>	Resource-based measure: Finishing pigs. This measure is assessed at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>If it is possible this measure will be taken in the absence of animals.</p> <p>Check the water supply in the lairage. Two aspects will be taken into account here (whether the drinkers are working and whether the drinkers are clean). Water supply will be considered hygienic when the drinker places are without faeces and without mould. If one of these aspects is insufficient this will be classified as 2 (i.e. inadequate). This can be corroborated by the assessor during the course of the visit. Doing so, the assessor will assess the type of drinker (pipe, bowl and trough), and (when possible) its length, width, height, cleanliness and whether it functions (works) or not. In addition, the risk of injuries due to drinkers will be checked.</p>
<i>Classification</i>	<p>0 – Water facilities are adequate</p> <p>2 – Water facilities are inadequate</p>

6.3.2 Good housing

6.3.2.1 Comfort around resting

<i>Title</i>	Flooring
<i>Scope</i>	Management- and resource-based measure: Finishing pigs. This measure is assessed at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	The flooring of lairage pens will be assessed by the absence of holes or structures on the floor that could cause lesions to the animals.
<i>Classification</i>	<p>0 – Floor is adequate to prevent lesions to the animals</p> <p>1 – One of the pens assessed could produce some lesions to the animals</p> <p>2 – More than one of the pens assessed could cause lesions to the animals</p>

<i>Title</i>	Bedding
<i>Scope</i>	Management- and resource-based measure: Finishing pigs. This measure is assessed in the lorry.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	Bedding will be assessed in the lorries and the presence or absence of enough material as a bed will be assessed.
<i>Classification</i>	<p>0 – All the lorries assessed provide enough bedding material for the animals</p> <p>1 – One or two of the lorries assessed do not provide enough bedding</p>

	material for the animals 2 – More than two lorries assessed do not provide enough bedding material to the animals
--	---

6.3.2.2 Thermal comfort

<i>Title</i>	Shivering
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading and at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	The assessor must stay outside the pen. Shivering is defined as the slow and irregular vibration of any body part, or the body as a whole. All animals in the lorries or inside the lairage pens will be visually assessed. This measure will be assessed twice, during unloading (to assess lorries) and in the lairage pens (if it is possible, in different animals).
<i>Classification</i>	Group level in the lorries: Percentage of animals shivering and Group level in the lairage: 0 – No pigs in the lairage pen/lorry observed shivering. 1 – Up to 20% of pigs in the pen/lorry observed shivering 2 – More than 20% of pigs in the pen/lorry observed shivering

<i>Title</i>	Panting
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading and at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	The assessor must stay outside the pen. Panting is defined as breathing in short gasps All animals in the lorries or inside the lairage pens should be visually assessed. This measure will be assessed twice, during unloading (to assess lorries) and in the lairage pens (if it is possible, in different animals).
<i>Classification</i>	Group level in the lorries: Percentage of animals panting and Group level in the lairage pens: 0 – No pigs in the lairage pen/lorry observed panting. 1 – Up to 20% of pigs in the pen/lorry observed panting 2 – More than 20% of pigs in the pen/lorry observed panting

<i>Title</i>	Huddling
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5

<i>Method description</i>	<p>The assessor must stay outside the pen. Because the other measures made during the assessment can interfere with this, due to movement of the animals, consider carrying out this measure first.</p> <p>Definition of huddling is when a pig is lying with more than half of its body in contact with another pig (i.e. virtually lying on top of another pig). It is not considered huddling when an individual is just side by side with another animal.</p> <p>The proportion of animals showing the behaviour will be considered in relation to the number of resting pigs. Only resting animals will be considered for this parameter (hence the proportion is not calculated in relation to the total animals of the pen/group).</p>
<i>Classification</i>	<p>Group level:</p> <p>0 – No pigs in the lairage pen displaying huddling behaviour</p> <p>1 – Up to 20% of resting pigs in the lairage pen displaying huddling behaviour</p> <p>2 – More than 20% of resting pigs in the lairage pen displaying huddling behaviour</p>

6.3.2.3 Ease of movement

<i>Title</i>	Slipping
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>The same animals can be scored for slipping and falling at the same time.</p> <p>Slipping is defined as a loss of balance, without (a part of) the body touching the floor. Moreover, an animal slipping while it is falling will only be considered as falling (see measure 'falling').</p> <p>Assess while the animals are unloaded. All pigs within the assessed lorries will be considered. The area of observation covers:</p> <ol style="list-style-type: none"> 1. The ramp of the lorry and ramp of the unloading bay 2. In case there is no slaughterhouse ramp it will be considered from the beginning of the truck ramp to the end of floor slope 3. In case there is no floor slope after the lorry ramp it will be considered from the beginning of the lorry ramp until 3 m after the finish of the lorry ramp 4. If the lorry has a tail gate lift, the assessment starts when the lift is on the floor and its doors are opened. <p>The final value will be the number of animals slipping in relation to the total number of individuals in the lorry.</p>
<i>Classification</i>	<p>Group level:</p> <p>Percentage of animals that slip</p>

<i>Title</i>	Falling
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	The same animal can be scored for slipping and falling at the same time. However, an animal slipping while it is falling will only be

	<p>considered as falling.</p> <p>Falling is defined as loss of balance in which any part(s) of the body (except the <u>l</u>egs) touch the floor. In addition, an animal is considered as falling only if it was previously standing up. Animals falling in the elevator of the lorries when the doors are opened due to the density inside are considered as falling.</p> <p>Assess while the animals are unloaded. All the pigs within the <u>l</u>orries sampled will be considered. The area of observation covers:</p> <ol style="list-style-type: none"> 1. The ramp of the lorry and ramp of the unloading bay 2. In case there is no slaughterhouse ramp it will be considered from the beginning of the truck ramp to the end of floor slope 3. In case there is no floor slope after the lorry ramp it will be considered from the beginning of the lorry ramp until 3 m after the finish of the lorry ramp 4. If the lorry has a tail gate lift, the assessment starts when the lift is on the floor and its doors are opened. <p>The final value will be the number of animals falling in relation to the total number of individuals in the lorry.</p>
<i>Classification</i>	Group level: Percentage of animals that fall

<i>Title</i>	Space allowance in the lorries
<i>Scope</i>	Management-based measure: Finishing pigs. This measure is assessed in the lorry
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>The animal unit manager is asked about the number of animals in the lorry, the lorry floor area (and if required, the number of pigs on each deck of the lorry).</p> <p>This can be corroborated by the assessor during the course of the visit when, after the unloading, the space allowance of the truck will be measured. Doing so, the assessor will take the length, width and height of each floor of the lorries.</p>
<i>Classification</i>	m²/animal

<i>Title</i>	Space allowance in lairage pens
<i>Scope</i>	Management-based measure: Finishing pigs. This measure is assessed at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	During the course of the visit the assessor will count the total number of animals inside the pen and will measure the space allowance of the pen. Doing so, the assessor <u>s</u> hould measure the length, width and height of each lairage pen.
<i>Classification</i>	m²/animal

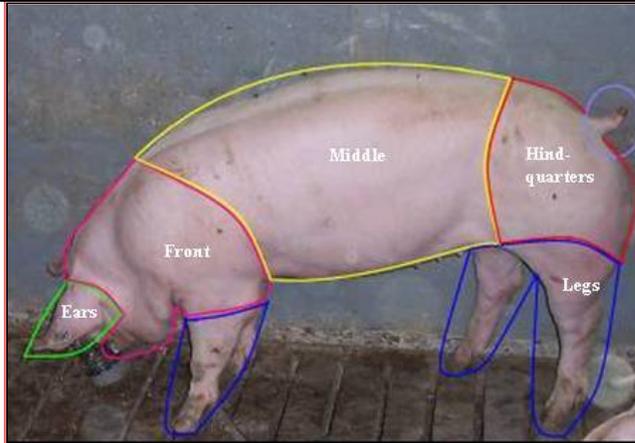
6.3.3 Good health

6.3.3.1 Absence of injuries

<i>Title</i>	Lameness
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed after

	unloading when pigs are moved to lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>Preferably, for an optimal assessment, the walking area shall have a minimum of 3 meters and a maximum of 10 meters. Do not assess this parameter if a minimum of 2 meters are available.</p> <p>Lameness is the inability to use one or more limbs in a normal manner. It can vary in severity from reduced ability or inability to bear weight, to total recumbency.</p> <p>All pigs in the assessed lorries will be considered. The assessor must assess the pig walking. The gait of the individual animal is scored according to the scale presented below.</p> <p>Individual level: 0– Normal gait 1– Difficulties walking, but still using all legs 2– Severely lame, minimum weight-bearing on affected limb 3– No weight-bearing on affected limb, or not able to walk</p> <p>Note that animals with a lameness score 3 will be considered as sick animals and, in consequence, will also be assessed in the measure 'sick animals' § 6.3.3.2.</p>
<i>Classification</i>	<p>Group level: The number of animals with a score of 1 and 2</p>

<i>Title</i>	Wounds on the body
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed after slaughter.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>Wounds on the body should be visually assessed by inspecting one side of the pig's carcass after scalding and before the legs, ears or head of the animal are cut off or before the carcass is divided. The tail zone is not considered here.</p> <p>Wounds on the body can present as either surface penetration of the epidermis or penetration of the muscle tissue). At the same time, these are be defined as scratches or wounds, respectively.</p> <p>Five body regions should be considered:</p> <ol style="list-style-type: none"> 1. Ears 2. Front (head to back of shoulder) 3. Middle (back of shoulder to hind-quarters) 4. Hind-quarters 5. Legs (from the accessory digit upwards).



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In order to standardize the assessment use the following method:

- A scratch longer than 2 cm will be considered as 1 lesion,
- 2 parallel scratches with up to 0.5 cm space between them will be considered as 1 lesion,

- A small wound (less than 2 cm) will be considered as 1 lesion,
- A bleeding wound between 2 and 5 cm, or a healed wound of more than 5 cm will be considered as 5 lesions. A deep and open wound of more than 5 cm will be considered as 16 lesions.

Wound level:

- a. A zone is considered as 'a' if it has up to 1 lesion
- b. A zone is considered as 'b' if it presents from two to ten lesions
- c. A zone is considered as 'c' when it presents more than ten superficial scratches or any wound which penetrates the muscle tissue

Individual level:

- 0 – If all regions of its body are considered as 'a'
- 1 – When any region of the body is considered as 'b'
- 2 – When any region of the body is considered as 'c'

<i>Classification</i>	<p>Group level: Percentage of animals scored as 0 Percentage of animals scored as 1 Percentage of animals scored as 2</p>
-----------------------	--

Comment [PPN43]: I have received a picture out of focus from Herman Vermeer that could be used, but I do not think that this picture will add more information to this measure and have therefore not changed it

6.3.3.2 Absence of disease

<i>Title</i>	Sick animals
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed in the lorries on arrival.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	Sick animals are defined as those animals that are unable to walk or with a lameness scored as 3 (no weight-bearing on affected limb, or not

	able to walk, see § 6.3.3.1). All pigs in assessed lorries will be considered. Assess the number of sick animals. The final value will be the number of animals scored as sick in relation to the total number of pigs in the lorry.
<i>Classification</i>	Group level: Percentage of sick animals

<i>Title</i>	Dead animals
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed in the lorries on arrival and at lairage.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	This measure will be assessed twice; during unloading and in the lairage pens. Assess whether all the animals in the pen are breathing. All animals inside the lairage pens and within the lorries will be considered. To assess this parameter the assessor must stay outside the lairage pen. The final value is the number of animals scored as dead in relation to the total number of individuals in the lorry (or in the lairage pen).
<i>Classification</i>	Group level: Percentage of dead animals

6.3.3.3 Absence of pain induced by management procedures

<i>Title</i>	Stunning effectiveness
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during slaughter in slaughterhouse stunning area.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	Effectiveness of stunning is based on 4 different indicators. These are: <ol style="list-style-type: none"> 1. Corneal reflex The corneal reflex is assessed by touching the cornea with a blunt object (e.g. a writing pen). If the animal shows a blinking response, the reflex is considered positive. If the eye does not blink or closes slowly, the reflex is negative. The corneal reflex will be assessed around the sticking point (if it is possible just before exsanguination, if not, immediately after). 2. Righting reflex The presence of a righting reflex is assessed by observation of the animal and is defined as voluntary movements as intends to recover the normal body position (such as heading up or standing up). 3. Rhythmic breathing The presence of rhythmic breathing is assessed by observation of respiratory movements of an animal lying down or hanging on the line. It is assessed by observing the movements of the flanks and the mouth. 4. Vocalizations The presence of vocalizations is assessed by direct observation of the animal. <p>The presence of righting reflex, rhythmic breathing and vocalizations are individually assessed from stunning until 1 minute after sticking (if this is possible).</p>

	Note that it is important to differentiate righting reflex from the clonic phase typical of electrical stunning, as untrained assessors may confound them. After training it is easier to detect that in the clonic phase, although animals can move the legs energetically, they are not trying to 'head up' or "stand up". In addition, rhythmic breathing or vocalizations can be confounded with the gasping movements when pigs are stunned with CO ₂ . However, rhythmic breathing is a regular movement of the flank (and gasping occurs in an occasional and non periodic non-periodic way).
<i>Classification</i>	The percentage of animals positive to righting reflex, corneal reflex, rhythmic breathing or vocalizations.

6.3.4 Appropriate behaviour

6.3.4.1 Expression of social behaviours

This criterion is not applied in this situation

6.3.4.2 Expression of other behaviours

This criterion is not applied in this situation

6.3.4.3 Good human–animal relationship

<i>Title</i>	High pitched vocalizations
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed when driven to the stunning area.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	Vocalizations will be assessed at group level in the final stages of driving towards the stunning area, gas stun box or during movement through the alley or chute leading to the restrainer. If an animal in the group displays High Pitched Vocalizations (HPV; squeal/scream), this is recorded in the audit protocol. One–zero sampling and instantaneous sampling will be considered. In both ways the assessor will be equipped with a beeper that will produce a signal, sound or buzz every 20 s. Recordings will be made using tables with rows of 20 s observation. For the one–zero sampling the assessor will listen whether any of the observed pigs has vocalized or not vocalized during those 20–s of focal observations. At the tone, marking the end of the interval, the assessor records whether any of the pigs is vocalizing at that moment (instantaneous sampling). Additionally, in a third column the assessor notes if a single pig is vocalizing or several pigs, thus modifying the information gained in the previous column. The sampling is carried out three times during 4 minutes min per period (total of 12 min).
<i>Classification</i>	Group level: Percentage of events with one-zero vocalizations and Percentage of events with instantaneous vocalizations

6.3.4.4 Positive emotional state

<i>Title</i>	Reluctance to move
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading.
<i>Sample size</i>	Sample size according to § 6.3.5

<i>Method description</i>	<p>All the pigs within the assessed lorries will be considered within this measure. The same animals can be scored for both 'Turning back' and 'Reluctance to move' at the same time.</p> <p>Reluctance to move is defined as an animal that, during 2 seconds at least (see photographic illustration):</p> <ul style="list-style-type: none"> • Stops and does not explore • Does not move the body • Does not move the head. <p>The area of observation covers:</p> <ul style="list-style-type: none"> • The ramp of the lorry and ramp of the unloading bay • In case there is no slaughterhouse ramp it will be considered from the beginning of the truck ramp to the end of the floor slope • In case there is no floor slope after the lorry ramp observations are done from the beginning of the lorry ramp until 3 m after the end of the lorry ramp • If the lorry has a tail gate lift, the assessment starts when the lift is on the floor and its doors are opened <p>The final value is the number of animals showing reluctance to move behaviour in relation to the total number of individuals in the lorry. Note that animals with a lameness score of '3' are considered within this measure (see 6.3.3.1).</p>
<i>Classification</i>	<p>Group level: The percentage of animals that show reluctance to move</p>



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<i>Title</i>	Turning back
<i>Scope</i>	Animal-based measure: Finishing pigs. This measure is assessed during unloading.
<i>Sample size</i>	Sample size according to § 6.3.5
<i>Method description</i>	<p>All the pigs within the assessed lorries will be considered within this measure. The same animals can be scored in both 'turning back' and 'reluctance to move' at the same time.</p> <p>Turning back is defined as when a pig facing towards the unloading zone turns around and faces the lorry area. It is not considered turning back when the animals that arrived to the end of the unloading area return (see photographic illustration).</p>

	<p>The area of observation covers:</p> <ol style="list-style-type: none"> 1. The ramp of the lorry and ramp of the unloading bay 2. In case there is no slaughterhouse ramp it will be considered from the beginning of the truck ramp to the end of the floor slope 3. In case there is no floor slope after the lorry ramp it will be considered from the beginning of the lorry ramp until 3 m after the finish of the lorry ramp 4. If the lorry has a tail gate lift, the assessment starts when the lift is on the floor and its doors are opened <p>The final value will be the number of animals showing turning back behaviour in relation to the total number of individuals in the lorry. Note that animals with a lameness score '3' will not be considered within this measure (see 6.3.3.1)</p>
Classification	<p>Group level: The percentage of animals showing turning back behaviour</p>



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6.3.5 Sampling and practical information

Different numbers of animals must be sampled for different measures; these have been summarized in Table 10.

The number of animals in each pen should be recorded for all measures. Ensure that the animals are representatively sampled. For some measures, there will be a requirement to sample at specific stages of transport and slaughter; full details on that aspect are given in Table 10, as well as in the 'Selecting finishing pigs for slaughterhouse assessment' Section of this paragraph.

There is a variety of recording sheets for different measures (see Annex B). For each measure there are instructions on which recording sheet to use. Each recording sheet has an area to record any relevant note that may be useful further on.

Table 10 Order of recorded measures, summary of the sample size required for each measure according to the stage of transport or slaughter, place and time required.

Information collected	Sample size	Place	Time required
Slipping	2 lorries	Unloading	3.0 hours
Falling			
Reluctance to move	2 lorries	Unloading	
Turning back			
Shivering	6 lorries	Unloading/from	

Panting		unloading to lairage	
Sick animals			
Dead animals			
Space allowance in lorries			
Bedding of lorries			
Lameness	2 lorries	From unloading to lairage	
Huddling			
Shivering			
Panting			
Space allowance in lairage pens			
Flooring of lairage pens	8 pens	Lairage	0.75 hoursh
Dead animals			
Water supply			
Food provision			
High pitched vocalizations	Group level	From lairage to stunning	0.25 hoursh
Stunning effectiveness	60 animals, divided into 3 batches of 20 with time break in between	Stunning area	0.50 hoursh
Wounds on the body			
Pneumonia ¹			
Pleurisy ¹			
Pericarditis ¹			
White spots on liver ¹	60 samples divided into 3 batches of 20 with time break in between	After slaughter	1.0 hoursh
Total time			5.5 hoursh

¹: Pleurisy, pneumonia, white spots on liver and pericarditis are assessed at the slaughterhouse but applicable to on farm life. Therefore the slaughter assessment evaluation/calculation will not include these measures.

Selecting finishing pigs for slaughterhouse assessment

For water supply, thermoregulation measures, dead animals and stocking density, the same pens will be assessed. The slaughter checks related to on farm assessment (see paragraph 6.1B - pleurisy, pneumonia, white spots on liver and pericarditis) will preferably be combined with wounds on the body. If this is not possible due to slaughterhouse management, the assessor shall take the hygienic measurements accordingly.

From the total of six lorries mentioned in Table 10 for transport assessment, two of them are used to assess falling/slipping, two other are used for lameness assessment and the last two lorries are used within reluctance to move and turning back measures.

The order in which these parameters will be assessed has to be decided by the assessor, however, ensure that a similar number of animals are assessed for slipping-falling and reluctant to move, turning back and lameness. Sick and dead animals and thermal regulation measurements are assessed in the 6 lorries.

The pens should be selected randomly, with two considerations: 1) the pens selected must be a good representation of the global pens at the slaughterhouse as regard to the position and 2) it is important to take animals at different lairage times, when possible.

6.4 Calculation of scores for finishing pigs at the slaughterhouse

As yet, this is not included in the protocol.

Annex A: Guidelines for visit to the animal unit

Biosecurity

Adhere to the individual animal unit's own biosecurity requirements. Where this is unknown, ensure that there was no previous contact between pigs and the assessor for at least 48 ~~hours~~ prior to assessment (including pigs at a slaughterhouse). Furthermore take care to shower and change clothing in the intervening period.

Where possible the assessor should park his/her vehicle outside the site boundary, and use a knapsack sprayer to disinfect the wheels after the visit. Non-disposable items (e.g. clipboard, torch, etc.) shall also be thoroughly cleaned and disinfected.

Equipment required

- Appropriate disposable clothing and footwear (should the farm not provide any)
- Recording sheets, clipboard and a supply of writing materials
- Head-torch
- Stopwatch
- Stock marker spray
- Knapsack sprayer containing disinfectant
- Buckets and disinfectant for boots
- Thermometer
- Device to measure distances

Commencing the visit

The assessor should find the animal unit manager and introduce him/herself. It is advisable to give a brief explanation of what is about to be done during the course of the visit, since the person hosting the visit may not be familiar with the assessment. The assessor will ask the animal unit manager to accompany him/her during the walk around the buildings. Make a brief sketch of the building for personal records. ~~Identify hospital pens and pens with mixed and/or injected animals during 10 previous days in order to exclude them from the assessment.~~

Explain to the animal unit manager that there will be assessment of animal-based measures to begin with and approximately how long these will take to complete, and that his/her assistance will be required when assessing the management-based, and resource-based measures.

At the end of the visit

Let the animal unit managers know that the visit has been completed, and thank them for their time and help during the visit. Inform the animal unit manager that when all the farm (or slaughterhouse) visits have been completed, they he will be informed about how his/her particular farm (slaughterhouse) is ranked ~~in relation to the average of all the sites that have been assessed.~~

Comment [PPN44]: We need to identify these pens so they can be excluded from the assessment. In the future we will look into this and maybe even include assessments of hospital pens to the assessment as a reference measure

Comment [VC45]: I am not sure we should keep that : it was used during the construction of the protocol; we may better say that he will be able to compare its results with the results already present on the web page related to WQ

Comment [HV46]: Valerie: I removed the last part: The farmer will receive some feedback, but not in relation to the average. That will indeed be a moving average that can be found on a web page.

Annex B: Recording sheets

B1. Recording sheets for sows, growing pigs and piglets on farm

Animal unit manager questionnaire for sows and piglets

To be completed at the start the visit using information provided by the farmer

Number of sows on the farm?

Number of finishing pigs on the farm?

Please complete:

	Mating/Service	Pregnancy	Lactation
No. buildings			
Number of rooms			
Number of pens			
Number of sows/pen			
Sows housed: (delete as appropriate)	Individually In groups	Individually In groups	Traditional crate Freedom crate Loose housed

Page: _____
 Assessor: _____
 Date: _____
 Farm: _____

Piglet Management

	Yes	No	%/Age
What % of piglets are:			
Teeth clipped?			
Teeth grinded?			
Castration			
What % of male piglets is castrated?			
At what age is castration performed?			
Is anaesthetic used during the procedure?			
Is analgesia (longer-term pain relief) used in the procedure?			
Tail docking			
What % of piglets is tail docked?			
At what age is tail docking performed?			
Is analgesia used during the procedure?			
Is anaesthetic used during the procedure?			
Weaning			
At what age are piglets weaned?			

Health

Mortalities	Yes	No	%/No.
What % of sows dies each year? (This should include only not culled animals)			
How many sows are sent as cull sows each year?			

General organization of the farm (pre-sampling) for growing pigs on farm

Fill in the next table in order to have an overview of the farm.

Complete the information for all the successive periods between weaning to slaughter (*we may consider that a period ends when all or a part of the animals are moved to another room*). When two different systems are present on the farm for the same period, use 2 columns.

 (A)(B)(C)(D)(E)(F)
Entrance age						
Leaving the room age						
Initial weight						
Final weight						
Nb rooms						
Nb rooms/batch						
Floor type						
Nb pigs/pen						
Nb pigs/room						
Outdoor access Y/N						

⁽¹⁾ A batch is a group of animals of the same age

Ask the animal unit manager to make a drawing of the farm including all rooms from weaning to end of growing period.

Identify the rooms with the letter given in the previous table (A to E – or more...) and indicate for each room:

- The pens / corridor
- The type of system (if different systems are present: straw/slatted floor; small/large pens)
- How long the animals have been in this room.
- Decide where to do the observation, identify the pens (number) and complete a questionnaire about specific information concerning the rooms.

Specific information concerning the animals that are scored:

Room				
Pens				
Date of arrival in the pen				
Mixing (Y/N)				
Date of the last mixing				
Nb days after last injections				
Nb pigs injected				
Nb meal or ad libitum				
Time of feeding				
Nb of distribution per meal				

Castration

What proportion of males ~~de-you is~~ castrated? _____

With or without anaesthesia? _____

With analgesia? _____

Comment [VC47]: And/or analgesia ?

Comment [PPN48]: We do not use this in the decision three and it can then either be added to the decisions three or deleted from this table

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Tail docking

What proportion of animals is tail docked? _____

With or without anaesthesia? _____

With analgesia? _____

Comment [VC49]: And/or analgesia

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Mortality

~~(%?)Percentage Number~~ of dead pigs (mortality) on a farm during the last ~~12 months~~ _____

Comment [HV50]: % would be better, unless we know the exact number of animals he started with and that is not asked

Comment [VC51]: After weaning

Farm: _____ Date: _____ Assessor: _____ Page: _____

Qualitative Behaviour Assessment for sows, piglets and growing pigs

- | Please observe the animals in the unit for 10-20 **minutes**, and then assess their behavioural expression ('body language') by scoring the following terms:
- | Visual Analogue Scale VAS for Qualitative Behaviour Assessment (please be sure that the lines of the QBA measures are 125 mm)
- | Please observe the animals in the unit for 10-20 **minutes**, and then assess their behavioural expression ('body language') by scoring the following terms:

Active	Min. _____	Max. _____
Relaxed	Min. _____	Max. _____
Fearful	Min. _____	Max. _____
Agitated	Min. _____	Max. _____
Calm	Min. _____	Max. _____
Content	Min. _____	Max. _____
Indifferent	Min. _____	Max. _____
Frustrated	Min. _____	Max. _____
Friendly	Min. _____	Max. _____
Bored	Min. _____	Max. _____
Playful	Min. _____	Max. _____
Positively occupied	Min. _____	Max. _____
Lively	Min. _____	Max. _____
Inquisitive	Min. _____	Max. _____
Irritable	Min. _____	Max. _____

Resource-based measures for Pregnant Sows

	Measure	Room:	Room:	Room:	Room:	Room:	Room:
		Pen:	Pen:	Pen:	Pen:	Pen:	Pen:
	No. of animals						
	Dimension (L x W)						
	Floor type						
Drinkers	Type						
	Number						
	Working (Y/N)						
	Clean (Y/N)						
Feeders	Type						
	Dimension (L x W)						
	No. feeding spaces						
	Clean (Y/N)						
Resources	Showers (Y/N)						
	Heat source (Y/N)						
	Ventilation (Y/N)						
	Kennels (Y/N)*						
	Outdoor access (Y/N)						
	Temperature #						
	Bedding type						
	% clean (0-2)						
Environmental enrichment	Description						
	Renewed (Y/N)						

Floor type: FS (fully-slatted); DS (deep-straw), PS (part-slatted); SL (solid); SB (shallow bedding)

Drinkers: Type – BT (bite drinker), BO (bowl); TR (trough)

Feeders: Type – HO (hopper); TR (trough); FL (floor fed); ESF (electronic sow feeder); IS (individual stall)

Temperature to be recorded at pig level

Bedding: Type – NO (none); DS (deep-straw), SB (shallow bedding). % clean: 0: < 25% of bedding area is wet & soiled; 1: between 25-50% of bedding area is wet & soiled; 2: >50% of bedding area is wet & soiled.

*A kennel is a covered lying area

Temperature to be recorded at pig level

Page:

Assessor:

Date:

Farm:

Resource-based measures for Lactating Sows and Piglets

	Measure	Room: Pen: Sows/ Piglets	Room: Pen: Sows/ Piglets	Room: Pen: Sows/Pi glets	Room: Pen: Sows/ Piglets	Room: Pen: Sows/ Piglets	Room: Pen: Sows/ Piglets
	No. of animals						
	Dimension (L x W)						
	Creep dimension						
	Floor type						
Drinkers	Type						
	Number						
	Working (Y/N)						
	Clean (Y/N)						
Feeders	Type						
	Dimension (L x W)						
	No. feeding spaces						
	Clean (Y/N)						
Resources	Showers (Y/N)						
	Heat source (Y/N)						
	Ventilation (Y/N)						
	Kennels (Y/N)						
	Outdoor access (Y/N)						
	Bedding type						
	% clean (0-2)						
	Temperature [#]						
Environmental enrichment	Description						
	Renewed (Y/N)						

Floor type: FS (fully-slatted); DS (deep-straw), PS (part-slatted); SL (solid); SB (shallow bedding)

Drinkers: Type – BT (bite drinker), BO (bowl); TR (trough)

Feeders: Type – HO (hopper); TR (trough); FL (floor fed); ESF (electronic sow feeder).

Bedding: Type – NO (none); DS (deep-straw), SB (shallow bedding). % clean: 0: < 25% of bedding area is wet & soiled; 1: between 25-50% of bedding area is wet & soiled; 2: >50% of bedding area is wet & soiled.

*A kennel is a covered lying area

[#]Temperature to be recorded at pig level for both sows and piglets

Page:

Assessor:

Date:

Farm:

Respiratory disorders (coughing and sneezing) for growing pigs

Assess the respiratory disorders while the animals become comfortable with your presence before to begin with the Social behaviour or at the end of the visit. Time required: 5 min per point.

Please, specify: _____ done with social behaviour _____ done at the end of the visit

PENS Id:						
Number of coughs						
Number of pigs coughing						
Number of sneezes						
Number of pigs sneezing						
Number of pigs in the pen						

PENS Id:						
Number of coughs						
Number of pigs coughing						
Number of sneezes						
Number of pigs sneezing						
Number of pigs in the pen						

PENS Id:						
Number of coughs						
Number of pigs coughing						
Number of sneezes						
Number of pigs sneezing						
Number of pigs in the pen						

Health and other measures into the pen for growing pigs

Panting and shivering could be done before entering the pen, while counting the number of pigs per pen.

The result is in general the proportion of animals with a score 2. In order not to evaluate the same animal twice, you have to put a mark (blue for example) on each of them once it has been scored. In large pens, you should use 2 colours and put a mark every ⁿ pig in order to have 15 or more pigs per pen.

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Room / Pen:	/	
Number of pigs in the pen		
	No. panting:	No. shivering:
Huddling	No. of pigs resting:	No. of pigs huddling:
Pen cleanliness		
Human Animal Relation		
Number of pigs scored		
Body condition	Presence:	
Bursitis	Score 1:	Score 2:
Manure	Score 1:	Score 2:
Wounds on body	Score 1:	Score 2:
Tail biting	Score 2:	
Lameness	Score 1:	Score 2:
Respiratory PT	Pumping:	Twisted snouts:
Rectal prolapse	Presence:	
Scouring	Score 1:	Score 2:
Skin conditions	Score 1:	Score 2:
Rupture/Hernia	Score 1:	Score 2:

Pen facilities (resource-based measures) for growing pigs

Room:	Drinker	Feeder/trough	Enrichment description :
Pen:	Type:	Type:	T °C:
Length:	Number:	Length:	Outdoor access:
Width:	Length/width:	Width:	Floor type:
	Height:	Height:	Shelter: (YES (NO
Number of pigs:	Clean: (YES (NO	Clean: (YES (NO	Surface : m ² /animal
	Works: (YES (NO	Works: (YES (NO	(or more than 2m ² /animal

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Drinker Type: **S**: pipe; **B**: bowl; **A**: trough

Feeder Type: **A**: trough; **NR**: dry feed hopper; **NS**: wet feed hopper; **S**: on the floor

Outdoor access, floor type: **T**: land; **B**: concrete; **C**: slatted floor; **H**: grass

Enrichment: precise the amount (ex: 3 chains, 100g straw/pen...)

Page: _____
Assessor: _____
Date: _____
Farm: _____

B2. Recording sheets for finishing pigs at slaughterhouse

Management questionnaire at the slaughterhouse

Name of the slughter: _____

Code applied to the slaughter: _____

Name of the observer: _____

Date: _____

Hour at the beginning of the assessment: _____

(indicate pause if they exist)

Weather: _____

Outside temperature: _____

Species slaughtered at the slaughterhouse: _____

Number of pigs per year: _____

Number of pigs slaughtered the day of the assessment: _____

Speed of the chain: _____

Stunning system: _____ Electric: _____ CO²: _____

Description of the stunning system (including driving and restraining methods):

Which percentages of the animals are own animals and which are from other companies:

Description of the system of emergency killing at the unloading area and lairage pen:

Other comments:

Thermal comfort and resource measures at the slaughterhouse

Thermoregulation and lairage facilities

Name			Date:		Slaughterhouse:		
1	2	3	4	5	6	7	8
Drinkers							
length							
width							
height							

| Pen ID |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Length |
| Width |
| Animals/dead |
| / | / | / | / | / | / | / | / |
| Panting |
| Shivering |
| Huddling |

There are showers in the lairage pens? Yes No Only in some ones

Are they working at the moment of assessment? Yes No Only in some ones

Human Animal Relationship (HAR) at the slaughterhouse

High-pitched vocalisation from lairage to slaughter

Interval	One-zero		20s	Instantaneous			
	Vocalization			Vocalization		Modifier	
	HPV	no HPV		yes	no	single	multi
1			1				
2			2				
3			3				
4			4				
5			5				
6			6				
7			7				
8			8				
9			9				
10			10				
11			11				
12			12				
13			13				
14			14				
1			1				
2			2				
3			3				
4			4				
5			5				
6			6				
7			7				
8			8				
9			9				
10			10				
11			11				
12			12				
13			13				
14			14				

Absence of pain induced by management procedures at the slaughterhouse

Stunning effectiveness at the stunning area

Farm: _____ Date: _____ Assessor: _____ Page: _____

Pig	Corneal	Righing	Breathing	Vocal	Pig	Corneal	Righing	Breathing	Vocal
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				
17					17				
18					18				
19					19				
20					20				
21					21				
22					22				
23					23				
24					24				
25					25				
26					26				
27					27				
28					28				
29					29				
30					30				

Absence of disease measures at the slaughterhouse

Slaughter checks after the sticking

Page: _____

Assessor: _____

Date: _____

Farm: _____

N	Pleurisy	Pneumonia	Whites spots	Pericarditis	N	Pleurisy	Pneumonia	Whites spots	Pericarditis
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				
17					17				
18					18				
19					19				
20					20				
21					21				
22					22				
23					23				
24					24				
25					25				
26					26				
27					27				
28					28				
29					29				
30					30				

Absence of injuries measures at the slaughterhouse

Fresh skin lesions after the sticking

Page:

Assessor:

Date:

Farm:

Carcass	Total Score	Observations	Carcass	Total Score	Observations
1			31		
2			32		
3			33		
4			34		
5			35		
6			36		
7			37		
8			38		
9			39		
10			40		
11			41		
12			42		
13			43		
14			44		
15			45		
16			46		
17			47		
18			48		
19			49		
20			50		
21			51		
22			52		
23			53		
24			54		
25			55		
26			56		
27			57		
28			58		
29			59		
30			60		

Annex C: Contributors to Welfare Quality®

Welfare Quality® partners	Country
Wageningen UR Livestock Research	The Netherlands
IFIP Institut du Porc, Rennes	France
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Coopérative Interdépartementale Aube, Loiret, Yonne, Nièvre	France
Aarhus University (formerly known as DIAS: Danish Institute of Agricultural Sciences), Aarhus	Denmark
University of Natural Resources and Applied Life Sciences, Vienna	Austria
University of Kassel, Kassel	Germany
Institut National de la Recherche Agronomique, Paris	France
Institut de l'Elevage, Paris	France
Institut de Recerca i Tecnologia Agroalimentàries, Girona	Spain
Institut Supérieur d'Agriculture Lille, Lille	France
Veterinärmedizinische Universität Wien, Vienna	Austria
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NEN (Netherlands Standardization Institute)

The Netherlands

NEN is the national organization for standardization in the Netherlands, recognized under European law. NEN supported the writing and editing of the Welfare Quality[®] assessment protocols according to the input received from the Welfare Quality[®] consortium.

Colophon

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Appendix 3

Guidelines for developing Welfare Quality[®] protocols¹

At the end of the Welfare Quality[®] project, it was felt that the Welfare Quality[®] assessment protocols would need further refinement when new knowledge and helpful techniques emerged in the future. It was thus important to set clear principles to guide the development of Welfare Quality[®] assessment protocols so that any further refinement can follow common guidelines. These guidelines should also apply to protocols developed for new species (i.e. that were not covered in the original project) by people who want to follow the Welfare Quality[®] approach. At the same time, the Welfare Quality Network has established a process to review upgraded and new protocols.

The present guidelines shall thus apply to the upgrading of the current Welfare Quality[®] protocols and to 'Welfare Quality[®]-like' protocols that are developed for other animal types or species. These guidelines are designed to help both the people developing the protocols and the reviewers.

1. Welfare criteria

Welfare Quality[®] defined 12 welfare criteria underlying good farm animal welfare:

- Absence of prolonged hunger: Animals should not suffer from prolonged hunger, i.e. they should have a suitable and appropriate diet.
- Absence of prolonged thirst: Animals should not suffer from prolonged thirst, i.e. they should have a sufficient and accessible water supply.
- Comfort around resting: Animals should have comfort when they are resting.
- Thermal comfort: Animals should neither be too hot nor too cold.
- Ease of movement: Animals should have enough space to be able to move around freely.
- Absence of injuries: Animals should be free of injuries, e.g. skin damage and locomotory disorders.
- Absence of disease: Animals should be free from disease, i.e. animal unit managers should maintain high standards of hygiene and care.
- Absence of pain induced by management procedures: Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration, dehorning).
- Expression of social behaviours: Animals should be able to express normal, non-harmful, social behaviours (e.g. allo-grooming).
- Expression of other behaviours: Animals should be able to express other normal behaviours, i.e. it should be possible to express species-specific natural behaviours such as foraging.
- Good human-animal relationship: Animals should be handled well in all situations, i.e. handlers should promote good human-animal relationships.
- Positive emotional state: Negative emotions such as fear, distress, frustration or apathy should be avoided whereas positive emotions such as security or contentment should be promoted.

Each of the above criteria is to be checked (on animals or their environment). In other words, protocols should include measures that allow determination of the compliance of an animal unit to these 12 criteria. In the event that a particular criterion is not considered applicable by the developers then the reasons shall be substantiated.

¹ Text prepared by Isabelle Veissier (May 2012), checked by the Welfare Quality Network Working Group on upgrading protocols (November 2012), and approved by the General Assembly (January 2013).

2. Welfare measures

The validation of analytical methods (e.g. biochemical assays) is based on a number of properties (selectivity, trueness, precision, fitness for purpose, ruggedness...) ². Compliance with these properties/requirements were also demanded for welfare measures developed in Welfare Quality[®]. For the precision of measures we were able to fix a minimum for intra- and inter-observer repeatability. Nevertheless, it must be borne in mind that the validation of a welfare measure results from a compromise between the above properties (see below).

2.1. Selectivity

The selectivity of a welfare measure first refers to the degree to which a measure can provide information on an animal's welfare status and not on something else. This property is sometime referred to as validity although the validation of a method depends not only on selectivity but also on trueness, precision, fitness for the purpose etc. Selectivity should be analysed in reference to the welfare criterion the measure is supposed to inform. There are several ways to check that a measure really provides good information that can be used to assess compliance with a welfare criterion:

- Comparing the results produced by the method and those produced by another one that has already been validated and that thereby serves as a gold standard (concurrent validity). As far as animal welfare is concerned, there is generally no gold standard.
- Comparing the effects of conditions or treatments to demonstrate a causal relationship between treatment and effect (predictive or construct validity).
- When concurrent or predictive validity cannot be established experts should at least agree on the validity of a measure according to their experience (consensus or face validity)

A second and very important requirement is that there are no confounding factors that can influence the results.

2.2. Trueness

Trueness refers to the closeness of agreement between a test result and the accepted reference value of what is being measured. For welfare measures, in many cases there is no reference value. Nevertheless, we can compare the result produced by a measure carried out according to a particular method to the results obtained when a more detailed method is used. For instance, regarding behaviour, one may compare the results obtained during a short observation period to those obtained during longer observations; and if scan sampling is used (i.e. one snap shot observation at fixed intervals of time) the results can be compared to those obtained from continuous observations.

2.3. Precision (also called reliability or repeatability)

For welfare measures, authors often refer to

- Intra-observer repeatability, i.e. the precision between measures done by the same observer in similar conditions. This can be tested using video recordings for behaviours or by reassessing the same animals e.g. for clinical symptoms after a short time lapse.
- Inter-observer repeatability, i.e. the precision between results obtained by several observers in similar conditions. This may be checked by asking several observers to look at the same animals at the same time, or to assess welfare using video or photographic evidence.

Very often the repeatability is expressed by the correlations between observations in the case of continuous data (Spearman or Pearson correlations) or concordance between observers in the case of discrete data (Kendall's coefficient of concordance). In Welfare Quality[®], it was considered that a correlation of 0.7 or a concordance of 0.40 or more are acceptable on the condition that these values are significant.

2.4. Fitness for purpose

The fitness for purpose is the extent to which the performance of a method matches the needs of the users. For welfare measures, it is necessary that whatever method is used should be able to detect

² See for instance (Thompson *et al* 2002)

variations among the expected range of variability within the population. The fitness for the purpose is often based on the detection limit (the smallest amount the method can detect) and the validated range (the range of situations in which the method can be regarded as validated)

To determine whether the detection limit of a welfare measure is fit for purpose we may ask if the method can be used to detect slight welfare problems. For instance, 'sunken eyes' is used to detect dehydration in calves but this indicates an extreme state where the animal urgently needs to be rehydrated, often by intravenous administration of a liquid. This symptom is not sensitive enough to detect if thirst occurs on a farm where there are fewer drinking points than recommended. Nevertheless, it does seem appropriate for detecting dehydration when animals have undergone long transportation during warm weather. The validated range is of importance, not only at the bottom of the scale (to detect minor problems) but also at the other extreme, to distinguish between moderate and severe welfare problems.

2.5. Ruggedness

For welfare measures, this may be transposed to **stability over time**. The results of a welfare assessment should be representative of the long-term farm situation. They should not be sensitive to changes in environmental or internal conditions that are not significant for the welfare of the animals. Thus, similar recordings should be achieved at different times if no major changes occurred on the farms. However, there might be differences in the results obtained from some measures because the conditions for observation have changed slightly, e.g. different weather conditions, small changes in the management or exchange of animals. This is particularly true for behaviours whose expression may reflect multifactorial influences.

2.6. Variations in different systems

For welfare measures to be applied on farms or at slaughter, it is important to check if the measure can be applied in the range of conditions that normally occur, (e.g. various farming systems, different slaughter procedures). For instance, different methods are required to detect lameness in cows housed in a loose barn vs. those in tied stalls. In Welfare Quality[®] protocol lameness is assessed in loose housed cows by making them walk in a straight line and determining if the cow bears its weight equally on the four limbs and makes regular steps. For tied cows, the observer first checks if the cow stands on its four limbs when undisturbed and then makes the cow move to the left and to the right, observing how she shifts weight from foot to foot.

2.7. Feasibility

Feasibility can be assessed by the time necessary to carry out a measure and by whether or not the methodology requires access to specific devices or the need for specialist skills. In Welfare Quality[®], we decided that a full assessment of a farm or a slaughterplant should not exceed 1 day, that the observers should be trained for 3-4 days before the observations and that they should not need to be specialists on each welfare criterion addressed (e.g. since they did not need to be vets they could only detect clear cut clinical symptoms on animals for the criteria Absence of injuries and Absence of disease). Feasibility was assessed according to the knowledge and devices currently available. If appropriate automation is developed then automatic recording (e.g. of locomotion) may replace actual observation and thereby increase feasibility by reducing the time required to take a measure.

These properties are described in greater detail in a forthcoming paper (Mounier et al., in prep), together with the theoretical background and examples of the validation of welfare measures.

3. Development of scoring models

If the data produced by the various measures included in a protocol need to be interpreted in terms of overall welfare they must be combined into an overall score. Welfare Quality[®] designed a hierarchical evaluation model to proceed from numerous individual measures to the 12 welfare criteria (Step 1) which are then combined to yield scores for each of the 4 welfare principles (good feeding, good

housing, good health, and appropriate behaviour, Step 2). Ultimately, farms are sorted into 4 categories that reflect the overall level of welfare of their animals (Step 3).

In Step 1, data collected on farms or at slaughter are transformed into scores on a value scale to reflect the compliance of a given farm with each of the welfare criteria (0- worst; 100-best). Animal scientists are to be consulted here because they are considered to have the expert knowledge needed to interpret the results in term of animal welfare. Subsequently, appropriate functions need to be designed to reflect expert opinion. Several types of functions are used:

- When all measures used to check a criterion are taken at farm level and are expressed in a limited number of categories, a decision tree is produced.
- When the measures used to check a criterion are taken at group level and several groups are assessed at the animal unit, the score attributed to the animal unit is equal to that given to the group with the lowest score. obtained in a group as long as at least 15% of the observed animals are in that 'worst' group³.
- When a criterion is checked by only one measure taken at individual level, this scale generally represents the severity of a problem and the proportion of animals observed can be calculated (e.g. percentage animals walking normally, percentage moderately lame animals, percentage severely lame animals). A weighted sum is calculated, with weights increasing with severity.
- When the measures used to check a criterion lead to data expressed on different scales (e.g. percentage animals lying outside the lying area, or average latency to lie down expressed in seconds), data are compared to an alarm threshold that represents the limit between what is considered abnormal and what is thought to be normal.

This exercise generally shows that experts do not follow a linear reasoning, e.g. for a given disorder a 10 % increase does not yield the same decrement in expert scores at the bottom of the [0-100] scale (where most animals show the disorder) than at the top of the scale (where most animals are normal). It is therefore necessary to resort to non-linear functions to produce criterion-scores, in this case I-spline functions.

If researchers change an existing measure or introduce a new one then they must repeat the above process (e.g. consult experts, estimate parameters etc.).

In Step 2, criterion scores are combined into principle scores. It is thus necessary to balance a number of issues. During the Welfare Quality[®] project, animal and social scientists were consulted in order to reflect both the supposed experience of the animals and societal concerns. In general, experts consider some criteria to be more important than others (e.g. absence of thirst is more crucial than absence of hunger) but nevertheless do not accept compensation between scores (e.g. absence of thirst does not compensate hunger and vice versa). In Welfare Quality[®], a Choquet integral was thus chosen to take into account these two lines of reasoning. Although some variations between animal types were observed, these were rather limited. For the time being, we thus recommend using the same values for Choquet integrals whatever the species.

In Step 3, the scores obtained by a farm on all welfare principles are used to assign that farm to one of four welfare categories. The Welfare Quality[®] categories were chosen to address stakeholders' requirements: excellent welfare, enhanced welfare, acceptable welfare, and not classified. Minimal and aspiration values were set for each category: 55-80 to be placed in the excellent category, 55 for enhanced, and 10-20 to be acceptable. A farm is excellent if it scores more than 55 on all principles and more than 80 on two of them, it is enhanced if it scores more than 20 on all principles and more than 55 on two of them, it is acceptable if it scores more than 10 on all principles and more than 20 on three of them, else the farm is not classified. Compensation between welfare principles is thus limited. At that stage, potential end users of the protocols (stakeholders) were consulted in addition to animal and social scientists, because the final welfare categories are meant to help stakeholders take

³ For example : in a given farm 10 groups of the same size are observed. Each group represents 10% of the animals of the farm. For a given criterion assessed at group level, the score equals 50 in 5 groups, 30 in 3 groups, 20 in 1 group and 12 in 1 group. The lowest score is then 12. There are less than 15% of animals in this condition (only 10%). The next score is 20. There are two groups that obtain 20 or a lower score and these two groups together represent 20% of the animals of the farm, so more than 15%. The final score of the farm will be 20.

decisions. Step 3 is similar whatever the species. When sufficient improvements have been made on farms or at slaughter, we envisage stricter rules according to which a farm that score below 20 for one principle is deemed 'not classified', i.e. not acceptable.

For any protocol that is either being refined or designed, it is thus necessary to consult animal scientists to enable computation of the data obtained on a farm or slaughterplant into criterion scores. This computation should use functions that appropriately match the scientists' opinions (Step 1 described above). The calculation of principle-score from criterion-scores can be done with Choquet integrals with similar weights to those used in Welfare Quality[®] (average values from Welfare Quality[®] consultations, Step 2); the first application of this strategy was for fur animals in the Welfur project. The final overall assessment of a farm should follow the procedure described in Welfare Quality[®] (Step 3).

4. Evaluation sheet for new protocols and/or new measures

4.1. Evaluation of a new protocol

1- Does the protocol cover the 12 welfare criteria?
Yes No

2- If not, which criteria are not covered?

Criterion x not covered: is the exclusion of this criterion sufficiently justified?
Yes No

3- Is the proposed measure(s) linked to at least one welfare criterion?
Yes No

For each measure:

4- is the measure sufficiently repeatable within and between observers (correlation ≥ 0.7 or kappa coefficient ≥ 0.4)
Yes No

5- is the measure validated, i.e. present a reasonable compromise between selectivity, trueness, precision, fitness for the purpose, stability over time, relevance for a wide range of systems, and feasibility?
Yes No

6- Is a scoring model proposed?
Yes No

If yes, then:

7- Was the calculation of criterion-score elaborated from a consultation with animal scientists (solely)?
Yes No

8- How many scientists were consulted? When possible, specify their expertise.

9- Was it determined that the scientists consulted had no conflict of interest in the production system addressed?
Yes No

- 10- Did the questions posed to the animal scientists (reactions to a dataset) reflect the whole range of possible situations? On the other hand when only small variations are found in practice, more questions must be asked concerning the most probable values found in practice)
Yes No
- 11- Does the proposed calculation of scores match the experts' opinion?
Yes No
- 12- Are principle scores calculated?
Yes No
- 13- If yes, are the principles scores calculated in the same way as in Welfare Quality®?
Yes No
- 14- Does the overall classification of farms follow the rules adopted in Welfare Quality®?
Yes No

4.2. Evaluation of a new measure to replace an existing one

- To what criterion (or criteria) and animal type is the proposed measure linked?
- is the measure more repeatable within and between observers compared to the actual measure in the Welfare Quality® protocol?
Yes No
- does the measure present a better compromise between selectivity, trueness, precision, fitness for the purpose, stability over time, relevance for a wide range of systems, and feasibility compared to the actual measure in the Welfare Quality® protocol?
Yes No

4.3. Evaluation of a new scoring method

For any protocol that is either being refined, it is necessary to consult animal scientists to enable computation of the data obtained on a farm or slaughterplant into criterion scores, this computation shall be done using functions that suitably match the scientists' opinions. The calculation of principle-score from criterion-scores can be done with Choquet integrals with similar weights as in Welfare Quality® (average values from Welfare Quality® consultations,. The final overall assessment of a farm should follow the procedure described in Welfare Quality®.

- What criterion and animal type are addressed by the refinement of calculations?
- For each criterion/animal type concerned, was a consultation of animal scientists performed in order to adjust the calculation of the criterion-score?
Yes No
- How many scientists were consulted? When possible, specify their expertise.
- Was it determined that the scientists consulted had no conflict of interest in the production system addressed?
Yes No

Did the questions posed to the animal scientists (reactions to a dataset) reflect the whole range of possible situations? On the other hand when only small variations are found in practice, more questions must be asked e.g, if a problem affect 0 to 5% animals in practice, then the experts should be asked how they interpret scores of e.g. 0 , 1, 2, 3, 4, 5 then. 7.5, 10, 20 40... %

- Yes No

- Does the proposed calculation of scores match the experts' opinion?
Yes No

If a refinement of the calculation of welfare principle scores or a new method is proposed for the overall evaluation then the benefits and risks of these new methods must be thoroughly evaluated. However, at the moment, it seems difficult to provide clear guidelines for such an evaluation.

5. Procedure

This section describes the procedure by which a new protocol can be adopted.

First, the proposers of an upgraded or a new protocol shall present the protocol to the Management Team of the Welfare Quality Network, together with complementary information. A proposal must thus include the following:

- A description of the measures
- Information on their relevance for specific welfare criteria and their repeatability
- Any other information to help reviewers decide if the measures present a good compromise between selectivity, trueness, precision, fitness for the purpose, stability over time, relevance for a wide range of systems, and feasibility
- If a scoring method is included, information on the expert(s) consulted must be provided
- In the event that measures are meant to replace existing ones it should be explained why the new measures are better

All this information must be supported by scientific data

Second, the Management Team will submit the documentation to two peer reviewers

Third, the reviewers will analyse the protocol using the above evaluation sheet. They may suggest improvements.

Fourth, the Management Team will send the protocol, the documentation provided and the reviewers' reports to the General Assembly of the Welfare Quality Network. The General Assembly will take the final decision (accept / ask for amendments / reject)

Fifth, after final approval the document will be prepared for publication at the public home page (<http://www.welfarequalitynetwork.net>) of the Welfare Quality Network.