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Integrated assessment of pig production systems

Application of methodical bases

Very contradictory points of view exist on the theme "animal welfare oriented" or "type-specific" livestock housing systems. In the light of the influence such systems can have on business competitiveness, an as realistic as possible method must be found for assessing and comparing such production systems within the complex infrastructure of a farm business. With this in mind, the following assessment concept represents a new method applying methodical bases of the test theory.

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In this report consideration will be given to demands and applications for an evaluation concept assessing pig production systems.

The basic integrated evaluation concept exists through a test development from the starting point production system. This comprises a methodical, test-theoretical safeguard through which it can be ensured that the relevant material criteria and other demands, which must always be present in a practice-oriented assessment concept, are met. Only thus can it be ensured that the results be accepted as objective, reliable and valid.

In the first draught of the assessment concept within the framework of pre-test 1, 40 weaner production and feeding pig units were inspected and assessed. The details thus gathered were included in the subsequent reworking of the concept.

Assessment concept for pig farms

The basic integrated assessment concept was prepared for the evaluation of pig farms. With help from data taken from individual farms the aim was to investigate and assess the complete production technique with regard to hygiene, management/production and animal welfare.

The current example of the assessment concept is divided into three sections. A general description of the farm to be investigated is in the first part, which is the cover. The second part serves data collection via a check list. The third and last is for the actual assessment (assessment form). This means that the time of data collection is dif-

ferent from that of assessment, so that in the final analysis the influence of the farmer (= stock manager) is avoided thus meeting the requirements of high objectivity. To the third section also belongs a test instruction that is firstly looked upon as support for definite usage and, secondly, contains the classification requirements (for every item) necessary for assessment.

Development of the assessment concept

Section 1: Cover

The first section of the assessment concept should serve as the overview of the farm to be assessed and contain a general description. In this way, the pig production should be systematically represented.

Section 2: Checklist

The checklist serves as a clear and structured recording of the data relevant to the assessment. The collection of the data takes place, firstly, during the inspection of the housing, through questioning of the farmer or livestock manager, and from measurements carried out or from own knowledge. In order to clarify questions and difficulties that crop up "on the spot", the farmer or stock manager should be on-hand when the housing is being inspected.

The checklist was systematically created so that a single comprehensive list covers all production types and system areas and is divided into parts for "farm inspection" and "pig farmer questioning". The order of the items is equivalent to that in the assessment form (section 3) in order to ease the evaluation of data and the orienting. Following this, for example, item number 1 of the checklist would be carried out (inspection of the housing).

Section 3: Assessment form

After the working phase of data collection

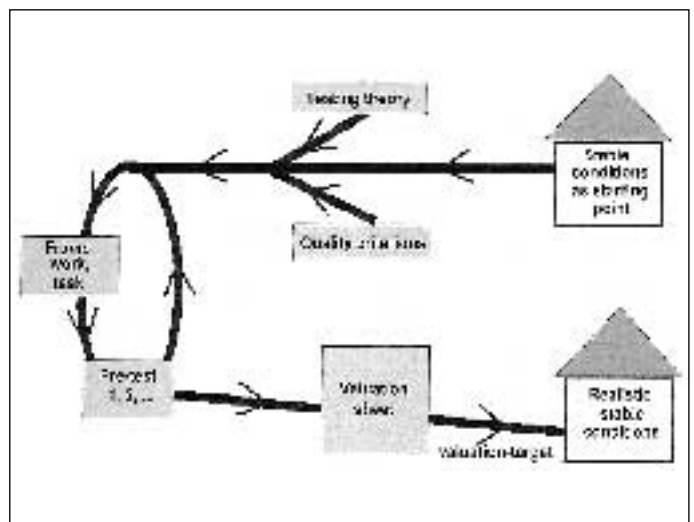


Fig. 1: Procedural diagram of assessment concept

Item-nr.	Characteristic
1	Farm
2	Building shell
3	Construction
4a	Ground plan: group systems
4b	Site area measurements: Individual systems
5-7	Lying area: individual and group systems
8a	Feeding: sow systems
8b	Feeding: slaughter pig production and weaner rearing
9a	Drinkers: group systems
9b	Drinkers: individual systems
10	Feeding place
11	Activities
12aa/12ab	Dunging: bedded housing systems
12ba/12bb	Dunging: strawless housing systems
13	Lighting
14a	Temperatures: insulated housing
14b	Temperatures: natural ventilation
15aa-15ad	Behaviour: individual systems
15ba-15bd	Behaviour: group systems
16	Livestock controls
17	Outside run

Table 1: Assessment part (A) production system

Item-nr.	Characteristic
18a	Husbandry – individual systems
18b	Husbandry – group systems
19	Individual and group systems
20	Pen construction
21-23	Hygiene
24/25	Cleanliness
26	Housing equipment
27a	Feeding: manual
27b	Feeding: electronic self-feed
28	Feeding controls
29	Feeding
30/31	Source

Table 2: Assessment part (B.1) farm management

Item-nr.	Characteristic
32-34	Animal health precautions
35	Dust pollution in-house
36-38	Housing/penning
39-44	Notifiable disease prophylactic

Table 3: Assessment part (B.2) animal health management

follows, with help of an assessment form, the real assessment of the production system in the third section of the assessment concept. For every question or every item there exists a single, uniform answer format¹⁾, the so-called multi-choice answer. This features a five-stage answer scale from zero up to four points whereby the correct answer must be crossed. The award of zero points means a minimum or negative statement, four points the maximum or positive statement.

In total, the assessment concept in its current form covers 60 individual items of which, however, only 48 items can be answered with regard to a single production system.

¹⁾ Through this, the so-called evaluation objectivity is increased considerably.

stem. The individual items which cannot be applied to all production systems are additionally classified alphabetically whereby the user can recognise them very quickly, even during data collection. The assessment concept stipulates, however, that this number of items (48) must be answered to allow a simplified statistical evaluation and, through this, comparability. For improved clarity, the items of the assessment sections production system (A), farm management (B.1) and animal health management (B.2) classified and thereby divided into different characterisation areas.

Item construction

Every test development begins with a theoretical preconception about the characteristic which the test should investigate. For this purpose, an adequate task-type must be chosen. Under task-type one should understand the way in which a test question should be answered. This is very important for the carrying out, assessment and economy of a test. The smallest observation unit within a test is called an item. An item comprises the so-called item source which can be a task, a question, a statement or challenge to take a position (in the case of the questionnaire) and the answer format a solution to a problem or key answer (in the case of the questionnaire). Multi-choice answers are distributed so that they are very suitable for representing the degree of sought-for characteristics.

At the end of the collection phase (fig. 1) the quality of the considered items is determined by an item analysis. Firstly, the item difficulty is calculated whereby an average difficulty of every individual item (normal division) of 0.5 is aimed for. Secondly, the selectivity should be determined where the individual item result in question is compared with the total farm result. The assessment of both quality criteria shows, one, the importance of the accompanying test instructions and, two, are very important indicators of the understandability of the item formulation. On top of this, the practice with this new assessment concept takes for granted a previous comprehensive training in observation.

Summary

During the development of a practice-oriented assessment concept

Table 4: Example for an item in form of a multiple-choice exercise

Nr	Item source: maximum result	Answer format multi-step item scale	Item source: maximum result
Stall-Nr. 1*	4	3 2 1 0	0
Stall-Nr. 2	4	3 2 1 0	0
Stall-Nr. 3	4	3 2 1 0	0
Stall-Nr. 4	4	3 2 1 0	0

* At least 25% of the animals on a farm must be held under a particular housing system (pen Nr. 1/2/3/4)

cept for pig production farms, one can take advantage of already proved test-theoretical fundamentals from other specialist disciplines. The major difference to judgement methods up until now lies in the fact that alongside a very deeply-detailed contents classification, a prior formal-methodical system, the so-called test construction, has been developed for the local farm inspection. This formal-methodical test construction has then to be tested itself, according to the fundamentals of statistical data collection and evaluation, with regard to explanatory content. With the help of so-called expert ratings the construction is looked at stage by stage and thus refined until accepted as suitable for use by the expert commission including the project managers. This occurs through pre-tests. In total this method was increasingly improved through use on 60 farms and finally through the recording of a further 20 units, tested for its practical performance. Through characterisation (item) analyses the method is self-tested and the formal usability of the total concept supported on the basis of test-theoretical defined testing and material criteria such as objectivity, reliability and validity.

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