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Full Research Article

ANIMAL WELFARE ASSESSMENT IN SLOVENIAN CONVENTIONAL AND ALTERNATIVE PIG PRODUCTION SYSTEMS

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Abstract

The aims of the study were to assess the welfare of pigs in Slovenian farms based on the international Welfare Quality® Assessment protocol for pigs and to gain a first insight into the welfare of pigs in Slovenian conventional and alternative farms. Pig welfare in Slovenia was assessed using the Welfare Quality® protocol on 10 alternative and 10 conventional farms. The size of the farm ranged from 11 to 1900 breeding sows in conventional farms and from three to 50 breeding sows in alternative farms. Using the protocol, the welfare of breeding sows, suckling piglets, growers, and fattening pigs was evaluated. The protocol consisted of four main principles of animal welfare (good feeding, good housing, good health, and appropriate behaviour), which were subdivided into 12 independent criteria. To evaluate each of these criteria, a set of measures was used. Overall animal welfare quality was calculated with a mathematical model incorporated into the protocol. Depending on the scores of the four principles, farms were classified as excellent, enhanced, acceptable or not classified. According to the Welfare Quality® protocol and statistical calculation, growers and fatteners in Slovenian conventional farms were rated as acceptable, while Slovenian alternative farms were rated as enhanced. We can conclude that the welfare of the growers and fatteners in our alternative farms is at a higher level than in conventional farms. The most critical evaluation points in sows were bursitis, wounds on the body, stereotypies, and fear of humans.

Key Words: alternative farm, conventional farm, pig production, welfare assessment

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INTRODUCTION

Animal welfare is an integral part of all livestock production systems and consumers expect that animal-based food products are produced with respect for the animals' welfare. The concept of welfare is multidimensional and can only be measured by external parameters (Blokhuis et al., 2010). The 'five freedoms', first listed in the Brambell Report (1965), serve as the basis for livestock welfare assessment and include the critical aspects of health and nutrition, expression of normal behaviours, fear, and distress (Johnson et al., 2019). There is a large body of research on the use of animal-based measures to assess animal welfare (European Food Safety Authority, 2015). The Welfare Quality® project (2009) focused primarily on animal-based measures as opposed to resource- and management-based measures. Animal-based measures can be monitored and used during a single farm visit by an independent observer to assess the current level of animal welfare. Welfare Quality® (2009) suggests four principles for welfare: (i) good feeding, (ii) good housing, (iii) good health, and (iv) appropriate behaviour. Each principle is defined by a set of independent but complementary criteria which are characterised by various measures (Botreau et al., 2007). The procedures and requirements for welfare assessment in sows, piglets, and finishing pigs are also described.

Housing conditions in conventional or alternative systems, especially for animals kept in groups, have different effects on the development of behavioural abnormalities as well as on welfare in general.

The aims of the study were to assess the welfare of pigs in Slovenian farms based on the international Welfare Quality® Assessment protocol for pigs (WQ®) and to gain a first insight into the welfare of pigs in Slovenian conventional and alternative farms.

MATERIALS AND METHODS

Farms

The evaluation of pig welfare in Slovenia was carried out within the framework of the Slovenian Target Research Program (Welfare in connection with poultry and pig health care in conventional and alternative breeding systems, No. V4-1604).

Welfare was assessed using the WQ® protocol on 10 alternative and 10 conventional farms. The selected farm sample was considered representative of the conditions of pigs kept in intensive and extensive systems in Slovenia. We classified the farms as alternative if voluminous feed, straw bedding, and outdoor access were integrated in the production system. The size of the farm ranged from 11 to 1900 breeding sows in conventional farms and from 3 to 50 breeding sows in alternative farms (Table 1).

Table 1. Farm size relative to number of animals

Average number of breeding sows in conventional farms	Number of farms	Average number of breeding sows in alternative farms	Number of farms
1400–1900	2	40–50	2
600	1	11–30	4
11–85	7	3–10	4

The welfare of breeding sows, growers, and fattening pigs was evaluated with the WQ® protocol. A total of 323 breeding sows and 1245 growers and fatteners on conventional farms and 156 breeding sows and 387 growers and fatteners on alternative farms were studied. Growers and fatteners were not evaluated separately, but overall, as one production category. Boars and hospital pens were excluded. The welfare protocol was always assessed by four observers. To minimize the differences between observers and to standardize the scores from the visits, observers received identical training prior to the assessment.

WQ® protocol

The protocol consisted of four main principles of animal welfare (good feeding, good housing, good health, and appropriate behaviour), which were subdivided into 12 independent criteria (Table 2).

Table 2. Main principles of animal welfare and welfare criteria

Main principles of animal welfare	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

To evaluate each of these criteria, a set of measures was used (Table 3).

Table 3. Measures for sows, growers, and fatteners

	Welfare criteria	Measures for sows	Measures for growers and fatteners
1	Absence of prolonged hunger	Body condition score	Body condition score
2	Absence of prolonged thirst	Water supply1	Water supply1
3	Comfort around resting	Bursitis, shoulder sores, absence of manure on the body	Bursitis, absence of manure on the body
4	Thermal comfort	N/A	Shivering, panting, huddling
5	Ease of movement	Space allowance1, farrowing crates	Space allowance1
6	Absence of injuries	Lameness, wounds on the body, vulva lesions	Lameness, wounds on the body, tail biting
7	Absence of disease	Mortality, coughing, sneezing, pumping, rectal prolapse, scouring, constipation, metritis, mastitis, uterine prolapse, skin condition, ruptures and hernias, local infections	Mortality, coughing, sneezing, pumping, twisted snouts, rectal prolapse, scouring, skin condition, ruptures, and hernias
8	Absence of pain induced by management procedures	Nose ringing	Castration, tail docking1
9	Expression of social behaviours	Social behaviour	Social behaviour
10	Expression of other behaviours	Stereotypic behaviour, exploratory behaviour	Exploratory behaviour
11	Good human-animal relationship	Fear of human	Fear of human
12	Positive emotional state	Qualitative behaviour assessment (QBA)	Qualitative behaviour assessment (QBA)

[1]Resource-based measures; N/A = not applicable

General information about the farm was collected with a questionnaire, answered by the farmer, followed by a visual inspection of the farm interior. The questionnaire included information on the number of animals, the number of buildings, rooms and pens, the housing system, piglet management (teeth grinding, castration routine, tail docking, weaning), disease prevention, feeding, and production and mortality data.

Good feeding, housing, and health measures were graded at the pen or individual level using a 3-point scale ranging from 0 to 2. The assessment scales were chosen so that a score of 0 was given if animal welfare was good; a score of 1, if applicable and feasible, if animal welfare was compromised to some degree; and a score of 2 if

animal welfare was poor and unacceptable. For some measures, the number of animals or pens that scored 1 or 2 was noted. If a condition was either present or absent, a binary scale (0: absent/2: present) was used. All measures and numbers of animals were assessed according to WQ® protocol.

When assessing social and exploratory behaviours, pigs were scored as active or inactive. The behaviours of active pigs were recorded as follows: positive social behaviour, negative social behaviour, exploratory behaviour, and other (eating, drinking, etc.) Each pen was observed five times consecutively in 2.5 minute intervals at three different observation points on the farm.

The qualitative behaviour assessment (QBA) was conducted at between one and eight observation points (depending on the size and structure of the farm) per farm and lasted a total of 15 minutes. The QBA used descriptive terms with an expressive connotation to reflect the animals' experience of a particular situation.

A rating scale was used to score pigs at group level based on the following 20 different terms: 1: active, 2: relaxed, 3: fearful, 4: agitated, 5: calm, 6: content, 7: tense, 8: enjoying, 9: frustrated, 10: sociable, 11: bored, 12: playful, 13: positively occupied, 14: listless, 15: lively, 16: indifferent, 17: irritable, 18: aimless, 19: happy, and 20: distressed. The scale used was 125 mm long; a value on the left (or minimum) indicated that the quality of expression indicated by the term was not present in any of the animals observed, while a value on the right (maximum) indicated that the quality of expression was present in all the pigs. Scoring was done using this scale based on the number of animals showing each of the terms used and the intensity of the behaviour registered in these animals.

More detailed information on the overall methodology of assessment can be found in the WQ® protocol (2009).

Calculation of the scores

A bottom-up approach was taken to combine the data on the different measures into an overall assessment of the animal unit. Values obtained for the different measures on the animal unit were combined to calculate criterion-scores; then the criterion-scores were combined to calculate principle-scores using Choquet integrals; finally, the animal unit was assigned to one welfare category according to the principle-scores obtained. A mathematical model has been designed by the WQ® protocol to produce an overall assessment. Criterion-scores and principle-scores ranged from 0 to 100, with a higher score indicating better status. Individual criteria within a particular principle should not compensate for each other (i.e., a high score on one criterion should not compensate for a low score on another). Therefore, compensation between criteria is controlled and limited as much as possible by the WQ® aggregation system. Depending on the scores of the four principles, farms are classified as excellent, enhanced, acceptable or not classified (Table 4).

Table 4. Classification of farms depending on the scores of the four principles (Welfare Quality®, 2009)

Classification of farms	Scores of the four principles
Excellent	> 55 in all principles and > 80 in two of them
Enhanced	> 20 in all principles and > 55 in two of them;
Acceptable	> 10 in all principles and >20 in three of them
Not classified	applied when scores do not meet the criteria for excellent, enhanced, and average

Since the calculation of scores for sows and piglets is not included in the WQ® protocol, we determined how often we assigned a score of 0, 1, and 2 for individual measures.

More detailed information on the general methodology for calculating scores can be found in the WQ® protocol (2009).

RESULTS

Characteristics of conventional and alternative farms are shown in Table 5.

Table 5. Characteristics of the conventional and alternative farms

		Conventional farms	Alternative farms
Type of production	Farrow to finish	5	10
	Suckling piglet production and rearing weaners up to 30 kg	5	0
Housing system	Indoor	6	0
	Indoor with outdoor access	4	3
	Outdoor	0	2
	Mixed housing system with different combinations of indoor and outdoor housing	0	5
Type of floor	Partially slatted floor	7	2
	Fully slatted floor	2	0
	Solid floor	1	6
	Deep straw bedding	0	2
Environment temperatures on the evaluation days		13 °C to 30 °C	13 °C to 28 °C
Age of weaned piglets		between 28 and 35 days	between 28 days and 4 months

Calculation of scores for growers and fatteners in conventional and alternative farms in Slovenia is shown in Table 6 and Figure 1.

Table 6. Criterion-scores and principle-scores for growers and fatteners from conventional and alternative farms in Slovenia

		Conventional farms		Alternative farms	
Main principles	**Welfare criteria**	**Criterion-scores**	**Principle-scores**	**Criterion-scores**	**Principle-scores**
Good feeding	Absence of prolonged hunger	88.0	75.7	100.0	64.9
	Absence of prolonged thirst	75.0		63.0	
Good housing	Comfort around resting	76.7	22.7	91.5	42.6
	Thermal comfort	74.1		89.0	
	Ease of movement	4.0		25.6	
Good health	Absence of injuries	89.7	35.1	94.4	52.6
	Absence of disease	76.3		90.6	
	Absence of pain induced by management procedures	15.8		35.3	
Appropriate behaviour	Expression of social behaviours	62.9	48.3	79.3	75.1
	Expression of other behaviours	80.7		89.3	
	Good human-animal relationship	39.1		64.5	
	Positive emotional state	48.3		86.5	

Depending on the scores of the four principles for growers and fatteners, conventional farms were rated as acceptable, while alternative farms were rated as enhanced (Figure 1).

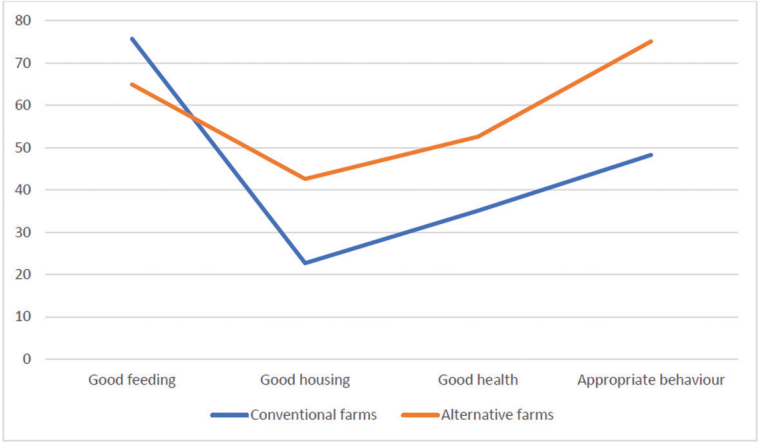

Figure 1. Classification of conventional and alternative farms for growers and fatteners in one of the welfare categories

In evaluating the feeding, housing, and health of sows in early gestation, a score of 0 was given more frequently on all measures on alternative farms than on conventional

farms; a score of 2 was given more frequently on conventional farms. For sows in mid and late gestation, the observations in categories wound on the body and bursitis stood out, a score of 0 was given least often in these two categories in both alternative and conventional farms, but more often in alternative farms than in conventional ones. Similarly, lactating sows were least likely to receive a score of 0 for bursitis. Generally, alternative farms were scored 0 more often than conventional farms. For the measures rectal prolapse, sneezing, uterine prolapse, and neurological problems, scores of 0 were given in alternative farms to the same extent (100 %) as in conventional farms.

Lactating sows in conventional farms were scored 2 more often than in alternative farms. This mainly relates to the detection of bursitis, shoulder sores, local inflammation, mastitis, metritis, panting, and respiratory problems.

For piglets, in both alternative and conventional farms, we gave a score of 0 in all cases for the following measures: absence of manure on the body, coughing, panting, and neurological disorders. A score of 2 was given only in conventional farms in the evaluation of the following measures: huddling, lameness, and splay legs.

Castration was still performed without anaesthesia and analgesia in both conventional and alternative farms. The tail was docked in most (80 %) conventional farms, the percentage was lower (30 %) in alternative farms. Teeth were clipped in 40 % of conventional farms and in 20 % of alternative farms.

In the evaluation of stereotypic behaviour, a higher percentage of score 2 was given in the conventional farms (sham chewing, tongue rolling, teeth grinding, bar biting), except for drinker biting and floor licking, where score 2 was given many times more often in the alternative farms. In the evaluation of fear of humans, a score of 0 was given several times in the alternative farms, but only in 52.5 %.

Sows in conventional farms were less active, contented, enjoying, sociable, playful, positively occupied, lively, and happy than in alternative farms. In the evaluation of social and exploratory behaviour, negative and positive behaviours and lying of sows were observed many times more frequently in conventional farms than in alternative farms.

DISCUSSION

The main objective of the present study was to evaluate the welfare of pigs in Slovenian farms using the WQ® protocol. According to the WQ® protocol, growers and fatteners in Slovenian conventional farms were rated as acceptable, while Slovenian alternative farms were rated as enhanced. In Germany, the welfare of fattening pigs on conventional farms was assessed and, regardless of farm size, the overall WQ classifications 'excellent' and 'not classified' were not recorded in any of the farms, while 'enhanced' and 'acceptable' were achieved by 80 and 20 % of the farms, respectively (Meyer-Hamme et al., 2018).

The criterion-scores and principles-scores for growers and fatteners from conventional and alternative farms in Slovenia (Table 6) show that the alternative farms scored higher on all main principles (as well as on all criteria), except for the principle of good feeding, where the lower score was due to poorer water supply in the alternative farms (the number of drinker places was not always sufficient). The lowest scores generally relate to the criterion of ease of movement (availability of space). All farms met the minimum legal standards in terms of space availability set out in Council Directive 2008/120/EC (European Union, 2008), but according to the WQ® protocol, legal requirements are not fully in line with animal welfare standards. A 2021 decree about the animal welfare measure of the Rural Development Programme of the Republic of Slovenia 2014-2020 (Republic of Slovenia, 2021) promotes farms that meet animal welfare requirements that go beyond minimum conditions and normal husbandry practises. In order to receive payments, the beneficiary must meet the requirement of 10 % more unobstructed floor area per animal in group pens in accordance with the minimum standards.

Low scores were also recorded in both housing conditions and for the criterion absence of pain, which is a consequence of castration and tail docking without analgesia or anaesthesia in conventional and alternative systems. It should be emphasized that such procedures are part of the general practice of pig rearing in Slovenia. In the study by Tuyttens et al. (2012), farmers considered surgical castration without anaesthesia to be the most favourable strategy in terms of farm profitability, animal performance and efficacy against boar taint, but expected the lowest consumer acceptance of this strategy. There is still a very heterogeneous situation in the European Union regarding the castration method, and there seems to be a big difference between the different parts of Europe in terms of social sensibility to the problem and willingness of stakeholders to discuss the issue (Castrum consortium, 2016). Classic surgical castration can be very effective in eliminating boar taint, but at the same time it is a subject of public concern because of its negative impact on the animal's welfare and integrity (Vanhonacker and Verbeke, 2011). Therefore, some alternative measures are already being considered which would eventually lead to the abolition of this method. Surgical castration using anaesthetics and analgesics, breeding uncastrated boars and slaughtering them at a lower slaughter weight, as well as immunocastration, are most frequently mentioned as alternative methods. These alternatives have become increasingly popular in recent years; in Sweden and Germany, for example, castration of piglets is permitted only under anaesthesia (Higuera, 2019).

Since no statistical calculation was made in the WQ® protocol for breeding sows, a final evaluation (classification) was not possible, but we highlighted critical points. The most critical evaluation points were bursitis, wounds on the body in pregnant sows in group housed animals, stereotypies, and fear of humans.

In sows in mid and late gestation, bursitis and wounds on the body are more prominent; we assigned a score of 2 most often in both alternative and conventional breeding systems, but less often in alternative breeding systems than in conventional.

The development of bursitis has been associated with the type of floor on which the pigs are kept. The prevalence and severity of bursitis are significantly higher in pigs housed on solid concrete or slatted floors than in pigs housed on straw (Mouttotou et al., 1998; KilBride et al., 2008). In our study, two alternative farms had outdoor housing and two had deep straw bedding, which is probably why there was less bursitis on the alternative farms.

Wounds on the body are usually the result of mixing of animals (mixing-induced aggression). Post-mixing aggression establishes a social hierarchy. These fights are stressful but diminish over time. However, persistent aggression is often the result of competition for resources such as food and water. Body wounds are more common in farms where enrichment material is not available to the pigs (Johnson et al., 2019).

When stereotypies were evaluated, a higher percentage of score 2 was assigned in conventional breeding systems. In the study by Arellano et al. (1992), sham chewing was the most frequently observed stereotypy (69%), which is consistent with our observations. Stereotypies (sham chewing, tongue rolling, teeth grinding, bar/trough/drinker biting, floor licking) are identifiable as repetitive movements that provide no obvious gain or purpose to the animal. The main causes are a lack of stimuli, a low availability of food, the characteristics of the food (fibre, energy, feeding system, particle size), and a lack of enrichment materials (Scipioni et al., 2009). In our study, sows from conventional breeding systems developed more stereotypies than those from alternative systems, most likely due to the lack of enrichment materials in the former.

When assessing fear of humans, a score of 0 was reported several times in alternative farms, and this was possibly related to previous positive experiences, such as gentle tactile interactions, conversation, and the provision of food. A variety of factors can influence pigs' willingness to approach humans, including the processing of external information through the pig's senses, genetics, stage of production, and previous pig-human interactions (Azarpajouh and Colpoys, 2015). In the study by Hemsworth et al. (2002), several significant correlations were found between the number of negative interactions that pigs received from the stockperson and subsequent meat quality of the pigs.

CONCLUSION

According to the results of our study, growers and fatteners in Slovenian conventional farms were rated as having acceptable welfare, while Slovenian alternative farms were rated as enhanced. The most critical evaluation points in sows were bursitis, wounds on the body, stereotypies, and fear of humans. We can conclude that the welfare of the fatteners in our alternative farms is at a higher level than in conventional farms. However, regardless of the breeding method, there is still much room for improvement.

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Authors' contributions

The welfare protocol was assessed by IGO, JP and MS. IGO was a major contributor in writing the manuscript. All authors have read and approved the final version of the manuscript.

Competing interests

The authors declare that they have no competing interests.

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PROCENA DOBROBITI SVINJA U SLOVENAČKIM KONVENCIONALNIM I ALTERNATIVNIM SISTEMIMA PROIZVODNJE

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Kratak sadržaj

Cilj ispitivanja je bila procena dobrobiti svinja i uslova držanja na slovenačkim konvencionalnim i alternativnim farmama na osnovu Internacionalnog protokola za procenu dobrobiti (Welfare Quality®) svinja. Uslovi dobrobiti svinja u Sloveniji procenjeni su uz pomoć Welfare Quality® za svinje na 10 konvencionalnih i 10 alternativnih farmi. Veličina farme se kretala od 11 do 1900 svinja na konvencionalnim farmama i od tri do pedeset svinja na alternativnim farmama. Procenjeni su uslovi dobrobiti priplodnih krmača, prasadi na sisi, zalučene prasadi i tovnih svinja. Protokol se sastojao od četiri glavna principa dobrobiti (dobra ishrana, dobar smeštaj, dobro zdravlje i dobro ponašanje životinja) koji su podeljeni na 12 nezavisnih kriterijuma. Za procenu svakog od ovih kriterijuma korišćen je set parametara. Kvalitet uslova dobrobiti je računat uz pomoć matematičkog modela koji je koji je sastavni deo protokola. U zavisnosti od rezultata četiri principa, farme su klasifikovane kao odlične, vrlo dobre, prihvatljive ili neklasifikovane. Na osnovu protokola za ocenu dobrobit svinja (Welfare Quality®) i statističkih proračuna, dobrobit zalučene prasadi i tovnih svinja na slovenačkim konvencionalnim farmama je ocenjena kao prihvatljiva, dok su slovenačke alternativne farme ocenjene kao vrlo dobra. Možemo zaključiti da su uslovi dobrobiti zalučene prasadi i tovnih svinja na alternativnim farmama boljeg kvliteta nego na konvencionalnim farmama. Najkritičnije tačke procene kod svinja su bili burzitis, rane na telu, stereotipije i strah od ljudi.

Ključne reči: alternativne farme, konvencionalne farme, proizvodnja svinja, procena dobrobiti