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Assessment of welfare scorecard with respect Health and Behaviour for pigs in peri urban regions of Bengaluru

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Abstract

Pig welfare is strongly shaped by management practices, housing conditions, and effective biosecurity. Proper health care, including vaccination, hygiene, and enrichment, helps reduce stress, disease risk, and harmful behaviours. Modern production systems require careful welfare monitoring using animal-based indicators to identify issues early. Ensuring high welfare standards is essential for improving productivity and supporting sustainable pig farming. The data from twenty piggery farms in peri urban region of Bengaluru was collected with regard to health and behaviour to assess welfare scores, through structured schedule in person. The farms were divided in to small (<100), medium (100 to 200) and large farms (>200) based on the number of pigs. Ten welfare measures were considered viz., Body condition score, Physical appearance. Abnormal postures, Complications from surgical procedures, Diseases controlling measures, Lameness, Reproductive efficiency, Respiratory problems, Mortality and culling rates and Behaviour. The results indicated that the small farms demonstrated better overall welfare scores for health and behaviour, likely due to lower stocking density, closer monitoring, and improved individual animal care. Medium and large farms showed comparatively lower scores, indicating the need for enhanced management practices, especially in nutrition, behaviour management, and housing conditions. Strengthening welfare-focused interventions across all farm sizes can help ensure healthier and more sustainable pig production.

Keywords: Pig welfare, Housing

Introduction

Pig welfare and health are deeply influenced by farm management practices, housing conditions, and biosecurity measures. Ensuring timely vaccination, deworming, hygiene, and disease prevention is essential for maintaining healthy herds. Providing adequate space and environmental enrichment supports natural behaviours, reduces stress, and minimizes harmful interactions such as aggression or tail biting. Modern intensive production systems demand improved stockmanship and welfare monitoring to address challenges like stress, behavioural issues, and sow mortality. Animal-based indicators and structured welfare assessment protocols now play a key role in early detection of welfare problems. Overall, promoting proper management, housing, and welfare assessment is crucial for sustainable pig production. In order to protect the animals from common diseases, periodical deworming and timely vaccination must be planned. Pigs should be vaccinated against Classical Swine Fever at the age of 2-4 weeks and breeding pigs should be tested invariably for brucellosis and leptospirosis. As a routine farm practice, all the piglets at the time of weaning should be vaccinated against Classical Swine Fever. Piglet anaemia can be prevented and cured by timely supplying iron either orally or by injection. Animals purchased for the farm should be purchased from disease free herds as far as possible and the newly purchased animals should be quarantined away from the farm for a period of three to four weeks (Bujarbaruah *et al.*, 2007) [5].

Among animal criteria, some body regions are very important to examine, since they may be possibly affected by injuries and proliferative processes caused by fighting or poor environmental conditions: ears, snout, shoulders, flanks, legs distal joints, toes, perineum and tail (Boyle *et al.*, 2000) [3].

Preventing disease is essential for maintaining good animal welfare. This relies on effective management practices, maintaining high hygiene standards, and minimizing pigs' contact with urine and feces. The amount of available space can impact the health and physical condition of pigs; restricted space limits their ability to exercise, which can result in muscle weakening, decreased bone strength, and increased fatigue (Mellor *et al.*, 2020) [22].

Typical positive social behaviours among pigs housed in groups include social nosing, vocalisations, physical contact while lying down, and playful actions (Camerlink *et al.*, 2022) [6].

Pigs often show behavioural synchrony, meaning they engage in activities like feeding, resting, and moving around at the same time. The amount of space available for social interactions is likely influenced by group size—larger groups generally lead to more frequent interactions between pigs (EFSA, 2005).

The primary factors affecting pig welfare and behaviour are the farm's management practices and environmental conditions. As a result, effective management and appropriate housing conditions are essential for maintaining animal welfare (Godyń *et al.*, 2019) [12].

Providing sufficient space and environmental enrichment is particularly important for promoting both the well-being and overall health of pigs (Palumbo *et al.*, 2023) [24].

Providing enrichment materials can promote positive behaviours like sniffing, nosing, licking, and playing, while also helping to decrease undesirable behaviours such as biting and aggression (Mkwanazi *et al.*, 2019) [23].

Offering pigs straw bedding can help decrease aggressive interactions with pen-mates by satisfying their natural urges to root, nose, and chew. It is well established that stress and discomfort caused by certain management practices and the intensive conditions typical of modern farming can lead to problematic behaviours such as tail biting, which is considered a significant issue in pig production globally (Wallgren *et al.*, 2019) [27].

Tail lesions can negatively impact growth rates, disrupt physiological functions, and interfere with gut microbiota development in young pigs. Over time, these issues can result in the rejection of the entire carcass or specific parts during processing, leading to considerable economic losses (Correa *et al.*, 2023) [7].

Pigs are social creatures that exhibit a range of behaviours, from positive actions like social nosing and play to negative ones such as aggressive encounters and oral manipulation, especially within farm environments. Social behaviours play a crucial role in recognition, maintaining group cohesion, and establishing social hierarchies. These interactions significantly impact pig welfare. Stress caused by aggression or undesirable social interactions is a major welfare concern across almost all groups of pigs in commercial production systems (Markland *et al.*, 2025) [20].

Effective biosecurity in swine farming involves implementing specific practices and protocols to minimize the transmission of diseases among pigs, humans, and other farms. A comprehensive biosecurity plan should be in place, outlining

clear, written procedures for the entry, conduct, and exit of employees, visitors, service personnel, equipment, and animals. One crucial component of this plan is the safe and proper disposal of pig slaughter waste, particularly in preventing the spread of African Swine Fever (ASF). Slaughterhouse operators must ensure that potentially infectious materials—such as blood, manure, and body remains—are handled and disposed of safely to reduce the risk of ASF transmission. Additionally, poor animal handling not only affects immediate outcomes like milk production in lactating sows and reproductive performance but can also lead to chronic stress. Over time, this stress can impair immune function, lower productivity, and negatively impact meat quality (Hasahya *et al.*, 2023) [13].

Sow mortality is a complex issue that adversely affects animal welfare, farm sustainability, and overall profitability. With the intensification of pig production—marked by larger herd sizes and a strong emphasis on maximizing productivity—sows are under increased stress. The shift toward leaner genetic lines to meet market demands has unintentionally led to reduced body fat reserves in sows, making them more vulnerable to metabolic disorders, reproductive issues, and heat stress. In addition, the quality of stockmanship has not always evolved in line with these production changes, further contributing to the problem (Bonckaert *et al.*, 2025) [2].

Ensuring high animal welfare standards and having dependable methods to evaluate them are increasingly crucial in the modern livestock industry (Alonso *et al.*, 2020) [1].

When high welfare standards are not maintained and animal health and well-being are at risk, it is essential to identify the issue early. This allows for timely intervention, minimizing negative welfare impacts and supporting sustainable pig production. One effective method for identifying animal welfare issues is through the observation of behavioural changes (Matthews *et al.*, 2016) [21].

In Germany, a new protocol for assessing the welfare of sows and piglets was published in 2016, based on the Welfare Quality® protocol for sows and piglets. This development followed the legal requirement, introduced in 2014 under the German Animal Welfare Act, mandating that farmers conduct on-farm welfare assessments using animal-based indicators and they are using 0 to 2 scoring system for assessment welfare in pigs (Friedrich *et al.*, 2020) [11].

Materials and Methods

Location of the study: Bengaluru Rural district lies in the southeastern part of the state, covering a geographical area of 229,519 hectares, which accounts for 1.2% of the state's total area. Located at 13°18'56.5" N latitude and 77°30'53.1" E longitude, the district is part of Bengaluru's peri-urban zone.

Parameters: The data from twenty piggery farms in peri urban region of Bengaluru was collected with regard to health and behaviour to assess welfare scores, through structured schedule in person. The farms were divided in to small (<100), medium (100 to 200) and large farms (>200) based on the number of pigs. Ten welfare measures were considered viz., Body condition score, Physical appearance. Abnormal postures, Complications from surgical procedures, Diseases controlling measures, Lameness, Reproductive efficiency, Respiratory problems, Mortality and culling rates and Behaviour.

Scoring criteria (Total - 40 marks)**Body condition score (4)**

Parameter	Ideal	Medium	Poor
BCS	4 marks	2 marks	1 mark
Physical appearance	6 marks	3 marks	0 marks
Complications from the surgical procedures	3 marks	1.5 marks	0 marks
Abnormal postures	1 mark	0.5 marks	0 marks
Diseases controlling measures	8 marks	4 marks	0 marks
Lameness	2 marks	1 mark	0 marks
Reproductive efficiency	4 marks	2 marks	0 marks
Respiratory problems	1 mark	0.5 marks	0 marks
Mortality and Culling rates	2 marks	1 mark	0 marks
Behaviour	9 marks	4.5 marks	0 marks

Tabulation and analysis: After collecting responses from the participants, the data was carefully reviewed, verified, and numbered. The data were then coded, compiled, and tabulated according to standard procedures consistent with the study's objectives. statistical analysis will be carried out using

Duncan's Multiple Range Test (DMRT). This post-hoc test is applied following a significant ANOVA result to determine which specific group means differ significantly from one another.

Results and Discussion

Table 1: Welfare score of 'Health and behaviour' component in pig farms of different size.

Parameter	Maximum score	Small farms	Medium farms	Large farms	Overall average	P value
Body condition score	4	3.80±0.12 ^a	3.4±0.15 ^b	43.1±0.02 ^c	3.4±0.05	0.000
Physical appearance	6	5.60±0.24 ^a	5.60±0.16 ^a	4.4±0.29 ^b	5.30±0.16	0.003
Complications from surgical procedures	3	3.00±0.00	2.55±0.23	3.00±0.00	2.78±0.12	1.000
Abnormal postures	1	1.00±0.00	1.00±0.00	1.00±0.00	1.00±0.00	1.000
Disease controlling measures	8	6.00±0.00	5.9±0.10	6.00±0.00	5.95±0.05	1.000
Lameness	2	2.00±0.00	2.00±0.00	2.00±0.00	2.00±0.00	1.000
Reproductive efficiency	4	4.00±0.00	4.00±0.00	4.00±0.00	4.00±0.00	1.000
Respiratory problems	1	1.00±0.00	1.00±0.00	1±0.00	1±0.00	1.000
Mortality and culling rates	2	2±0.00	2±0.00	2.00±0.00	2.00±0.00	1.000
Behaviour	9	9.00±0.00 ^a	8.4±0.16 ^a	7.4±0.36 ^b	8.3±0.17	0.000
Overall score	40	32.4±0.50 ^a	31.25±0.5 ^a	26.57±0.29 ^b	30.38±0.58	0.000

Note: Means within a row with different superscripts differ significantly

Body condition score

Body condition scores ranged from 3.1 in large farms to 3.8 in small farms, with significant differences among all farms. Higher scores in small farms may reflect more individualized feeding attention and diverse feed resources, while lower scores in large farms could be due to uniform rations and competition among animals. Body condition is a critical welfare indicator as it reflects nutritional status, health, and reproductive efficiency. Similar findings were reported by Devi *et al.* (2014) [8], who observed that pigs maintained under smallholder systems in Northeast India often showed better body condition compared to those reared intensively under resource-constrained conditions.

Physical appearance

The mean scores for the Physical appearance was lowest in large farms (4.4) and it was highest in both farms small and medium farms (5.6). The statistical analysis indicated significantly lower ($P<0.003$) differences found in large farms when compared to small and medium farms. Better scores in small farms may be attributed to closer farmer attention, lower stocking density, and greater use of locally available feed resources that enhance coat condition and overall appearance. In contrast, intensive large farms may face issues such as minor skin lesions or rough hair coats due to crowding and uniform feeding practices. Similar observations were reported by Kumaresan *et al.* (2007) [17],

who noted that pigs maintained under smallholder systems in Northeast India generally exhibited better physical appearance and fewer skin problems than those in intensive units.

Complications from surgical procedures

The welfare score for complications from surgical procedures ranged from 2.55 in medium farms to 3.0 in small and large farms, with non-significant differences across farm categories. Surgical interventions such as castration, tail docking, and teeth clipping are commonly practiced in pig production but can cause pain, stress, and post-operative complications if not performed with appropriate techniques and care. The relatively uniform scores suggest that while complications were minimal across farms, the continued use of invasive procedures highlights the need for adoption of alternatives and pain management strategies to improve welfare (Sutherland *et al.*, 2020) [26].

Abnormal postures

The welfare score for abnormal postures was uniform (1.0 ± 0.00) across small, medium, and large farms, with non-significant differences observed. The uniform low scores suggest that such postures were rarely observed, indicating generally good health and comfort of pigs across farms. Nonetheless, regular monitoring of posture and locomotion remains essential for early detection of musculoskeletal or welfare problems.

Disease controlling measures

The welfare score for disease controlling measures ranged from 5.9 in medium farms to 6.0 in both small and large farms, with non-significant differences among the farm categories. Effective disease control, including vaccination, deworming, and biosecurity, is fundamental to maintaining herd health and improving welfare. The consistently high scores suggest that most farms practiced adequate preventive health measures. However, continuous monitoring, timely veterinary interventions, and farmer training are essential to sustain disease control and minimize economic losses (Laanen *et al.*, 2013) ^[19].

Lameness

The welfare score for lameness was uniform (2.0 ± 0.00) across small, medium, and large farms, with non-significant differences among farm categories. Lameness is a critical welfare concern in pigs as it is associated with pain, reduced mobility, poor feed intake, and decreased productivity. The uniform scores suggest that lameness was present at a low but consistent level across all farms, likely influenced by factors such as flooring type, hygiene, and nutrition. Regular locomotion scoring and early treatment are essential to reduce the impact of lameness on welfare and performance (Jensen *et al.*, 2021) ^[15].

Reproductive efficiency

The welfare score for reproductive efficiency was uniform (4.0 ± 0.00) across small, medium, and large farms, with non-significant differences among farm categories. Reproductive efficiency is a key determinant of profitability and sustainability in pig farming, as it directly affects litter size, farrowing rate, and piglet survival. The consistent scores suggest that reproductive performance was maintained at a moderate level across farms, likely supported by adequate nutrition and basic management practices. However, improvements in heat detection, breeding management, and sow body condition could further enhance reproductive outcomes (Kauffold *et al.*, 2019) ^[16].

Respiratory problems

The welfare score for respiratory problems was uniform (1.0 ± 0.00) across small, medium, and large farms, with non-significant differences among the farm categories. Respiratory health is one of the most common concerns in pig production, as diseases such as porcine respiratory disease complex (PRDC) can significantly impair growth, welfare, and productivity. The uniform scores in this study suggest a low prevalence of respiratory issues, possibly due to proper ventilation and basic disease control measures. Nevertheless, continuous monitoring and biosecurity practices are crucial, as respiratory diseases remain a major cause of morbidity in pig farms worldwide.

Mortality and culling rates

The welfare score for mortality and culling rates was consistent (2.0 ± 0.00) across small, medium, and large farms, with non-significant differences among farm types. Mortality and culling are important indicators of both animal welfare and farm profitability, as high losses directly reduce productivity and reflect underlying health or management issues. The uniform score observed suggests that farms maintained similar levels of management practices to minimize losses. However, studies have shown that factors such as poor housing, inadequate biosecurity, and reproductive inefficiencies can contribute to increased mortality and culling in pig herds if not effectively managed (Stalder *et al.*, 2021) ^[25].

Behaviour: Behavioural scores were highest in small farms (9.0) and lowest in large farms (7.4), with significant differences among all farm categories. Significantly ($P < 0.004$) higher scores in small farms when compared to medium and large farms may be attributed to lower stocking density, reduced aggression, and closer human-animal interaction, which promote positive behaviours. In contrast, intensive conditions in large farms often increase risks of stress-related behaviours such as tail biting and fighting due to space limitations and competition. Similar findings were reported by Kumari *et al.* (2021) ^[18], who highlighted that pigs in smallholder systems in Jharkhand displayed fewer abnormal behaviours compared to intensively managed pigs.

Overall welfare score for Health and behaviour

The overall mean welfare scores for Health and behaviour was highest in small farms (32.40 ± 0.50) and lowest in medium farms (26.57 ± 0.29). The statistical analysis indicated significant ($P < 0.000$) differences among all the groups. The results show that small farms achieved the highest welfare scores for health and behaviour, while medium farms recorded the lowest; This suggests that overall health and behavioural standards were maintained better in small farms when compared to medium and large farms. In contrast earlier observations that good animal care practices contribute to stable welfare outcomes irrespective of farm size (Hemsworth *et al.*, 2015) ^[14].

Conclusion

Small farms demonstrated better overall welfare scores for health and behaviour, likely due to lower stocking density, closer monitoring, and improved individual animal care. Medium and large farms showed comparatively lower scores, indicating the need for enhanced management practices, especially in nutrition, behaviour management, and housing conditions. Strengthening welfare-focused interventions across all farm sizes can help ensure healthier and more sustainable pig production.

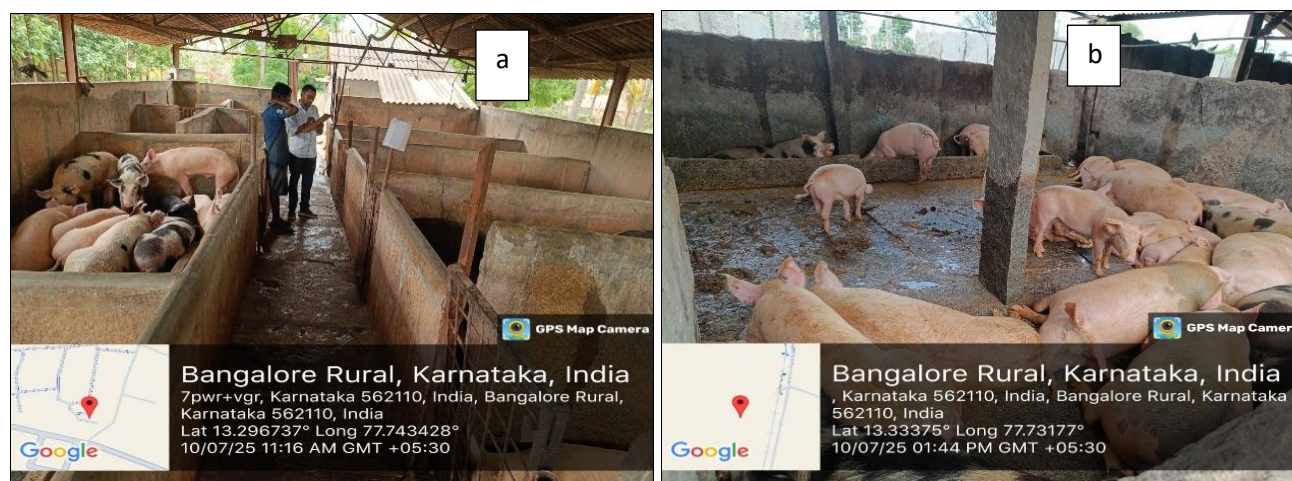


Plate 1: Collection of information and giving welfare scores with respect to health and behaviour for pigs in and around peri-urban regions of Bengaluru.

Conflict of Interest

Not available

Financial Support

Not available

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