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ASSESSMENT OF BROILER CHICKEN WELFARE IN INTENSIVE FARMING SYSTEMS IN GIANYAR REGENCY

Penilaian Kesejahteraan Ayam Broiler yang Dipelihara Intensif di Kabupaten Gianyar

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Abstract

The rapid development of intensive broiler farming systems has raised concerns regarding animal welfare. This study aimed to evaluate the level of animal ethics compliance and welfare status of broiler chickens raised under intensive systems in Gianyar Regency. This research used an observational method with a cross-sectional design involving 19 broiler farms and 950 chickens aged 4–5 weeks. Animal ethics were assessed using the Responsible Minimum Standards in FARMS Initiative, while animal welfare was evaluated using the RSPCA Welfare Assessment protocol. The results showed that compliance with animal ethics was not optimal, with only 3–6 out of 14 indicators fulfilled, while 8–11 indicators were not met. Major issues included high stocking density, lack of environmental enrichment, use of fast-growing strains, absence of stunning before slaughter, and lack of welfare certification. Welfare assessment revealed that all chickens exhibited at least one abnormal parameter. The average scores were 1.74 (gait score), 0.94 (feather condition), 0.74 (body lesions), 1.99 (breast cleanliness), 0.51 (leg deformity), 0.45 (pododermatitis), and 0.49 (hock lesions). In conclusion, broiler welfare and ethical compliance in intensive systems in Gianyar Regency are still not optimal. Improvements in management practices are required, particularly in stocking density control, environmental enrichment, and implementation of welfare standards. It is recommended that farmers adopt sustainable welfare practices and regular welfare audits.

Keywords: animal ethics, animal welfare, broiler chicken, intensive farming system.

Abstrak

Sistem pemeliharaan ayam broiler secara intensif berkembang pesat namun berpotensi menimbulkan permasalahan kesejahteraan hewan. Penelitian ini bertujuan untuk menilai

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tingkat pemenuhan *animal ethics* dan kondisi kesejahteraan ayam broiler pada sistem pemeliharaan intensif di Kabupaten Gianyar. Penelitian ini menggunakan metode observasional dengan desain cross-sectional pada 19 peternakan dan 950 ekor ayam umur 4–5 minggu. Penilaian *animal ethics* menggunakan *Responsible Minimum Standards* dari FARMS Initiative, sedangkan *animal welfare* menggunakan RSPCA *Welfare Assessment*. Hasil penelitian menunjukkan bahwa pemenuhan *animal ethics* belum optimal, dengan hanya 3–6 indikator terpenuhi dari 14 indikator, sementara 8–11 indikator tidak terpenuhi. Permasalahan utama meliputi kepadatan kandang tinggi, tidak adanya *enrichment*, penggunaan strain *fast growth*, tidak dilakukan *stunning*, serta tidak adanya audit kesejahteraan hewan. Penilaian kesejahteraan menunjukkan seluruh ayam memiliki minimal satu parameter tidak normal. Nilai rata-rata skor yaitu *gait score* 1,74; kondisi bulu 0,94; luka tubuh 0,74; kebersihan dada 1,99; penyimpangan kaki 0,51; pododermatitis 0,45; dan luka hock 0,49. Disimpulkan bahwa kesejahteraan ayam broiler pada sistem intensif di Kabupaten Gianyar belum optimal. Disarankan perbaikan manajemen terutama pada kepadatan kandang, *enrichment*, dan penerapan standar kesejahteraan secara berkelanjutan.

Kata kunci: *animal ethics, animal welfare*, ayam broiler, sistem pemeliharaan intensif

INTRODUCTION

Global demand for animal-sourced protein, particularly poultry meat, has continued to rise in parallel with population growth and increased household incomes (FAO, 2018). In Indonesia, chicken meat consumption increased from 7.12 kg per capita per year in 2022 to 7.65 kg per capita per year in 2024 (Ministry of Agriculture, 2024). This heightened demand has driven the expansion of intensive broiler production systems focused on production efficiency and rapid growth. Genetically selected broiler chickens can attain market weight within a short production cycle with high feed conversion efficiency. However, intensive systems often neglect the biological needs and natural behaviours of chickens, including restricted movement, high stocking densities, and suboptimal environmental quality, which can result in physiological and psychological stress (Bura *et al.*, 2024; Anderson *et al.*, 2021).

These issues have significant consequences for broiler health and welfare, such as metabolic disorders, suppressed immune function, and increased disease risk that frequently lead to antibiotic use (Burin *et al.*, 2019; Kwon *et al.*, 2024). Moreover, production pressure in intensive systems contributes to behavioural problems and reduced quality of life for birds. As public awareness of animal welfare grows, husbandry practices that incorporate animal welfare and animal ethics considerations have become essential demands in modern livestock production (Sinclair *et al.*, 2019).

Contemporary welfare frameworks have evolved from the Five Freedoms to the Five Domains of Animal Welfare, which address nutrition, environment, health, behaviour, and mental state (Mellor, 2017). Broiler welfare assessment can be conducted using animal-based measures such as the Royal Society for the Prevention of Cruelty to Animals (RSPCA) Welfare Standards and via management-focused approaches like the Responsible Minimum Standards (RMS) of the Farm Animal Responsible Minimum Standards (FARMS) Initiative, enabling comprehensive evaluation of welfare conditions and ethical husbandry practices.

Although numerous studies have investigated broiler welfare, research that directly assesses broiler welfare using internationally recognized assessment instruments in Bali—particularly in Gianyar Regency—remains limited. Gianyar was selected as the study site because broiler production there ranges from small- to medium-scale operations, making it a relevant representation for evaluating the implementation of animal welfare principles in the field (Selia *et al.*, 2024). Therefore, this study aims to assess the level of compliance with animal ethics

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and the welfare status of broiler chickens in intensive production systems in Gianyar Regency. The findings are expected to provide scientific insight into the current state of broiler welfare and to inform improvements in husbandry management that prioritise animal welfare and the sustainability of the poultry industry.

RESEARCH METHOD

Ethical Clearance

This study employed field observation and interview methods without direct intervention on experimental animals; therefore, formal animal experimental ethical approval was not required.

Research Object

The study objects were finisher-phase broiler chickens aged 4–5 weeks raised under intensive production systems in Gianyar Regency. The study sample consisted of 19 broiler farms selected using purposive sampling based on the criteria of intensive farming activity and farmer willingness to participate. The number of farms was determined using the Lemeshow formula with a 95% confidence level ($z = 1.96$), an estimated proportion (p) of 0.05, and an error margin (d) of 0.1, yielding a required sample size of 18.24 farms, which was rounded up to 19 farms. At each farm, 50 chickens were observed in accordance with the RSPCA standard instrument (RSPCA UK, 2017). Chickens were selected by random sampling, resulting in a total observation sample of 950 broiler chickens.

Research Design

This study employed an observational method with a cross-sectional approach to assess broiler chicken welfare conditions and animal welfare compliance at a single point in time. The sampling technique used was two-stage sampling, in which the first stage involved selecting farms as the primary sampling units, and the second stage involved selecting chickens as the secondary sampling units.

Research Variables

The variables used in this study consisted of independent, dependent, and control variables. The independent variable was the intensive broiler production system. The dependent variables were the level of fulfillment of animal ethics and the level of broiler welfare. The control variables in this study were the research location in Gianyar Regency and the use of standard assessment instruments adapted from the RSPCA Welfare Assessment and the Responsible Minimum Standards of the FARMS Initiative.

Data Collection Methods

Data Data were collected through field observation and recording using an assessment form developed by the AWATARA (Animal Welfare Training, Research and Assessment) certification body of the Faculty of Veterinary Medicine, Udayana University. The form was adapted from the RSPCA Welfare Assessment (2017) and the Responsible Minimum Standards from the FARMS Initiative (2020).

Animal ethics assessment was conducted using the Responsible Minimum Standards (RMS) instrument, which evaluates five principal animal welfare risks: space restriction, barren and unsuitable environments, breeding and genetics, slaughter, and compliance and transparency.

Animal welfare assessment was performed using the Royal Society for the Prevention of Cruelty to Animals (RSPCA) instrument, which includes the following parameters: walking ability, plumage condition, body lesions, feather cleanliness, foot angle deviations,

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pododermatitis, and hock lesions. Each parameter was assessed observationally and scored according to the standard guidelines.

Data Analysis

The obtained data were analyzed using a quantitative descriptive approach. Animal welfare data are presented as score distributions and mean values for each parameter to illustrate the welfare status of the chickens. Meanwhile, animal ethics data were analyzed by classifying each indicator into compliant and non-compliant categories, which are subsequently presented as the total number and percentage of indicator fulfillment.

RESULTS AND DISCUSSION

Result

This study was conducted across 19 intensive broiler chicken farms in Gianyar Regency, with a total of 950 chickens observed. Each farm was represented by 50 finisher-phase broiler chickens aged 4–5 weeks, selected at random. The general overview of the farms, along with the assessment results for animal ethics using the Responsible Minimum Standards (RMS) and animal welfare using the RSPCA Welfare Assessment, are presented in Table 1. Based on Table 1, the level of animal ethics compliance across all farms remains low, with the number of compliant indicators ranging from 3 to 6 out of a total of 14 indicators, while non-compliant indicators ranged from 8 to 11. Furthermore, all observed chickens on each farm were categorized as poor welfare, as every individual exhibited at least one parameter that deviated from normal conditions.

Animal Ethics Compliance

The animal ethics assessment was conducted using the Responsible Minimum Standards (RMS) instrument from the FARMS Initiative, which encompasses five welfare risk categories. The assessment results indicated that the majority of the farms have not yet achieved optimal compliance with animal welfare standards.

Welfare Risk 1: Space Restriction

Based on Table 2, all farms (100%) failed to meet the criteria for a maximum stocking density of 9 birds/m². This indicates that the chickens were reared under high-density conditions, which potentially restricted their movement. Regarding the thinning practice indicator, only 2 farms (11%) were compliant as they did not perform thinning, whereas the majority of the farms (89%) still practiced thinning (staged harvesting). Meanwhile, all farms (100%) complied with the standard housing type indicator by utilizing litter-floor housing.

Welfare Risk 2: Barren and Inadequate Environment

Based on Table 2, most environmental indicators showed non-compliance with the RMS standards. All farms (100%) failed to provide perches and pecking substrates, indicating a total absence of environmental enrichment. Regarding the minimum litter depth indicator of 5 cm, a total of 11 farms (58%) met the standard, while 8 farms (42%) did not. For the lighting indicator, 13 farms (68%) achieved the minimum light intensity of 50 lux, whereas 6 farms (32%) failed to meet the requirement. Furthermore, all farms (100%) did not allow natural sunlight to enter the housing and did not implement a nighttime dark period of 6–8 hours, indicating that a continuous lighting regimen was maintained. In terms of air quality, the majority of the farms met the standard for ammonia levels (84%), although 16% still exceeded the threshold. Additionally, all farms (100%) complied with the carbon dioxide level standard (CO_2 maximum of 3,000 ppm).

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Welfare Risk 3: Breeding and Genetics

Based on Table 2, all farms (100%) failed to meet the indicator for the utilization of slow-growing chickens. This indicates that none of the farms utilized chicken strains with a slow growth rate as recommended by the RMS. All farms used fast-growing chickens, specifically commercial strains such as Cobb and Ross. This condition indicates that the broiler chicken production systems in the study location are fully oriented toward production efficiency and rapid growth.

Welfare Risk 4: Slaughter

Based on Table 2, all farms (100%) failed to meet the indicator for the implementation of stunning prior to slaughter. In this study, the slaughter risk assessment was conducted using the RMS standards, with the primary indicator being the application of stunning before slaughter. Stunning is a procedure aimed at reducing or eliminating animal consciousness prior to slaughter to minimize pain, stress, and suffering of the chickens during the exsanguination process. Interview results revealed that the slaughter process is not conducted at the farm level; instead, chickens are sold alive to collectors. The chickens are subsequently distributed to slaughterhouses or other business units, leaving the farmers with neither control nor information regarding the slaughter methods applied. Consequently, all farms were categorized as non-compliant for the stunning implementation indicator within the RMS assessment.

Welfare Risk 5: Compliance and Transparency

Based on Table 2, all farms (100%) failed to meet the indicator for animal welfare audits or certifications. The absence of audits and certifications indicates that animal welfare implementation across the observed farms has not been externally verified. Interview results also revealed that the majority of the farmers were unfamiliar with the concepts of animal welfare audits or certifications and had never participated in such programs. Consequently, all farms were categorized as non-compliant for the compliance and transparency indicator based on the RMS standards.

Animal Welfare

The animal welfare assessment was conducted using the RSPCA Welfare Assessment instrument on 950 broiler chickens from 19 farms, with a sample size of 50 birds per farm. The observed parameters included walking ability, feather condition, body lesions, breast feather dirtiness, hock burn, and footpad dermatitis. A summary of the mean values for each parameter is presented in Table 3. Based on Table 3, all parameters showed mean values above normal conditions, indicating welfare compromises in the observed broiler chickens. The highest mean values were found for breast feather dirtiness (1.99) and walking ability (1.74), while other parameters showed lower values but remained above optimal conditions. Overall, these results indicate that the broiler chickens experienced mild to moderate welfare compromises.

Parameter 1: Walking Ability (Gait)

The distribution of gait scores is presented in Table 4. The majority of the chickens scored 1 and 2, accounting for 34% and 39%, respectively. This condition indicates that most of the chickens experienced mild to moderate locomotion impairment. Chickens with normal gait (score 0) were found in only 7% of the population, highlighting the low proportion of chickens with optimal locomotion status. Severe impairment (score ≥3) was observed in 20% of the chickens, indicating serious musculoskeletal issues within a portion of the population. Overall, these results demonstrate that locomotion impairment is a primary indicator of compromised

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welfare in broiler chickens.

Parameter 2: Plumage Condition

The distribution of plumage condition scores is presented in Table 4. The majority of the chickens fell into score 1 (50%) and score 0.5 (31%), indicating uneven feather coverage to early plumage damage. Chickens with normal plumage condition (score 0) were exceptionally low, accounting for 0%. Furthermore, as many as 20% of the chickens were categorized with severe plumage damage (score ≥1.5), indicating a more serious integumentary disorder. These findings demonstrate that the plumage quality of the broiler chickens at the study site was generally sub-optimal.

Parameter 3: Dorsal and Body Lesions

The distribution of body lesions is presented in Table 4. A total of 74% of the chickens exhibited lesions or scars, whereas only 26% were free of lesions. This proportion indicates that the majority of the chickens experienced integumentary system impairment. The high incidence of lesions suggests potential deficiencies in flock management, such as high stocking density or uncontrolled agonistic interactions among the birds.

Parameter 4: Breast Plumage Soiling

The distribution of breast plumage soiling is presented in Table 4. Almost all chickens (100%) were categorized into the highest score (Score 2), indicating extensive fecal contamination over a large area of the breast feathers. No chickens were observed with clean breast plumage (Score 0). These results demonstrate that the birds' bodily cleanliness was severely compromised, serving as the most critically affected welfare indicator identified in this study.

Parameter 5: Leg Angle Deviation

The distribution of leg angle deviations is presented in Table 4. A total of 53% of the chickens exhibited normal conformation (Score 0); however, the remaining 47% showed varying degrees of leg angle deviation. The majority of these abnormalities were mild (Score 1), accounting for 43%, whereas the prevalence of moderate-to-severe deviations was relatively lower at 3%. These results indicate that although most chickens maintained normal leg structure, the proportion of birds with deformities was substantial and possesses the potential to affect long-term welfare.

Parameter 6: Pododermatitis

The distribution of pododermatitis is presented in Table 4. The majority of the chickens exhibited alterations in the footpads, with only 15% being free of lesions. A total of 38% of the birds showed early signs (discoloration or swelling), while the remaining 46% had developed lesions of varying degrees of severity. Although the prevalence of severe lesions was relatively low (11%), the high proportion of chickens displaying early signs to mild lesions indicates that pododermatitis is a prevalent issue within the observed production system.

Parameter 7: Hock Lesions

The distribution of hock lesions is presented in Table 4. The majority of the chickens exhibited alterations in the hock joint, with only 3% being completely normal. A total of 35% of the birds showed early signs, whereas over 60% had developed lesions ranging from mild to severe. These findings indicate that hock joint impairment is a critical indicator of compromised broiler chicken welfare.

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Discussion

Animal Ethics Compliance

Welfare Risk 1: Spatial Restriction

Spatial restriction is a critical factor in intensive broiler production systems because it directly compromises the birds' ability to move, rest, and express natural behaviors. Based on Table 2, all surveyed farms (100%) failed to comply with the maximum stocking density standard of 9 birds/m^2 stipulated by the Responsible Minimum Standards (RMS). This finding indicates that the implemented management systems remain highly production-oriented at the expense of animal welfare aspects.

High stocking density is well-documented to be significantly associated with various health disorders and declined welfare in broiler chickens. Previous studies have reported that overcrowding increases the incidence of lameness, dermatitis, and physiological stress in broilers (European Food Safety Authority, 2010; Baxter *et al.*, 2020). Furthermore, recent research demonstrates that high stocking densities elevate competition for access to feed and water, while simultaneously deteriorating litter quality, which ultimately exerts a negative impact on both production performance and avian welfare (Nielsen *et al.*, 2023). Consequently, the results of this study are consistent with existing literature establishing stocking density as a primary determinant of compromised broiler welfare.

Regarding the thinning indicator, the majority of the farms (89%) still practice this method, despite the RMS recommendation against it. In commercial practice, thinning is conducted to reduce stocking density prior to final harvest; however, from an animal ethics perspective, this practice remains problematic as the chickens are still subjected to high stocking densities during the initial rearing period. Moreover, the thinning process involves catching and depopulation activities that can induce acute stress, elevate injury risks, and compromise biosecurity protocols (Hertogs *et al.*, 2021; Nagel-Alne *et al.*, 2024). This condition demonstrates that thinning-based management strategies are not fully capable of mitigating the welfare issues stemming from initial high stocking densities.

Conversely, all farms (100%) utilized litter-based housing systems, which aligns with animal welfare standards. Litter systems allow chickens to move more freely and exhibit natural behavioral repertoires, such as scratching, standing, and resting comfortably (WOAH, 2019). Nevertheless, the outcomes of this study indicate that the suitability of the housing type does not automatically guarantee optimal welfare if other management factors are neglected.

The findings of this study reinforce that broiler chicken welfare is multifactorial and cannot be determined by a single indicator alone. Although the utilization of litter-based housing complied with the standards, high stocking densities and thinning practices remain the primary risk factors contributing to the decline of broiler welfare in intensive production systems.

Welfare Risk 2: Barren and Inadequate Environment

The housing environment is a primary determinant of broiler chicken welfare because it directly influences the animals' physical condition, behavior, and physiological status. Based on the results presented in Table 2, several environmental factors failed to comply with the Responsible Minimum Standards (RMS). This indicates that the environmental quality of the studied farms does not yet fully support the optimal welfare of broiler chickens.

All surveyed farms (100%) failed to provide any form of environmental enrichment, such as perching facilities or pecking objects. The absence of these structures indicates that the rearing environment suffers from environmental deprivation, potentially hindering the birds from expressing their natural behaviors. Ethologically, chickens possess an innate need to engage in explorative behaviors, including pecking, scratching, and interacting with their surroundings. Research has

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demonstrated that providing enrichment can stimulate physical activity, improve leg health, and reduce abnormal behaviors (Bist *et al.*, 2023; Van *et al.*, 2021). Conversely, a barren and monotonous environment can elevate stress levels and trigger aggressive behaviors or cannibalism (Riber *et al.*, 2018).

Regarding the litter parameter, only 58% of the farms complied with the minimum thickness standard of 5 cm. Litter quality is a critical component in safeguarding avian welfare, as it directly correlates with footpad health, integumentary condition, and resting comfort. Inadequate bedding is known to increase the risk of footpad dermatitis, integumentary lesions, and moisture accumulation, which further deteriorates the housing environment. Furthermore, poor-quality litter contributes to elevated ammonia concentrations, which can adversely affect the respiratory system of the birds (Pendriadi *et al.*, 2023).

In terms of illumination, although 68% of the houses met the minimum light intensity requirement of 50 lux, all farms failed to provide a dark period at night and did not permit natural light penetration into the facilities. A continuous 24-hour lighting regimen is commonly implemented to maximize feed intake and growth rates; however, this practice disrupts the birds' natural circadian rhythms. Studies indicate that the omission of a scotophase (dark period) can lead to chronic stress, metabolic disorders, and suppressed immune function in broiler chickens (Linhoss *et al.*, 2025). Additionally, the absence of natural daylight has been reported to reduce activity levels and limit the expression of normal avian behavioral repertoires (Youssef *et al.*, 2026).

In contrast to the aforementioned parameters, the air quality across the majority of the farms was relatively satisfactory. Specifically, 84% of the farms complied with the safe thresholds for ammonia concentrations, and all farms (100%) adhered to the maximum limits for carbon dioxide (CO_2). This condition indicates that the housing ventilation systems were generally effective in maintaining adequate air exchange and preventing the accumulation of hazardous gases. Low ammonia levels play an essential role in preserving respiratory tract health and bird comfort (Pendriadi *et al.*, 2023), while controlled CO_2 levels reflect a properly functioning ventilation system that maintains stable indoor air quality (Donald, 2013).

Overall, these findings demonstrate that the environmental quality in the observed broiler farms remains suboptimal. Although ventilation management was executed effectively, deficiencies persist across multiple environmental factors, including the complete absence of environmental enrichment, suboptimal litter quality, and non-compliant lighting management. These findings underscore that broiler chicken welfare is dictated by interconnected environmental components that must be managed holistically.

Welfare Risk 3: Breeding and Genetics

The results demonstrated that all surveyed farms (100%) utilized fast-growing chicken strains and failed to comply with the indicators recommending the use of slow-growing strains. The utilization of commercial strains, such as Cobb and Ross, reflects a production orientation that prioritizes growth efficiency and feed conversion ratios.

Extensive research indicates that fast-growing chickens carry a significantly higher risk of welfare compromises, including lameness, cardiovascular disorders, and reduced physical activity (Baxter *et al.*, 2021). Accelerated growth rates are frequently uncoupled from optimal skeletal system development, thereby increasing the mechanical load exerted on the birds' legs. Conversely, slow-growing chickens are reported to exhibit higher activity levels, lower incidences of leg disorders, and an enhanced quality of life (Riber & Wurtz, 2024; Göransson *et al.*, 2021).

Consequently, recommendations for incorporating slow-growing strains within welfare standards aim to strike a balance between productivity and animal welfare. The findings of this study

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underscore that genetic factors remain a primary challenge in integrating animal ethics into intensive broiler production systems.

Welfare Risk 4: Slaughtering

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Welfare Risk 5: Compliance and Transparency

All surveyed farms (100%) lacked animal welfare audits or certifications, indicating a low level of compliance with formal welfare standards. The absence of an auditing system precludes external verification of the implemented husbandry practices. Audits and certifications are critical components of modern animal welfare systems, functioning as mechanisms for continuous control and evaluation (More *et al.*, 2021). In the absence of such oversight, the implementation of welfare standards is potentially inconsistent and difficult to monitor.

Furthermore, animal welfare certification is linked to enhanced consumer trust and improved product quality. Transparency within production systems can heighten farm accountability and promote more sustainable production practices (Fraser, 2008). The findings of this study demonstrate that compliance and transparency remain significant challenges in the implementation of broiler chicken welfare in Gianyar Regency. Therefore, enhanced education and the implementation of robust auditing systems are necessary to support the development of livestock industries that are committed to animal welfare.

Animal Welfare Assessment

Parameter 1: Walking Ability (Gait)

Walking ability is a primary indicator of broiler chicken welfare, reflecting the condition of the musculoskeletal system and the birds' comfort during physical activity. Based on Table 4, the predominance of scores 1–2 (accounting for 73%) with a mean value of 1.74 indicates that the majority of the chickens experienced mild-to-moderate locomotion impairment. According to the RSPCA Welfare Assessment categories, this condition signifies early-stage impairment of mobility, which can negatively impact avian welfare.

This finding aligns with research by Baxter *et al.* (2021), which states that modern, fast-growing broiler chickens exhibit a high prevalence of locomotion disorders due to an imbalance between muscle mass accretion and skeletal structure development. Beyond genetic factors, this condition can be further exacerbated by husbandry management factors, such as high stocking density, suboptimal litter quality, and continuous lighting regimens, all of which increase mechanical stress on the musculoskeletal system.

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Furthermore, the proportion of chickens with a score of ≥ 3 (20%) indicates locomotor impairment that has reached clinical thresholds, potentially causing pain and restricting access to feed and drinking water (Knowles *et al.*, 2008). Within the Five Domains framework, this condition represents a disruption in both the health and behavioral domains, which ultimately impacts the mental state of the birds. The results of this study reinforce that gait score is a sensitive indicator for assessing compromised welfare in broiler chickens.

Parameter 2: Plumage Condition

Feather condition is an important indicator reflecting the interaction between environmental factors, behavior, and skin health in broiler chickens. Based on Table 4, the predominance of scores 0.5–1.0 (accounting for 81%) with a mean value of 0.94 indicates that the majority of the chickens experienced mild-to-moderate deterioration in plumage quality.

Feather damage in broiler chickens is well-documented to be closely linked to rearing environment factors. Campbell *et al.* (2019) and Van de Weerd *et al.* (2021) reported that high stocking densities, a lack of environmental enrichment, and increased feather pecking behavior induced by environmental stress contribute to plumage degradation. Additionally, damp litter can further exacerbate integumentary deterioration and compromise the natural protective function of the skin (Kaukonen *et al.*, 2016).

The exceptionally low proportion of chickens with normal feather conditions demonstrates that the rearing environment remains suboptimal in supporting avian welfare. Within the Five Domains framework, this condition reflects a disruption in the environmental and health domains, which subsequently impacts the behavioral domain and the mental state of the birds.

Parameter 3: Dorsal and Body Lesions

Based on Table 4, a total of 74% of the broiler chickens were found to have dorsal and body lesions. This high prevalence of lesions indicates a disruption in the physical welfare aspects of the broiler chickens during the rearing period.

Previous research demonstrates that high stocking densities and a lack of environmental enrichment elevate the risk of injuries resulting from aggressive interactions or physical contact among the birds (Riber & Wurtz, 2024). Additionally, poor litter quality and suboptimal environmental management contribute to the increased incidence of skin lesions (EFSA, 2023).

Body lesions not only induce pain but also increase the risk of secondary infections, which can ultimately impact production performance (Estevez, 2007). Within the Five Domains framework, this condition is associated with disruptions in the health and environmental domains, directly resulting in elevated stress and discomfort for the birds.

Parameter 4: Breast Plumage Soiling

Based on Table 4, all broiler chickens (100%) were categorized into Score 2, with a mean value of 1.99. This result indicates that breast plumage soiling was the parameter representing the highest degree of compromised welfare in this study.

This condition is closely linked to litter quality and housing moisture management. Research by Kaukonen *et al.* (2016) and Wilcox *et al.* (2024) states that breast plumage cleanliness serves as a direct indicator of indoor litter conditions. Wet litter resulting from high stocking densities, suboptimal ventilation, and inefficient drinking systems increases the birds' contact with excreta, thereby deteriorating the condition of the breast feathers (Shepherd & Fairchild, 2010).

In addition to affecting bodily cleanliness, this condition is known to be associated with an increased risk of pododermatitis and hock lesions (Kwon, 2024). Within the Five Domains framework, breast

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plumage soiling indicates a disruption in the environmental domain, which subsequently impacts the health domain and the mental state of the birds.

Parameter 5: Leg Angle Deviation

Based on Table 4, a total of 47% of the chickens exhibited leg angle deviations, although the remaining 53% maintained normal conformation. This finding indicates a significant musculoskeletal system impairment within the observed broiler chicken population.

Research by Baxter *et al.* (2021) states that fast-growing broiler chickens carry a high risk of developing leg deformities due to bodily growth rates that progress more rapidly than skeletal system development. Environmental factors, such as high stocking densities and low physical activity, are also known to exacerbate this condition (Knowles *et al.*, 2008). Furthermore, continuous lighting management without a dark period can accelerate growth rates, thereby increasing mechanical pressure on the avian skeletal system. Within the Five Domains framework, this condition reflects a disruption in the health and behavioral domains, which subsequently influences the mental state of the birds.

Parameter 6: Pododermatitis

Berikut adalah terjemahan formal dalam bahasa Inggris yang sesuai untuk bab pembahasan (*Discussion*) pada publikasi jurnal veteriner internasional:

Parameter 6: Pododermatitis

The score distribution in Table 4 demonstrates that the majority of the chickens experienced early signs to developed lesions of pododermatitis, with a mean score of 0.45. This condition indicates that footpad impairment had begun to manifest across a large proportion of the observed avian population.

Litter moisture is well-established as the primary factor driving the development of pododermatitis. Kaukonen *et al.* (2016) reported that wet litter increases the risk of skin irritation on the footpads of chickens. Furthermore, high stocking densities and ammonia accumulation can further exacerbate this condition (Wilcox *et al.*, 2024). Genetic factors inherent to fast-growing chickens also increase mechanical stress on the legs, thereby elevating the risk of lesion formation (Kwon, 2024). Pododermatitis is known to induce pain, reduce physical activity, and exert a direct negative impact on both the welfare and production performance of the birds (Shepherd & Fairchild, 2010). Within the Five Domains framework, this condition represents a disruption in the health and behavioral domains, which subsequently affects the mental state of the birds.

Parameter 7: Hock Lesions

Based on Table 4, more than 60% of the chickens exhibited alterations or lesions in the hock area. This high prevalence of hock lesions indicates substantial environmental pressure during the broiler chicken rearing period.

Previous research demonstrates that hock burns are closely linked to litter quality, stocking density, and the duration of time birds spend in a resting or recumbent position (Kaukonen *et al.*, 2016; Tahamtani *et al.*, 2020). Furthermore, accelerated growth rates in modern broiler chickens increase stress on the joints, thereby elevating the risk of lesion formation (Baxter *et al.*, 2021). Suboptimal lighting management can also increase resting duration, thereby prolonging physical contact with the litter. Hock lesions not only induce pain but also reduce mobility and increase the risk of secondary infections (EFSA, 2023). Within the Five Domains framework, this condition reflects a disruption in the health and environmental domains, which subsequently impacts the behavioral domain and the mental state of the birds.

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CONLUSION AND SUGGESTIONS

Conclusion

Based on the findings regarding the assessment of broiler chicken welfare in intensive production systems within Gianyar Regency, it can be concluded that the implementation of animal welfare remains suboptimal from both animal ethics and animal welfare perspectives. Assessments using the RMS instrument demonstrated that the majority of the surveyed farms failed to comply with the minimum animal welfare standards. Only 3 to 6 out of 14 total indicators were met, while the remaining 8 to 11 indicators were non-compliant. Non-compliance was predominantly observed in parameters concerning high stocking densities, the complete absence of environmental enrichment, the utilization of fast-growing chicken strains, the omission of pre-slaughter stunning, and the lack of animal welfare audits or certifications. Concurrently, the animal welfare assessment conducted on 950 birds using the RSPCA instrument revealed that every chicken exhibited at least one parameter that deviated from normal conditions. The mean welfare scores were 1.74 for walking ability (gait), 0.94 for feather condition, 0.74 for body lesions, 1.99 for breast plumage soiling, 0.51 for leg angle deviation, 0.45 for pododermatitis, and 0.49 for hock lesions. These values indicate mild-to-moderate welfare compromises, with breast plumage soiling and locomotion impairment emerging as the most dominant issues. Furthermore, other parameters exhibited early signs of welfare disruptions that possess the potential to exacerbate if husbandry management practices are not modified. Overall, the intensive production systems implemented across broiler farms in Gianyar Regency are not yet fully capable of supporting optimal animal welfare.

Suggestions

Based on the findings of this study, it is necessary to enhance the implementation of animal welfare in broiler farms by controlling stocking density, optimizing litter management, and regulating illumination schedules through the inclusion of an adequate dark period. The provision of environmental enrichment, such as perching structures and pecking objects, is also essential to support the expression of natural behavioral repertoires. In the long term, the adoption of slow-growing chicken strains should be considered as a welfare-oriented alternative, complemented by stricter adherence to animal welfare principles during post-harvest stages, particularly through the implementation of pre-slaughter stunning methods. Furthermore, governmental bodies and relevant stakeholders must play an active role in enhancing public dissemination, technical education, and the development of accessible animal welfare auditing or certification systems for farmers. Future research should be conducted across more diverse housing systems, genetic strains, and geographic regions to obtain a more comprehensive overview of broiler chicken welfare.

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Table

Table 1. General Overview of the Sampled Farms and the Results of RMS and RSPCA Welfare Assessments in Broiler Chickens within Gianyar Regency

Farm	Chicken Breed	Number of Chicken per Cage	*Animal Ethics* RMS (14 indicator)		*Animal Welfare* RSPCA (50 sample)	
			Compliant	Not Compliant	Acceptible Welfare	Compromised Welfare
P1	Ross	19.000	5	9	0	50
P2	Cobb	12.000	5	9	0	50
P3	Ross	10.000	5	9	0	50
P4	Cobb	9.000	4	10	0	50
P5	Cobb	11.000	4	10	0	50
P6	Cobb	9.000	4	10	0	50
P7	Cobb	9.000	4	10	0	50
P8	Ross	10.000	4	10	0	50
P9	Ross	9.000	5	9	0	50
P10	Ross	11.000	3	11	0	50
P11	Ross	20.000	3	11	0	50
P12	Ross	5.000	5	9	0	50
P13	Ross	8.000	4	10	0	50
P14	Cobb	10.500	4	10	0	50
P15	Ross	6.500	3	11	0	50
P16	Ross	7.000	3	11	0	50
P17	Ross	7.000	4	10	0	50
P18	Cobb	5.000	5	9	0	50
P19	Cobb	5.000	6	8	0	50

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Tabel 2. Results of Animal Ethics Assessment

Welfare Risk	RMS Indicatior	Compliant (n, %)	Not-Compliant (n,%)
Spatial Restriction	Stocking density (≤9 birds/m²)	0 (0%)	19 (100%)
	No thinning practice	2 (11%)	17 (89%)
	Cage type meets standards	19 (100%)	0 (0%)
Barren and Inadequate Environment	Provision of perching structures	0 (0%)	19 (100%)
	Provision of pecking objects	0 (0%)	19 (100%)
	Litter depth minimum 5 cm	11 (58%)	8 (42%)
	Light density minimum 50 lux	13 (68%)	6 (32%)
	Sunlight entry into cage	0 (0%)	19 (100%)
	Dark period implementation (6–8 hours)	0 (0%)	19 (100%)
	NH_3 maximum 20 ppm	16 (84%)	3 (16%)
	CO_2 maximum 3000 ppm	19 (100%)	0 (0%)
Breeding and Genetics	Utilization of slow growth breed	0 (0%)	19 (100%)
Slaughtering	Implementation of pre-slaughter stunning	0 (0%)	19 (100%)
Compliance and Transparency	Welfare Audit/certification	0 (0%)	19 (100%)

Table 3. Mean Parameter Scores of Broiler Chicken Welfare Assessment

Parameter	Score (Max-Min)	Mean
Walking Ability (Gait)	0-5	1,74
Plumage Condition	0-2	0,94
Dorsal and Body Lesions	0-1	0,74
Breast Plumage Soiling	0-2	1,99
Leg Angle Deviation	0-3	0,51
Pododermatitis	0-2	0,45
Hock Lesions	0-2	0,49

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Table 4. Distribution of Broiler Chicken Welfare Scores (n = 950)

Parameter	Score	Number of Chickens (n)	Percentage (%)
Walking Ability (Gait)	0	68	7%
	1	326	34%
	2	374	39%
	3	158	17%
	4	19	2%
	5	5	1%
Plumage Condition	0	2	0%
	0,5	293	31%
	1	473	50%
	1,5	176	19%
	2	6	1%
Dorsal and Body Lesions	0	246	26%
	1	704	74%
Breast Plumage Soiling	0	0	0%
	1	2	0%
	2	948	100%
Leg Angle Deviation	0	507	53%
	1	410	43%
	2	23	2%
	3	10	1%
Pododermatitis	0	144	15%
	0 (P/S/H)	361	38%
	0,5	146	15%
	1	198	21%
	1,5	94	10%
	2	7	1%
Hock Lesions	0	26	3%
	0 (P/S)	355	35%
	0,5	327	34%
	1	186	20%
	1,5	67	7%
	2	6	1%

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