

Activity and crowing frequency of Ayam Kokok Balenggek from West Sumatra by using and without perch

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ABSTRACT

Animal conservation is included in the Sustainable Development Goals (SDGs) as a genetic resource, one of which is namely Ayam Kokok Balenggek (AKB). AKB is a unique and distinctive crowing sound from West Sumatra, Indonesia, often featured in contests. This study aims to investigate the activities and crowing frequencies of AKB by using and without perch. The total eight mature male AKBs aged 1.5 and 2 years used in this study. The samples were divided into 2 categories based on the class in the AKB contest, namely the 'landik' and 'boko' categories. The variables included eight activities and crowing frequency. The data analysis in this study was descriptive statistical analysis and the crowing frequency was subjected to a t-test analysis. The t-test results on the crowing frequency of the 'landik' and 'Boko' classes of AKB between perched and without perched was a highly significant difference ($P < 0.01$). The results revealed that when perched, AKB exhibited 13% crowing activity, 17% wing flapping, and 34% feather pecking, which was notably higher compared to when they were without perched. The crowing frequency significantly ($P < 0.01$) distinct of Boko class AKBs when perched was 36% higher compared to without perches, while the landik class was 59% higher than without perches. The crowing activity and frequency, wing flapping, feather pecking, and frequency of AKB are higher when they are perched. The information from the study is an attempt to converse AKB with a unique sound and will be used as a guide when AKB contests are implemented.

Introduction

Numerous native chicken breeds can be found across the country; one of these breeds is the native chicken, which can be raised for animal protein. Besides that, native chickens can be raised for ornamental such as onagadori chickens which have long tails from Japan, fighting such as Bangkok chickens from Thailand, and in Indonesia, there are singing roosters, one of which is Ayam Kokok Balenggek (AKB). AKB has a melodic crowing sound and is enjoyed by many chicken hobbyists. AKB stands out, receiving official recognition from the Ministry of Agriculture (Kementan) in 2011 through Ministerial Decree No. 2919/Kpts/OT.140/6/2011. This decree designated AKB as a national poultry breed and acknowledged its significance as a valuable genetic resource from West Sumatra. AKB is renowned for its melodious and intricate crowing sound, locally called "balenggek" in the Minang language (Arlina *et al.*, 2024). AKB is a specific local chicken breed from West Sumatra province, estimated to be the only one in the world (Rusfidra and Arlina, 2014). AKB is a rare indigenous rooster breed in Indonesia, known for its unique ability to produce a melodious crowing sound akin to a song. These chickens display syllabic diversity, with each part of their crow characterized by different pitches and vocalizations (Arlina *et al.*, 2014; Arlina *et al.*, 2020; Arlina *et al.*, 2024).

The preservation of AKB's genetic diversity is sustained through captive breeding efforts, further promoted by AKB contests. These contests have transformed AKB into an economically valuable hobby, with contest-winning AKB holding higher economic value. A contest was held to showcase the melodious AKB crowing sounds, and one of the assessments was the crowing frequency. Official AKB contests, organized by the government, often involve placing chickens on perches (Rusfidra *et al.*, 2014). Historically, AKB is in the Red Junglefowl (*Gallus gallus*), which naturally perches on tree branches throughout the day (Arshad, 1999; Rusfidra and Arlina, 2014). Recently, AKB enthusiasts and communities

have initiated contests without perches. From their perspective, the use of perches in AKB contests resembles the practices of Ketawa chicken contests and does not align with local wisdom. As a result, some AKB enthusiasts and communities abstain from participating in government-sponsored contests, as their chickens are not accustomed to perching. They view perch-free contests as a means of preserving AKB's local wisdom as a genetic resource.

Activities encompass a wide range of physical and non-physical actions that require intentional individual engagement. These activities reflect the adaptability of livestock to their environment, often manifesting in various behaviors. Given this context, it is anticipated that the behaviors of AKB will differ depending on their activities when placed on perches compared to when they are not perched. Poultry raised in free-range systems typically exhibit behaviors such as pecking and foraging (Prayitno and Sugiharto, 2015). Likewise, perching serves multiple purposes, including resting, chirping, foraging, defecating, and socializing (Damanik, 2014). In light of the issues above, this study aims to investigate the activities and crowing frequencies of Ayam Kokok Balenggek (AKB) when they are placed on perches compared to when they are not. The information from the study attempts to converse AKB with unique sound and will be used as a guide when AKB contests are implemented.

Materials and methods

The number of samples used in this study was eight Ayam Kokok Balenggek which had more than 3 crows aged between 1.5 to 2 years. The samples were divided into 2 categories based on the class in the AKB contest, namely the landik and boko categories. The landik category had three to five crowing, while the boko category had more than 5 crowing. The samples were reared at Kharisma Farm in Padang City. Sample selection followed a purposive sampling technique.

The study employed a direct observational approach involving con-

tinuous monitoring of AKB activities for one hour. Simultaneously, the crowing frequencies of AKB were recorded within a 20-minute timeframe under both perched and non-perched conditions. The height of the perch is 140 cm and the distance between perches is 120 cm. Data collection was done by recording the activity and crowing of AKBs in the morning at 06.00-08.00 am.

A two-week acclimatization period was provided for the AKB specimens before commencing the research to ensure adaptation to both perched and non-perched conditions. The data collection process consisted of four repetitions, sequentially alternating between perch and non-perch environments. The collected data included both primary and secondary data. The positioning of the AKB specimens was conducted randomly. Figure 1 illustrates the layout diagram depicting the placement of samples with and without perches.



Fig. 1. Observation of AKB using perch and without perch.

Research variables are observed using the tools, including perches, stakes, binding ropes, a stopwatch, a tripod, a POCO F4 Smartphone camera, and writing materials for recording research outcomes. The software utilized is called Cool Record Edit Pro, and it has functions for time measurement, frequency of the crowing sound, sound illustration, sound printing, sound analysis, sound visualization, and waveform sound waveform. The observed variables encompassed the following:

Crowing activity; Crowing is indicated by the elongation of the neck and the head tilting upwards at an angle of approximately 60 degrees, with the head remaining upright until the final crowing sound. Simultaneously, the beak is open and directed toward the sky (Rusfidra *et al.*, 2015).

Feather preening activity: Feather pecking involves the chicken's head being directed towards its back, reaching its own feathers, and subsequently engaging in pecking behavior (Syarif, 2021).

Scratching activity; Scratching activity is indicated by the chicken scratching once or twice with each foot alternately (Mishra *et al.*, 2005).

Wing flapping activity: Wing flapping is indicated by wings touching each other above the chicken's back and being waved in the air more than once. This activity can be performed while standing or moving (Mishra *et al.*, 2005).

Agonistic activity: Agonistic is indicated by behaviors such as jumping, flying, running, and fighting (Prayitno and Sugiharto, 2015).

Dozing activity: Dozing is indicated by a slight movement of the head and partially closed eyes or gradual opening and closing of the eyes (Prayitno and Sugiharto, 2015).

Sleeping activity: Sleeping is indicated by the neck being fully bowed and the eyes being fully closed (Prayitno and Sugiharto, 2015).

Crowing frequency: Crowing frequency is the rate at which a chicken crows in a period (Arlina *et al.*, 2020). The crowing frequency will be calculated for 20 minutes (according to the contest implementation time).

The data analysis approach utilized in this study was descriptive statistical analysis by calculating the mean, standard deviation, and coefficient of variance. The data of activity was calculated by percentage, and the crowing frequency was subjected to a t-test analysis. T-test analysis with the help of the SPSS program.

Results and Discussion

Activity Ayam Kokok Balenggek with and without Perch

In this study, various Ayam Kokok Balenggek (AKB) activities were observed, including crowing activity, feather pecking, scratching activity, dozing activity, and sleeping activity. These AKB activities are depicted in Figure 2.

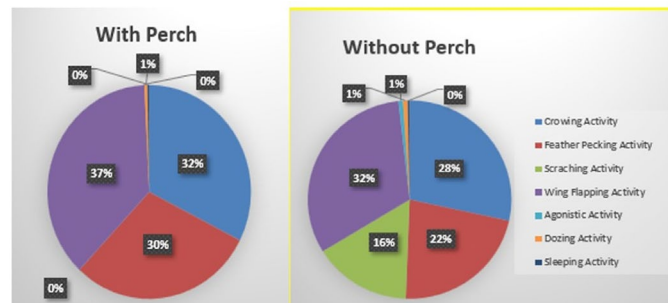


Fig. 2. The percentage of AKB activities with and without perch

Crowing Activity

The crowing activity of AKB was observed while perched at 32% and without perched at 28% (Figure 2). This shows that crowing activity while perched is 13% higher than when not perched, which agrees with Yura's findings (2017), indicating that AKB's crowing frequency is higher with perch (32.83 times/30 minutes) compared to without perch (29.50 times/30 minutes). The higher crowing activity percentage while perched can be attributed to the limited movement of AKB on the perch, allowing them to focus on crowing. In contrast, when not perched, AKBs engage in various activities like foraging and walking, and reducing crowing. Environmental factors also play a role, with free-range poultry exhibiting more pecking and foraging behaviors (Prayitno and Sugiharto, 2015).

Crowing activity is influenced by genetic factors, husbandry management, health conditions, and feed type, resulting in variations in AKB crowing characteristics (Prasetyo, 2014). Hormonal factors, such as testosterone and photoperiod, also impact crowing frequency in AKB, with testosterone affecting song production and learning (Dioniak and Deviche, 2001).

Crowing activity is crucial in AKB vocal beauty contests, where proficiency in crowing is a significant criterion. The higher crowing activity while perched suggests that placing AKB on perches enhances their crowing ability. Crowing serves various purposes, including demonstrating courage, establishing territorial dominance, and attracting potential mates (Rusfidra, 2006). Before crowing, AKBs typically engage in wing flapping to invigorate their bodies and infuse air into their lungs. This behavior helps them prepare for crowing. The elongation of the neck upward during crowing ensures the complete opening of the respiratory passage, facilitating respiration and sound emission (Young, 1986).

Feather Preening Activity

Feather preening activity for AKB was observed while perched at 30% and without perched at 22% (Figure 2). The percentage of feather preening activity while perched is 34% higher than when not perched. Feather pecking is a diversionary activity when AKBs are perched, as they do not have access to ground surfaces for scratching and foraging. Feather preening compensates for the behavior of pecking the ground, where fiber-rich food is typically found (Villagra *et al.*, 2014). Additionally, feather preening is considered a grooming activity, helping AKBs maintain their feathers (Lesley, 2021).

Scratching Activity

Scratching activity was observed only in a free-range environment (without perched) at a rate of 16% (Figure 2). This behavior is typical for chickens in such environments, where they can access surfaces like grass and soil for scratching and foraging (Utami, 2015). When perched, AKBs lack the opportunity for scratching and other ground-related activities, focusing instead on maintaining their balance on the perch. Scratching is a common behavior in birds, primarily used for food foraging. Chickens often scratch and peck to select and acquire food. The scratching sequence is usually accompanied by pecking as they search for and collect food (Mishra *et al.*, 2005).

Wing Flapping Activity

The percentage of wing-flapping activity in AKB varied while perched at 37% and not perched at 32% (Figure 2). Wing-flapping while perched was 17% higher than when without 3perched. The elevated perch position requires AKBs to maintain balance, leading to more frequent wing-flapping. Wing-flapping is observed when AKBs transition between sitting and standing positions, during crowing, and when they pivot or descend to regain the perch. Wings also play a crucial role in balance and defense against threats (Nagari dan Sunarno, 2022).

Agonistic Activity

Agonistic behavior and conflicts were observed only when AKB were not perched at 1% (Table 1), likely due to increased mobility and access to different areas within the free-range system. AKB on perched have restricted movement space and are unable to enter other AKB territories. is restricted on the perch and prevents access to other AKBs. Agonistic behavior is a form of self-defense during social conflicts among birds, influenced by territorial defense, hierarchical positions, and group dynamics (Prayitno and Sugiharto, 2015).

Dozing and Sleep Activity

Dozing and sleeping activity were relatively low in AKB, both when perched 0.5% (Table 2) and when not perched 0.7% (Table 1). The per-

centage of dozing activity was 56% higher when AKB were not perched, attributed to the timing of observations, primarily in the morning when chickens are less likely to engage in resting activities due to cooler temperatures. Sleep activity in avian species becomes more pronounced as ambient temperatures rise. Chickens thermoregulate primarily through panting rather than sweating (Prayitno and Sugiharto, 2015).

Sleep activity is considered a form of restful behavior and is relatively infrequent in AKB, both when perched 0% (Table 2) and without perched 0.3% (Figure 2). The percentage of sleep activity on perches was 7% higher than without perches, likely due to the timing of observations during the morning hours when avian species tend to engage in various activities before seeking rest (Utami, 2015).

According to Tables 1 and 2, whether on perches or without perches, AKB activities in the Boko and Landik classes demonstrate that crowing and wing flapping activities are higher in the Boko class than in the Landik class. In contrast, the Landik class has a greater incidence of feather pecking activities than the Boko class, resulting in lower crowing activities. Foraging activity, observed in both the Boko and Landik classes, occurs only when AKB are without perches, leading to decreased crowing activity when they are on perches. Birds raised in a free-range system are more free to engage in food search and selection activities through pecking and foraging (Prayitno and Sugiharto, 2015). The dozing and sleeping activities, both on and without perches, are consistent.

Frequency of Crowing

The frequency of crowing is the rate of frequency of crowing in a period of time (Rusfidra *et al.*, 2015). The frequency of crowing is calculated for 20 minutes according to the time in the contest. The frequency of AKB crows by class is presented in Table 3.

Based on Table 3, the mean crowing frequencies of the 'Landik' class while perched were 12.22 ± 10.44 times, and without perched, they were 7.69 ± 7.60 times. For the 'Boko' class of AKB, while perched, the mean crowing frequency was 15.53 ± 10.64 times, and without perched, it was 11.44 ± 8.71 times. The coefficient of variation for crowing frequencies in the 'Landik' and 'Boko' classes of AKB is categorized as high. The coefficient of variation is considered low when $\leq 5\%$, moderate when 6-14%, and high when $\geq 15\%$ (Kurniatio, 2009).

The t-test results on the crowing frequency of the 'Landik' and 'Boko'

Table 1. Percentage of activity without perch based on classes.

Class	Activity (%)						
	Crowing	Feather pecking	Scratching	Wing flapping	Agonistic	Dozing	Sleeping
Boko	35.1	14.2	15.5	33.7	1.4	0.1	0
Landik	21.8	30.1	17	30.3	0	0.9	0.6

Table 2. Percentage of activity on perch based on classes.

Class	Activity (%)						
	Crowing	Feather pecking	Scratching	Wing flapping	Agonistic	Dozing	Sleeping
Boko	37.2	20.3	-	42.5	-	0.1	0
Landik	27.7	38.9	-	32	-	0.9	0.5

Table 3. The standard deviation and coefficient of variation of crowing frequencies AKB classes, 'Landik' and 'Boko,' both while perched and without perched.

AKB Classes	On perch		Without perch	
	Mean $\pm$ SD	CV(%)	Mean $\pm$ SD	CV(%)
Landik	12.22 ± 10.44^A	85.43	7.69 ± 7.60^B	98.87
Boko	15.53 ± 10.64^A	68.53	11.44 ± 8.71^B	76.15

Note: (SD): Standard Deviation, (KK): Coefficient Variance. Different superscripts within the same row indicate a highly significant difference ($P < 0.01$).

classes of AKB between perched and without perched conditions exhibit a highly significant difference ($P < 0.01$). According to Yura (2017), a direct correlation exists between the elevation of perches and the corresponding increase in both the frequency and duration of AKB crowing. This observation aligns with the ancestral origins of AKB, which stem from the Red Junglefowl that inhabits and adapts to forested environments by perching on tree branches throughout the day (Arshad, 1999). Damanik (2014) posits that birds in their natural habitats perch to engage in various activities, including singing. Male chickens crow to demarcate their territorial dominance. Arlina *et al.*, (2020) emphasize that song-type vocalizations express territorial assertion.

The vocalization process of AKB is intricately linked to their respiratory system. When a chicken breathes, the inhaled air is directed through the nasal cavity in the head, subsequently reaching the larynx and ultimately branching into the primary extrapulmonary bronchi, terminating in the posterior and caudal thoracic air sacs, as well as the abdominal air sac. The avian respiratory system differs from that of humans due to air sacs and the two-way and unidirectional airflow pattern in the parabronchi (Powell, 2015). During expiration, air from the posterior and anterior air sacs (cervical, clavicular, and cranial thoracic) passes through the secondary and primary bronchi, traversing the lungs. The exiting air moves through the bronchi at the base of the trachea, where vibratory folds exist on its inner surface. The vibration of these folds generates sound. Within the trachea, a pair of medial tympanic membranes exist, which are vibrating membranes generating sound upon air passage during expiration. While in most birds, these membranes are relatively simple structures, they are complex in songbirds (Young, 1986).

The higher crowing activity and frequency of AKB when perched compared to when without perched aligns with their concurrent activities. The crowing activity of AKB while perched is 13% higher than when without perched. This elevated crowing frequency, while perched, can be attributed to the constrained activity of AKB, causing them to focus more on crowing. Conversely, crowing frequency, when without perched, can be disrupted due to the need to search for food, walk, and engage in other activities. When without perched, AKB are engaged in pecking and foraging activities, accounting for 15.68% of their behaviors. These observations shed light on the various activities and behaviors of Ayam Kokok Balenggek (AKB) in different conditions, providing valuable insights into their natural behaviors and responses to environmental factors.

Conclusion

Based on the research, it can be concluded that as a singing Rooster, AKB's activity and frequency of crowing can be increased by using perched. The activities performed by AKB while on perch indicate 13% crowing activity, 17% wing flapping, and 34% feather pecking, which is notably higher than without perch. Furthermore, sleep activity constitutes 56%, while sleep activity is 7% when perch are absent, showing a higher prevalence than when perch are present. Scratching activities amount to 16%, and agonistic activity accounts for 1%, both exclusively occurring without perches, with no opportunity for these activities observed with perches. The crowing frequency significantly distinct of Boko class AKBs when perched was 36% higher compared to without perched, while the Landik class was 59% higher than without perched.

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Conflict of interest

The authors declare that there are no actual or potential conflicts of interest including any financial, personal or other relationships with other people or organizations that could inappropriately influence, or be perceived to influence, their work.

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