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RESEARCH ARTICLE

Comparative Growth Performances of Saanen Does in Traditional Wooden and Aluminium Galvanized Iron Housing System

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ABSTRACT

Growth performance can be used as an indicator to utilize the general adaptability of the farm animals in the housing system. This study was done to evaluate the impact of traditional wooden and aluminium galvanized iron houses on the growth performance of Saanen does for a period of three months. Twelve Saanen does, aged nine to twelve months with an average weight of 24.6 ± 1.2 kg, were randomly assigned to each housing type (n = 6 per group). Live weights were recorded weekly, and total weight gain and average daily gain (ADG) were analyzed using non-parametric tests. The results revealed no statistically significant differences ($P > 0.05$) in weekly weight gain or ADG between the two housing types. However, the traditional wooden house (weekly weight gain: 0.69 ± 0.2 kg, ADG: 98.22 ± 23.4 g) demonstrated slightly higher gains compared to the aluminium galvanized iron house (weekly weight gain: 0.60 ± 0.1 kg, ADG: 85.32 ± 16.4 g). Weekly growth trends revealed steady weight increases with temporary stagnation around weeks 4–6 due to feed supply challenges. These findings confirm that both housing systems provide adequate environments for the physiological development of Saanen does. The study supports the feasibility of aluminium galvanized iron housing as a cost-effective and sustainable alternative for small ruminant farming in Malaysia.

1. INTRODUCTION

Saanen goats are widely renowned as one of the foremost milk-producing goat breeds that can produce up to 3 litres of milk per head per day under good care and feeding conditions (Gökdai et al., 2020). According to Pesmen & Yardimci (2008), Saanen goats can be successfully raised and are well adapted to various conditions around the world. In Malaysia, the Saanen goat has become a prevalent breed among community farmers and entrepreneurs due its heavy milk production (Asmad et al., 2019). However, the conditions under which Saanen goats are housed can have significant impact on their growth rates, feed efficiency, health, and overall welfare.

Housing systems have a significant effect on the body weight of farm animals (Kumari et al., 2013). Ensuring the right housing system can provide the non-stressful environment for the goats and lead to better growth performances. Growth performance is an effective tool and indicator of good health, making it useful for assessing different management systems (Lohith et al., 2021; Singh et al., 2021). Numerous studies have explored the impact of various flooring types on body weight gain in farm animals (Jørgensen et al., 2017; Rahman et al., 2013; Sutherland et al., 2019). Flooring material is a vital component in thousing systems as it plays a key role in mitigating climate stress and creating a favorable microclimate for animals (Rahman et al., 2013).

In Malaysia, smallholder farmers predominantly use wooden materials for goat housing (Awang et al., 2020). Wood has been a favoured material for goat housing due to its superior thermal qualities, natural insulation, and accessibility. While traditional wooden houses have adequately served farmers for decades, they are increasingly becoming obsolete in modern livestock management, but they also have their disadvantages. Key drawbacks include fire hazards, susceptibility to pest infestations, and limited long-term durability, particularly in areas prone to extreme weather. Additionally, in areas where there is high humidity or significant rainfall, wood is susceptible to deterioration, requiring more regular maintenance and replacement.

To overcome this problem associated with wooden housing, alternatives like aluminium galvanized iron have been developed. These materials offer enhanced durability, ease of maintenance, and cost savings, with a lifespan of up

to 10 years with minimal upkeep (Awang et al., 2020). However, the application of this type of housing system on goat growth performance is still unknown and requires further investigation, as housing systems play a critical role in goat management, exerting profound effects on the health, behaviour, and productivity of animals.

Thus, the aim of the present study was to investigate the growth performance of Saanen does in two types of housing systems: traditional wooden housing and aluminium galvanized iron housing. By evaluating the growth performance of Saanen does in different housing systems, this research seeks to provide valuable insights into the feasibility and benefits of adopting aluminium galvanized iron housing in the Malaysian context, with implications for improving housing standards, enhancing animal welfare, and promoting sustainable development in the Malaysian livestock industry.

2. MATERIALS AND METHODS

2.1 Animal ethics

The research protocol for the current study received approval from the UniSZA Animal and Plant Research Ethics Committee (UAPREC) under approval number UAPREC/008/003

2.2 Experimental animals, design and treatments

This study was conducted at Ladang Universiti Sultan Zainal Abidin (UniSZA), Pasir Akar, Besut, Terengganu, to compare two housing systems for goats. The first housing system, T1, was a traditional wooden structure built using wooden flooring and wooden walls with an asbestos roof. The structure utilized existing farm facilities and was elevated approximately 1 meter above the ground to facilitate waste management and improve ventilation. The flooring consisted of slatted wood with an approximate gap of 1.5 cm to allow manure to fall through, reducing direct contact between the goats and their waste. The walls were constructed using wooden panels with small ventilation gaps, ensuring sufficient airflow while providing protection from rain and direct sunlight.

The second housing system, T2, was a modern design composed of aluminium and galvanized iron. This structure featured an aluminium mesh floor with a grip size of approximately 1.5 cm, which allowed efficient waste drainage while maintaining adequate hoof support. The walls were built from aluminium-galvanized iron with a grip size of 2.5 cm x 8 cm, and the roof was made up of zinc sheets.

The dimensions of the pens followed the standard requirement for space allowance for goats aged 9 to 12 months, which is 0.75–1.0 sq. m/goat (Acharya et al., 2017). Each pen within the houses was equipped with a stainless-steel automatic water drinker mounted at a height convenient for the goats. In the traditional wooden house, a long feed trough made of durable plastic was placed inside the pen, while in the aluminium galvanized iron house, the plastic feed trough was hung outside the pen, positioned to allow easy access while minimizing spillage and feed contamination.

Figure 1: a) Traditional wooden house (using existing farm facilities b) Aluminium galvanized iron.

Twelve young adult (n = 12), non-pregnant, non-lactating and healthy female Saanen does aged between nine to twelve months were randomly selected from the flock at Ladang UniSZA. The does were equally divided into two groups: T1 (n = 6) and T2 (n = 6). Each doe was tagged for identification. Both groups were fed a daily diet consisting of 40% commercial concentrate in the morning and 60% Bracharia humidicola twice a day - in the morning after concentrate feeding and again in the afternoon. Table 1 shows the proximate analysis of the feed used during experiment. Ad-libitum water supply was provided to all goats within each group. The live weight of each doe was recorded weekly for 12 weeks using a hanging scale before morning feeding.

The total weight gain gain (kg) was calculated as the difference between final body weight and initial body weight. Average daily weight gain (g) was calculated based on total weight gain and the number of days in the study.

Table 1: Proximate analysis of feeds used during experiment.

Parameters (% DM basis)	*Brachiaria humidicola*	Concentrate feed
Dry matter	50.4	87.0
Crude protein	3.4	14.0
Crude fat	<0.1	4.0
Crude fibre	15.2	20.0

2.3 Statistical analysis

Data were analyzed using IBM SPSS Statistics 27, with a significance level of $P < 0.05$ used to determine statistical significance. Before conducting statistical tests, data normality was assessed using Kolmogorov-Smirnov test. Body weight was measured at the start and end of each month during the three-month study period. As the data were not normally distributed, non-parametric tests were employed. The Mann-Whitney test was used to evaluate the effect of housing type on body weight gain and ADG. The Friedman test was applied to assess weekly live weight trends within each housing type, with analyses conducted separately for each house.

3. RESULTS AND DISCUSSION

3.1 Body weight gain and average daily gain

Growth rate is a critical factor in animal husbandry, as well as a vital selection and financial profitability criterion (Asmad et al., 2014; Ibrahim et al., 2023). Wadhwani et al. (2016) highlighted that while assessing housing systems, body weight can be utilized as a measure of general adaptability, feed conversion efficiency, and overall health. The objective of the current study was to evaluate the effect of housing types on the growth performance of Saanen does, which is crucial for assessing different management systems in animal production. During the 12-week experimental period, the live weights of Saanen does in two different housing systems were closely monitored and recorded to analyze their growth pattern.

The body weight gains and ADG of the Saanen does in different types of housing were presented in Tables 2. In the current study, the traditional wooden house and the aluminium galvanized iron house showed a non-significant ($P > 0.05$) difference in body weight gain and ADG of Saanen does, suggesting that the does were not under stress. The average weekly body weight gains in the traditional wooden house and the aluminium galvanized iron house was 0.69 ± 0.2 kg and 0.60 ± 0.1 kg, respectively. The traditional wooden house (8.25 ± 1.2 kg) had slightly higher weight gain compared to the aluminium galvanized iron house (7.17 ± 0.8 kg).

Meanwhile, the ADG throughout the experimental period was slightly higher in the traditional wooden house (98.22 ± 23.4 g) compared to the aluminium galvanized iron house (85.32 ± 16.4 g). Similarly, a study by Ramachandran et al. (2017) on the growth performance of Jakhrana goats reported higher ADG in goats raised on wooden slatted flooring compared to those housed on conventional soil flooring, although the difference was not statistically significant. This variation could be attributed to greater comfort on the slatted wooden floor compared to the aluminium galvanized iron mesh floor. When goats are more comfortable, they tend to exhibit normal behaviors such as lying, which contributes to overall well-being and growth performance. According to Barroso et al. (2000), lying behavior is a critical indicator for evaluating the effects of housing types on animal health and welfare. This may explain the slightly higher ADG observed in the traditional wooden house compared to the aluminium galvanized iron house. This finding is further supported by Atalay et al. (2016), who reported that goat kids housed on slatted wooden flooring exhibited more lying behavior (48.9%) compared to those housed on straw flooring (43.2%). To establish a clearer relationship between housing conditions, behavior, and growth performance, future studies should investigate the direct effects of different flooring materials on both behavioral patterns and weight gain in goats.

However, Bhakat & Nagpaul (2005) found a significantly different effect between housing types, where a slatted wood floor resulted in higher body weight gain compared to concrete and mud floors. Similarly, Bharambe & Shinde (2014) found a significant effect of flooring in the housing system on the average body weight gain of Osmanabadi goat kids. The differences from the current study could be due to differences in breed, geographical location, age of the goats, and duration of the experiment. The lack of statistically significant differences between the two housing types indicates that other factors, such as feed quality, health management, and genetic factors, may play a more dominant role in determining growth outcomes.

3.2 Weekly live body weight trend

The weekly live body weight of Saanen does in different types of housing was presented in Figure 2. There were significant differences ($P < 0.05$) in weekly live weight between the two housing types throughout the study period. This finding may reflect the natural growth pattern of Saanen does, as they exhibit progressive growth over time.

The body weight trend throughout the study period also indicated a similar growth pattern in both housing types, indicating the suitability of both housing systems for sustaining healthy growth, reinforcing the feasibility of aluminium-

galvanized iron houses as an alternative to traditional wooden housing. These findings suggest that both housing systems provide adequate environments for Saanen does to support normal physiological development under effective management and feeding.

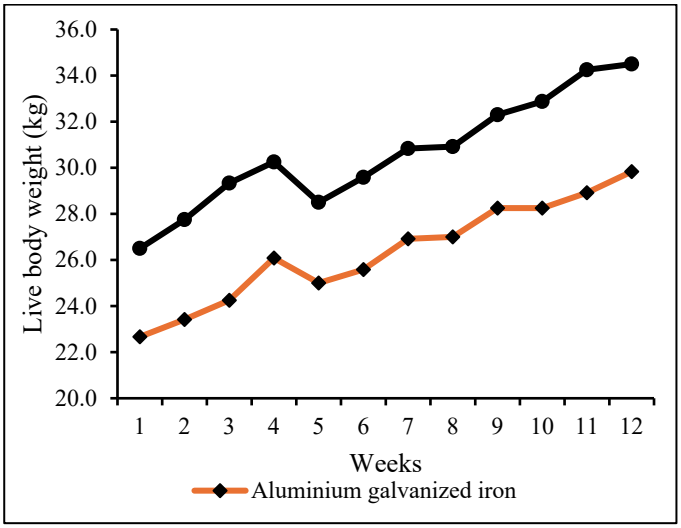

Figure 2: Weekly live weight of Saanen does in traditional wooden house and aluminium galvanized iron house.

Table 2: Effects of different housing types (traditional wooden house vs aluminium galvanized iron house) on growth performance of Saanen does.

Types of housing	Traditional wooden house	Aluminium galvanized iron	P value
Initial body weight (kg)	26.25 ± 2.7	22.67 ± 1.0	0.20*
Final body weight (kg)	34.50 ± 3.7	29.83 ± 1.6	0.22
Weekly body weight gain (kg)	0.69 ± 0.2	0.60 ± 0.1	0.48*
Average daily gain (g/day)	98.22 ± 23.4	85.32 ± 16.4	0.48*

*NS = Non-significant

For the growth pattern analysis, between weeks 1 to 4, the live weight of both groups increased relatively steadily, reflecting the effective adaptation of goats to their respective housing environments and feeding regimes. However, a plateau was observed from weeks 4 to 6 in the live weight of Saanen does in both housing types, with a slight decline around week 5. This temporary stagnation might be attributed to a feed shortage during that period. According to a study by Negesse et al. (2016), feed shortage significantly limits the growth performance of goats, as indicated by the study. Any disruptions in feeding schedules, feed composition, or stressors during this period could have contributed to the observed weight stagnation or decline. From weeks 6 to 12, both groups regained their growth momentum, with body weight increasing consistently through the latter part of the study. This recovery indicates the goats' resilience and the adequacy of both housing systems in supporting long-term growth.

4. CONCLUSION

The findings of this study indicate that both the traditional wooden house and the aluminium galvanized iron house provide similar environments for the growth and physiological development of Saanen does. The data suggest that the Saanen does were not under significant stress due to the housing conditions, supporting the feasibility of aluminium galvanized iron houses as a viable alternative to traditional wooden housing in the Malaysian context. Both housing systems provide adequate conditions for normal growth, reinforcing the potential for aluminium galvanized iron housing to contribute to sustainable development in the Malaysian livestock industry.

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DECLARATION OF INTERESTS

The authors declare that there are no conflicts of interest.

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