

Palatability response of tannin biscuit with different doses of molasses in Etawa crossbred goats

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Abstract. The aim of this study was to determine the effect of molasses dosage on the palatability response of tannin biscuits in Etawa crossbred goats (ECGs). The study employed a completely randomized design (CRD). The factor was the molasses dose. The treatments were P0 (0% molasses), P1 (5% molasses), P2 (10% molasses), P3 (15% molasses), and P4 (20% molasses). The data were analyzed using analysis of variance (ANOVA), and differences between means were analyzed using the Duncan's multiple range test (DMRT). Each treatment was repeated six times. The palatability response variables measured included feeding time (seconds), consumption amount per minute (grams), and consumption time per piece (seconds). The results showed that molasses doses had no significant effect on feeding time, consumption amount per minute, or consumption time per piece. In conclusion, the dose of molasses in tannin biscuit did not affect the palatability response in Etawa crossbred goats, and all doses could be consumed by ECG. Tannin biscuits with various molasses doses can be used effectively as a feed supplement without the risk of reducing feed consumption.

1 Introduction

The livestock sector plays a strategic role in enhancing national food security, particularly through the provision of animal-based protein sources. The Etawah Crossbred Goat (ECG), a small ruminant widely reared in Indonesia, is valued for its strong adaptability to diverse environmental conditions and its dual-purpose productivity in meat and milk. However, one of the primary challenges in ECG farming is the consistent availability of high-quality feed throughout the production cycle. ECG is known as dairy production. ECG are often crossbred with other local goats of Indonesia [1] [2], able to survive in the extreme circumstances [3].

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Efforts to improve feed efficiency continue to be developed, one of which is using local feed ingredients containing bioactive compounds such as tannins. Tannins are secondary metabolites from plants that can form complexes with proteins, thereby protecting feed proteins from microbial degradation in the rumen. This process, known as protein protection or protein bypass, is a mechanism by which protein is not digested in the rumen but is instead directly absorbed in the small intestine, thereby increasing the efficiency of protein utilization by livestock. According to [4] tannin is also known for its benefits as antioxidants, antidiarrhea, antibacterial and astringents. Tannins have strong bonds with protein molecules and can precipitate proteins.

One potential innovation that can be developed is the formulation of tannin-based feed biscuits with the addition of molasses at varying concentrations. These tannin biscuits are a modified form of feed technology known as a wafer, which follow similar production principles. Wafer represents a restructured form of livestock feed, typically modified from the conventional cube shape. The raw materials used consist of fiber sources, such as pasture and concentrate, formulated based on the nutritional requirements of the target livestock. During production, the feed mixture is compacted under pressure to form solid wafers. This compact form is expected to enhance palatability due to its density and structure, while also improving ease of handling, storage, and transportation [5]. In addition, the application of feed wafer technology is relatively simple, making it easy to implement [6], a complete nutritional content and uses a relatively simple technology so that it is easy to apply [7], improves livestock performance during dry season [8]

Molasses is a byproduct of the sugar industry, rich in simple sugars and possessing a sweet taste and distinctive aroma favored by livestock. The addition of molasses is expected to improve feed palatability, particularly in tannin-based feeds, by masking unpleasant tastes and stimulating consumption. According to [9] the main component of molasses are sugars (sucrose, fructose, and glucose), amino acids and minerals, so molasses which significant potential for utilization.

Tannin biscuits as a feed expected to improve ease of feeding, nutrient stability, and shelf life. However, before widespread use, palatability testing is necessary to determine the extent to which ECG prefer and consume the biscuits. This study aims to evaluate the palatability response of tannin biscuits with different molasses doses in ECG. The results are expected to provide information on the optimal molasses dosage to increase consumption and preference for tannin biscuits, thus enabling their use as an effective and efficient functional feed alternative to support ECG productivity.

2 Materials and Methods

This research was conducted in Department of Animal Science, Politeknik Negeri Jember.

2.1 Materials

The materials in this research were Etawa Crossbred Goats (ECG), tannin, molding biscuit machine, analytical scale, kelor powder, molasses, bran powder, ruminant premix, and tapioca powder.

2.2 Methods

The production process of tannin biscuits involves several stages, including formulation, mixing, heating and pressing, cooling and drying, and packaging. The formulation stage involves combining various feed ingredients in specific proportions to meet the nutritional requirements of livestock based on their physiological phase. The mixing process entails blending solid and liquid components with differing physical properties. During the pressing stage, the feed mixture is compacted using a pump system that brings the upper and lower

plates together to form wafer-shaped biscuits. Cooling is achieved by reducing the product temperature through a drying process. The final stage is packaging, in which the biscuits are vacuum-sealed using plastic materials to extend shelf life.

Palatability testing was carried out by giving tannin biscuits to ECG. Feeding time was initiated upon the first recorded ingestion of the tannin biscuits. Consumption amount/minute was calculated based on the intake volume per minute. Furthermore, consumption per piece was recorded to determine the consumption time per tannin biscuit.

2.3 Experimental design and observed parameters

Experimental design was P0: 0% molasses, P1: 5% molasses, P2: 10% molasses, P3: 15% molasses, and P4: 20% molasses. Each treatment was replicated six times. The parameters observed in this palatability test modified from [10] were feeding time (seconds), consumption amount/minute (g), and consumption per piece (seconds).

2.4 Data analysis

The collected data was analyzed using Analysis of Variety (ANOVA) based on a Completely Randomized Design (CRD). The difference between means was analyzed using Duncan’s Multiple Range Test (DMRT).

3 Results and Discussion

The palatability respon on ECG with different dose molasses on tannin biscuit shown on Table 1.

Table 1. The palatability respon on Etawa Crossbreed Goat (ECG) fed tannin biscuits with different molasses doses

Treatment	Feeding time (seconds) ^{ns}	Consumption per minute (gram) ^{ns}	Consumption time per piece (seconds) ^{ns}
P0	2.23±2.48	42.20±4.99	42.38±10.95
P1	1.49±0.61	33.20±12.22	73.33±77.65
P2	3.31±5.05	50.60±28.45	82.05±78.15
P3	1.42±0.44	41.20±16.27	63.28±60.64
P4	1.80±1.09	57.80±15.15	41.22±14.28

P0: 0% molasses, P1 : 5% molasses, P2: 10% molasses, P3: 15% molasses, and P4 :20% molasses

^{ns}: non significant

3.1 Feeding time

Based on Table 1 showed that doses of molasses had no significant effect on the initial feeding time of ECG when consuming tannin biscuits. The biscuits produced were characterized by a feed aroma, a crumbly texture, and the absence of mold, which are presumed to have contributed to the ECG's acceptance of the feed. These findings are in line with [11] which states that the efficiency of feeding behaviour is influenced by the type and physical characteristics of the feed. According to [12] that the application of pressure and heat to raw materials can induce a maillard reaction, which contributes to the development of a distinctive aroma characteristic of the base ingredients in the resulting feed. [13] reported that increased molasses concentrations are associated with improved palatability but may compromise the physical hardness of the feed

3.2 Consumption per minute

Consumption per minutes means that weight of tannin biscuit can be consumed in one minute. Based on Table 1 showed that dose of molasses not significantly affected on consumption per minute of ECG. Feed consumption is influenced by various factors, including aroma. A pleasant feed aroma has been shown to enhance feed palatability in livestock. In this study, molasses was utilized to improve the palatability of feed biscuits. According to [14], molasses possesses a naturally fragrant aroma, which can positively affect the palatability and acceptance of feed by livestock. Generally, livestock tend to prefer feed that has a fresh, fragrant smell and is free from rancid odors. [15] reported that the addition of molasses in wafer feed formulation undergoes a maillard reaction during the heating and pressing processes, resulting in the formation of a characteristic sweet aroma. Furthermore, the proportion and combination of various feed ingredients contribute to the development of the distinctive aroma profile of the feed.

3.3 Consumption time per piece

Consumption per piece means that time taken to consume per piece of tannin biscuit. Dose molasses on tannin biscuit was no significantly affected on consumption time per piece. ECG successfully consumed all treatment in this research, with consumption times ranging from 41.22 to 82.05 seconds. These findings suggest that tannin biscuits exhibit high palatability and have potential as a supplementary feed for ruminant. According to [16] in conditions where forage is scarce, such as during the dry season, biscuits may serve as an effective alternative. Moreover, these biscuits offer advantages in terms of long shelf life and safety for animal health.

4 Conclusion

The dose of molasses in tannin biscuits did not significantly affect the initial feeding time, consumption per minute, and consumption per piece. This indicates that the dose of molasses in tannin biscuits does not significantly affect the level of feed acceptance by livestock. All molasses dosage treatments tested were still well accepted by livestock without disrupting their eating habits. Tannin biscuits with various molasses dosages can be used effectively as a feed supplement without the risk of reducing feed consumption.

The Acknowledgements, The authors would like to thank P3M Politeknik Negeri Jember for funding the research through PNBPF funds in 2025, number: 0852/PL17.4/PG/2025.

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