Analysis of Differences in Farmer Income Estimation Between Middlemen and Animeter For Bali Cattle in Jaro Subdistrict, Tabalong Regency, South Kalimantan

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ABSTRACT

This study investigates differences in farmer income and body weight estimation for male and female Bali cattle in extensive farming in Jaro Subdistrict, Tabalong Regency, South Kalimantan. A random sampling approach was used, involving farmers from nine villages. Statistical analyses revealed a significant difference ($p < 0.05$) in the body weights of male Bali cattle measured by an animeter compared to those estimated by middlemen. In contrast, no significant difference ($p > 0.05$) was observed for female Bali cattle. These differences significantly impacted farmer income for male cattle because the income estimated by the animeter exceeded that estimated by the middlemen ($p < 0.05$). However, no significant difference ($p > 0.05$) was observed between the two estimation methods for female cattle. In addition, no significant relationship was observed between the estimates made by the middlemen and those made by the animeter for both sexes of Bali cattle. This study used the Monte Carlo simulation to predict demand for male and female Bali cattle in 2024. On average, farmers were able to supply between two and three male Bali cattle and between three to seven female Bali cattle per month. To ensure a steady income, farmers are advised to supply at least one male or female Bali cattle. Moreover, farmer groups are encouraged to compensate for cattle shortages or surpluses, thereby ensuring a stable supply for middlemen and consumers.

Keyword: Bali cattle, extensive farming, Monte Carlo simulation

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INTRODUCTION

Poverty is as a complex problem that is associated with the welfare of farmers, particularly in the domain of livestock production. Despite the crucial role of agriculture in sustaining livelihoods, the full optimization of livestock production remains unrealized, contributing to persistently high global poverty levels. Poverty continues to be a significant issue in global development efforts due to its lasting impact on communities and societies (Yanuarianto, 2021). In Indonesia, which is emblematic of agrarian struggles, the poverty rate is alarmingly high at 9.36% as of March 2023, affecting a substantial 25.90 million individuals who are living in impoverished conditions. Upon closer examination, a significant urban-rural divide is evident. The urban poor population is 7.29% or equivalent to 11.74 million people, while the rural poor population has soared to 12.22%, encompassing 14.16 million people (Statistics Indonesia, 2023). This stark disparity can be attributed to the significant inequality in income distribution between these regions, highlighting the economic challenges embedded in the fabric of rural life (Yasin, 2015).

Pardosi (2019) provided a further explanation of the correlation between poverty and economic inequality, particularly in the agrarian landscape. The income disparity between high-income and low-income groups leads to poverty, highlighting the need to address economic inequality to achieve sustainable development (Rauf, 2015; Dotulong et al., 2021; Saputra et al. 2022). For farmers, poverty can be a driving force that compels them to seek alternative solutions to improve their quality of life. In this context, adopting extensive Bali cattle farming has emerged as a promising alternative (Meidina et al., 2021). By adopting this innovative approach, farmers can increase cattle production without incurring high production costs. This can lead to increased income and improved living standards for farmers grappling with poverty-related challenges (Bamualim, 2015).

The potential for transformative change through extensive Bali cattle farming is exemplified in Jaro Subdistrict, Tabalong Regency, South Kalimantan (Statistics Indonesia, 2022). The integration of extensive Bali cattle farming with oil palm plantations represents a symbiotic relationship between the livestock and agricultural sectors (Pagala et al., 2020). This integrated model demonstrates that by-products of oil palm cultivation, such as legumes, can be used as a cost-effective and sustainable feed for cattle, fostering an environmentally conscious approach to livestock husbandry (Mudhita et al., 2016; Hassen et al., 2017; Prudhomme et al., 2020). Moreover, this approach has mutual benefits, as cattle manure can be used as valuable compost fertilizer to

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improve soil fertility and oil palm production (Mariani, 2015; Mariani et al., 2016; Pagala, 2020). The multifaceted role of cattle goes beyond providing food. They also contribute to bio-industrial practices and play a pivotal role in weed control within oil palm plantations (Rusdiana & Praharani, 2019; Rostini et al., 2020). This integrated approach not only optimizes agricultural resources but also underscores the potential for holistic and sustainable rural development.

In Jaro Subdistrict, where farmers typically own an average of five Bali cattle, the significance of these cattle extends beyond numerical metrics. The annual sale of one to two Bali cattle per farmer is a testament to the economic importance of these transactions within the local community. However, a notable challenge arises in the reliance on estimates by middlemen to determine the weight and subsequent selling price of Bali cattle. This prevalent practice introduces elements of uncertainty and inaccuracy, potentially impacting the overall economic dynamics of cattle transactions. As a result, this study is important for understanding income differences and relationships between estimates made by middlemen and an animeter. This study was conducted in the extensive Bali cattle farming landscape of Jaro Subdistrict, Tabalong Regency, South Kalimantan and aims to provide nuanced insights into the economic intricacies of this agricultural model. Through comprehensive examination, this study seeks to shed light on potential avenues for increasing income and ensuring the economic viability of extensive Bali cattle farming, ultimately contributing to poverty alleviation in the region.

MATERIALS AND METHODS

Research Type and Design

This study used an observational research design, specifically a true experimental method within a 2 x 2 factorial research design. The primary factors under investigation were version and sex using a two-way analysis of variance (ANOVA) with relationships to differentiate sex, relationship influence, and the combined influence of sex and relationship. The survey conducted for this study used random sampling techniques, targeting farmers in Jaro Subdistrict engaged in extensive farming practices with a Bali cattle population of more than five cattle. Subsequently, the Monte Carlo simulation was performed to determine the estimated quantity of Bali cattle sought or requested by middlemen and consumers in the forthcoming period.

Population, Sample, Sample Size, and Sampling Technique

This study used a survey method to investigate Bali cattle farmers in Jaro Subdistrict, Tabalong Regency, South Kalimantan. The research location was selected using a random sampling

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technique, taking into consideration the time, capacity, and accessibility of the researchers (Purnomo et al., 2023). This study included farmers from nine villages in Jaro Subdistrict, Tabalong Regency, South Kalimantan, namely Namun, Muang, Teratau, Purui, Nalui, Jaro, Garagata, Solan, and Lano. However, the farmers were selected using a specific objective-oriented random sampling technique. The total sample size of this study consisted of 40 samples from 20 respondents, each of whom sold a minimum of two cattle per year, representing farmers who practiced extensive cattle farming in Jaro Subdistrict.

Research Materials

This study collected data through interviews, direct observations, and physical measurements of Bali cattle on extensive farms in Jaro Subdistrict, Tabalong Regency, South Kalimantan.

Location and Period of Research

This study was conducted from September to October 2023 in Jaro Subdistrict, Tabalong Regency, South Kalimantan. The research location included the villages of Namun, Muang, Teratau, Purui, Nalui, Jaro, Garagata, Solan, and Lano, which were selected through a random sampling technique, taking into consideration the suitability of the subdistrict for the required farming system.

Research Procedure

The study investigates Bali cattle farming using the Monte Carlo Simulation and performance testing using the Lambourne formula.

Data Analysis

The compensation paid to farmers was calculated using two methods. Body weights of the cattle were determined based on estimates made by middlemen and an animeter, which were subsequently multiplied by the unit price per kilogram. The collected data, including the body weights of the cattle and the corresponding prices, are presented in a descriptive manner.

RESULTS AND DISCUSSION

Cattle farmers in Jaro Subdistrict earn their income primarily from selling cattle, which are usually valued based on the live weights of both male and female cattle. The valuation was estimated by middlemen with an approval from the farmers. This practice, which lacks measurement tools, has the potential to create bias and bring disadvantages to farmers.

This study analyzes the body weights of Bali cattle based on estimated made by middlemen and an animeter using Statistical Product and Service Solutions (SPSS) Statistics 25. The results of the two-way ANOVA showed significant differences in body weight between male and female cattle, as illustrated in Table 1 and Figure 1.

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Table 1. Differences in the Body Weight Estimation of Bali Cattle between Middlemen and Animeter in Jaro Subdistrict

Sex	Weight ($\bar{x}$ ± SD) Kg	
	Middlemen	Animeter
Male	312.8515 ± 23.58676[a]	363.1120 ± 17.99460[b]
Female	227.1415 ± 23.58676[a]	222.2555 ± 11.97846[a]

Note: Different superscripts in the same row indicate significant differences ($p < 0.05$)

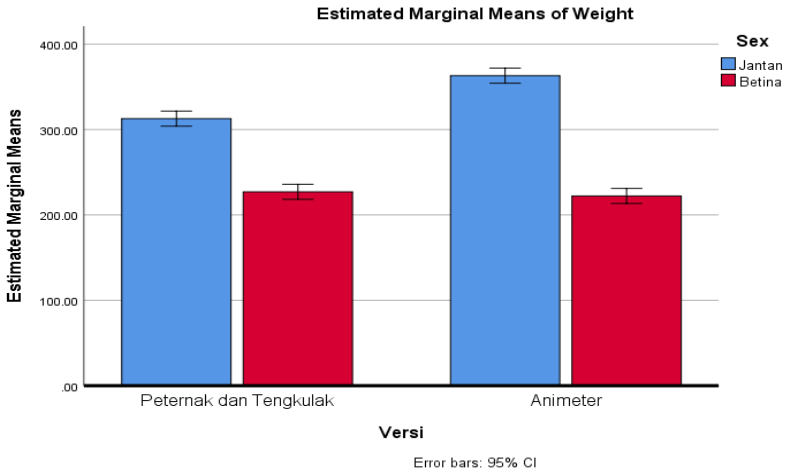

Figure 1. Visualization of the Differences in Body Weight Estimation of Bali Cattle between Middlemen and Animeter in Jaro Subdistrict in 2023

Table 1 shows the statistical analysis results, which indicated a significant difference ($p < 0.05$) in the weights of male Bali cattle between estimates made by middlemen and the animeter. In contrast, no significant difference ($p > 0.05$) was observed in the weights of female Bali cattle between estimates made by middlemen and the animeter.

The differences in the weights of male Bali cattle between middlemen and the animeter is attributed to a potential lack of understanding as middlemen did not differentiate between the weights of male cattle and those of female cattle. These differences, particularly in the case of selling a large number of male cattle, may result in increased losses for selling female cattle. This is consistent with the findings of Muslimin (2022) and Luan (2020) who suggested that differences in sex hormones between male and female cattle influence carcass composition, such as bone tissue, meat, and fat.

Setiawan (2019) observed similar findings that carcasses of male cattle weigh more than those of female cattle. The average body weight of castrated male Bali cattle ranges from 370 kg to 400 kg, while female Bali cattle weigh approximately 283 kg. The influence of

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testosterone or androgen hormones on nitrogen retention, protein synthesis, and muscle growth in male cattle contributes to their faster growth compared to female cattle. As a result, male cattle weigh more in terms of body weight and carcass weight than female cayyle at the same physiological or chronological age (Desya et al., 2022).

According to Tahuk (2021), sex hormones play a physiological role in influencing metabolic processes related to growth, including protein synthesis, amino acid transport, carbohydrate metabolism, gluconeogenesis, fat mobilization, mineral metabolism, and cartilage bone growth, which collectively support overall body growth. Additionally, male cattle exhibit greater increases in meat uric acid compared to female cattle (Pinardi et al., 2020). Observations during the field research at the slaughterhouse indicated that more male cattle were slaughtered than female cattle due to the perceived higher quality of beef, which has favorable fiber and optimal moisture content.

These sex-based differences had a significant impact on the income of farmers, as evidenced by differences in prices of male cattle based on estimates made by middlemen compared to the animeter, as presented in Table 2 and Figure 2. Prices of male cattle estimated by the animeter was significantly higher than those estimated by middlemen ($p < 0.05$). In contrast, no significant difference was observed between the prices estimated by middlemen and the animeter for female cattle ($p > 0.05$).

Table 2. Differences in the Farmer Income Estimation between Middlemen and Animeter in Jaro Subdistrict

Sex	Income ($\bar{x}$ ± SD) Rp	
	Middlemen	Animeter
Male	46927.7250 ± 3538.01429[a]	54466.8000 ± 2699.19043[b]
Female	34071.2250 ± 3538.01429[a]	33338.3250 ± 1796.76970[a]

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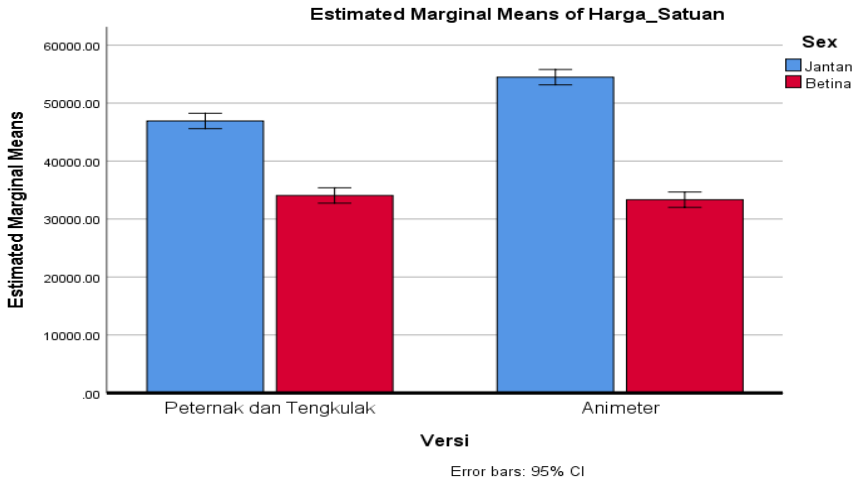

Figure 2. Visualization of the Differences in Farmer Income Estimation between Middlemen and Animeter in Jaro Subdistrict in 2023

Table 3 presents the results of the Monte Carlo simulation, showing the average number of cattle that farmers needed to provide to middlemen. On average, farmers could supply between two and three male Bali cattle and between three to seven female Bali cattle to middlemen per month.

Table 3. Demand Estimation of Bali Cattle

Quantity ($\bar{x}$ ± SD) Total	
Sex	**Total**
Male	1.5 ± 1.8
Female	2.9 ± 4.2

The study concluded that in order to generate income, farmers should supply at least one male or one female Bali cattle. If Bali cattle are not available when needed by middlemen and consumers, the formation of a farmers' group becomes necessary. Within such a group, shortages can be dealt with if a farmer has fewer cattle than needed by the middlemen, while surpluses can be managed by selling them in the following month.

Farmers' groups play a crucial role in facilitating middlemen in selecting cattle based on desired criteria by coordinating with the group leader and in reaching price agreements among farmers. These groups are also crucial in agreeing on the distribution of available feed resources (Indrayani, 2015). Additionally, these groups

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participate in the government's empowerment initiatives by enhancing farmers' knowledge in livestock farming and the roles of farmers' groups. Training provided to farmers' groups includes processing livestock manure into biogas and bio-urine, as well as understanding the estrous cycle of female livestock (Masir et al., 2020). The farmers' groups aim to increase farmers' capital through cooperatives. They also engage in benchmarking studies to improve productivity and livestock seed populations through group empowerment (Rajul, 2022).

Furthermore, the presence of farmers' groups facilitates the dissemination of information and government programs. The results of this study showed that the sale of female Bali cattle did not differ significantly between farmers, middlemen, and the animeter, and was less profitable compared to the sale of male Bali cattle. This difference was influenced by the slower weight gain of female cattle compared to male cattle, as well as differences in the quality and carcass of male cattle. This study emphasizes the importance of not selling productive female cattle that are capable of producing high quality offspring. This is done with the aim of increasing the Bali cattle population in Jaro Subdistrict, Tabalong Regency, South Kalimantan.

To support the beef self-sufficiency program, it is necessary to have access to high quality beef cattle seeds must be available. Meeting this demand necessitates a cattle breeding program that is primarily managed by the community. The breeding activities aim to enhance the productivity and population of beef cattle seeds through community empowerment (Sari et al., 2020). In terms of production technology aspect, farmers' groups are responsible for implementing appropriate business practices, including selection of quality seeds, improvement of feed quality, maintenance techniques, and improvement of animal health. In the socio-economic aspect, farmers' groups play a role in strengthening institutions and marketing networks (Riyanto, 2015.). In summary, this study provides insights into differences in income and factors influencing Bali cattle farming in Jaro Subdistrict, Tabalong Regency, South Kalimantan. In addition, this study contributes to providing valuable information for sustainable livestock development and the welfare of farmers.

CONCLUSION

Differences in farmer income estimation between middlemen and animeter were observed for male Bali cattle in Jaro Subdistrict, Tabalong Regency, South Kalimantan. In contrast, no differences in farmer income estimation between middlemen and animeter were observed for female Bali cattle in the same region. Furthermore,

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no relationship between the estimates provided by middlemen and animeter for male and female Bali cattle in Jaro Subdistrict, Tabalong Regency, South Kalimantan.

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