CONSTRAINTS TO AND OPPORTUNITIES FOR IMPROVING GOAT PRODUCTIVITY IN TABANAN REGENCY, BALI PROVINCE

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ABSTRACT

This study was undertaken to establish a database as consideration for improving goat production in Tabanan Regency. A survey was conducted from April to September 2018 on 38 smallholder goat farmers integrated with commodity plantations, owning 142 goats. Data were used to measure constraints to, challenges of, and opportunities for improving goat production, through a hybrid method of Strengths, Weaknesses, Opportunities and Threats and Analytic Hierarchy Process analyses. Problem priority faced was the competition between average numbers of 2.0 ± 0.1 family labourers aged 38.8 ± 2.1 years who cultivated average 0.9 ± 0.1 hectare of commodity plantations integrated with flock size of 2.5 ± 0.2 goats per household. Goats were housed in battery systems and fed forage. About 33% farmers had just sold all or portion of their goats due to the busy activity of clove and coffee harvesting in July-September and time consuming for cut and carry forage while commercial concentrates were not given to their goats. Recommendation taken was to providing *Pennisetum purpureum* silage as sustainable feed resource for goats thus improved the nutritious content of feed particularly during dry season where feed was limited or during harvesting and Bali Hindu ceremonies where family labourer was limited.

Keywords: *assessing goat rearing, Tabanan Regency, SWOT and AHP analyses, limited family labourer, sustainable feed resource*

HAMBATAN DAN PELUANG PENINGKATAN PRODUKTIVITAS PETERNAKAN KAMBING DI KABUPATEN TABANAN, PROVINSI BALI

ABSTRAK

Studi ini dilakukan untuk pengadaan database sebagai dasar pertimbangan untuk meningkatan produksi kambing di Kabupaten Tabanan. Sebuah survey dilakukan sejak April hingga September 2018 terhadap 38 peternak kambing skala kecil yang terintegrasi dengan perkebunan, dengan total kambing sebanyak 142 ekor. Data digunakan untuk mengukur hambatan, tantangan dan kesempatan untuk meningkatkan produksi kambing, melalui metode hibrida dari Kekuatan (*Strengths*), Kelemahan (*Weaknesses*), Kesempatan (*Opportunities*) dan Ancaman (*Threats*) dan Analisis Proses Hirarki Analitik. Prioritas problem yang dihadapi adalah kompetisi antara rataan jumlah dari 2.0 ± 0.1 tenaker keluarga berusia 38.8 ± 2.1 tahun yang mengerjakan rataan 0.9 ± 0.1 hektar perkebunan yang berintegrasi dengan rataan jumlah kepemilikan 2.5 ± 0.2 kambing per keluarga. Kambing-kambing dikandangkan dengan sistem bateri dan diberi pakan di kandang. Sebanyak 33% peternak baru saja menjual sebagian atau seluruh jumlah kambingnya oleh karena kepadatan aktivitas dari panen cengkeh dan kopi pada bulan Juli-September dan waktu yang diperlukan untuk potong dan beri atau *cut and carry* hijauan sementara konsentrat komersial tidak diberikan kepada kambingnya. Rekomendasi diberikan adalah untuk menyediakan silase *Pennisetum purpureum* sebagai sumber pakan yang berkesinambungan sekaligus meningkatkan kandungan nutrisi dari pakan khususnya pada musim kering dimana pakan terbatas atau musim panen dan upacara Hindu Bali dimana tenaker keluarga terbatas.

Kata kunci: penilaian pemeliharaan kambing, Kabupaten Tabanan, analisis SWOT dan AHP, tenaker keluarga terbatas, sumber pakan berkesinambungan

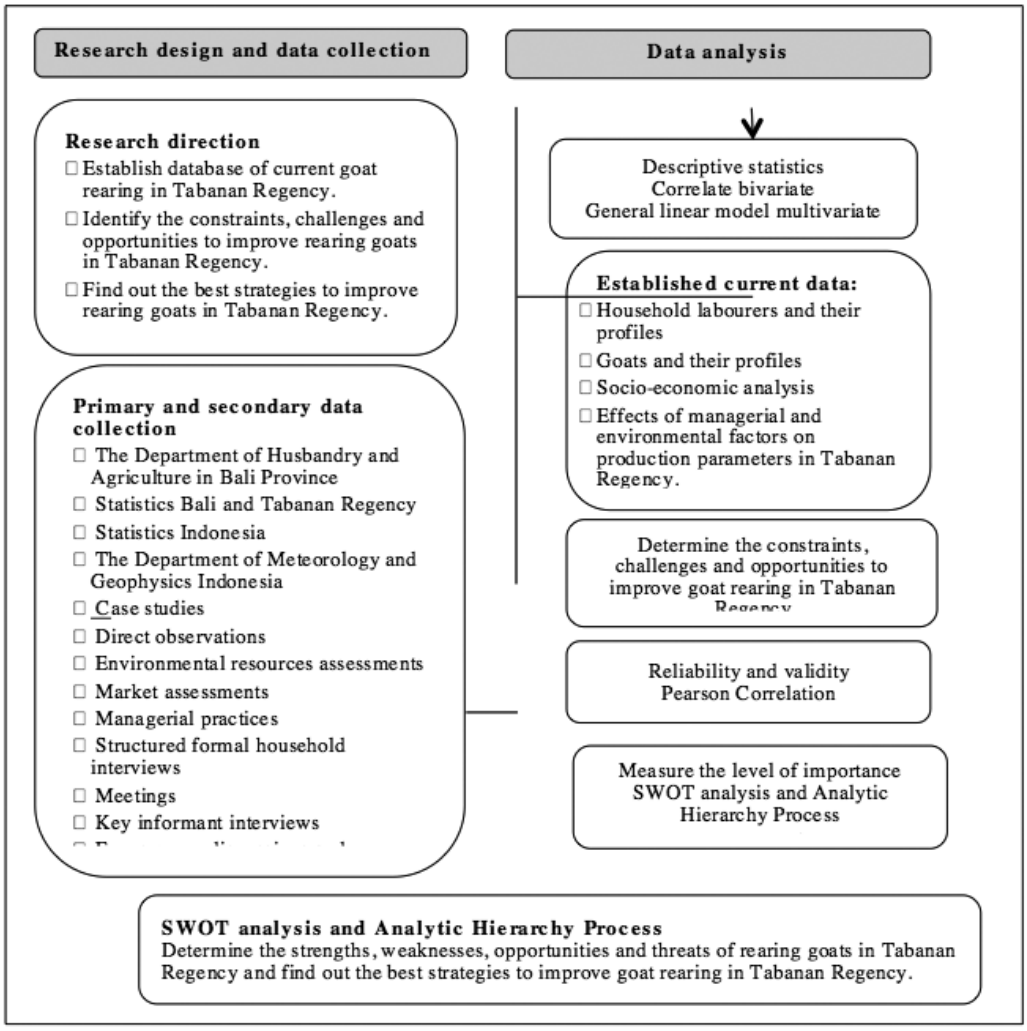

Figure 1. Proposed SWOT analysis and Analytic Hierarchy Process research framework in Tabanan Regency, Bali Province.

INTRODUCTION

Lack of baseline quantitative data on the reproductive and productive performance of goats in Tabanan Regency has limited our ability to identify factors that could lead to their improvement. Pupuan District was selected as the sampling area as it had the largest goat population among the districts in Tabanan Regency (BPS-Bali, 2018). Although Tabanan was designation regency for improvement of goat farming that was officially promulgated by the Indonesian Minister of Agriculture (Anonymous, 2015), this regency has 2,478 goats in 2018 and it had a 58% less compared to 5,888 goats in 2013. There were 1,509 goats in Pupuan District in 2018 and it also had a 58% less compared to 3,571 goats in 2013 (BPS-Bali, 2018). Available literature presented little information on the current situation of their goat rearing under smallholder production systems in Tabanan Regency. Thus this study aimed to rectify this lack of data and to measure constraints to, challenges of, and opportunities for improving goat production in Tabanan Regency, through a hybrid method of Strengths, Weaknesses, Opportunities and Threats (SWOT) and Analytic Hierarchy Process (AHP) analyses (Kurttila *et al.*, 2000; Doloksaribu *et al.*, 2017).

MATERIAL AND METHODS

primary and secondary data on goat rearing under smallholder production systems in Tabanan Regency were summarized from various data resources (Figure 1). A purposive sampling procedure as described by Bryman (2016) was adopted to ensure that the selected householders comprised of goat farmers in Pupuan District. Pupuan District was selected as the sampling area as it had the largest goat population among the districts in Tabanan Regency. The combined data were analysed by using descriptive statistics, correlate bivariate and general linear model multivariate analyses using SPSS version 26 (Figure 1).

Table 1. SWOT and AHP analyses considered for improving goat production in Tabanan Regency, Bali Province.

Strength:
• The ownership and average size of land cultivated 0.9 ± 0.9 hectare was relatively large. • The availability of feed resources, particularly leguminous fodder trees or shrubs that were used as shading plants in coffee plantations have been used to ameliorate feed constraints and to enhance soil fertility in Tabanan Regency, as well as natural anti-parasitic properties. • Balinese culture - desires to own and raise livestock. • Goats are relatively low cost and easy to care for. Goats are also easy to transport. • High education level 2.6 ± 0.2 or graduated from year 9 of farmers aged 38.8 ± 2.1 years with the length of goat rearing experience was more than 10 years.
Weaknesses:
• The average number of 2.0 ± 0.1 household labourers was relatively small for the size of land cultivated and sufficient number of goats cared for providing sufficient quantity of organic fertilizer for their cultivated land. • Lack of family labourer to cut and carry forage for their goats while they had busy activity during the crop harvesting. • Farmers usually sell all or portion of their goats in July-September and buy small flocks after the harvesting is over. • Age profile and sex balance of goat flocks particularly the number of does owned per household was disproportional and may not be optimised for maximum production. • Feed supply may not be optimised for maximum production particularly during dry season. • Lack of a "business approach" to raising goats. Goats kept for cultural reasons or as a "living bank". • Price received by farmers may not be based on quality and weight - but bargaining power of traders. • Smallholder goat farmers were not sure on how to predict the age of their goats and they had never weighed their goats even when they sold their goats. • Smallholder goat farmers had never recorded the productive nor reproductive parameters of their goats and it means farmers have no data on how well their animals were performing. • Limitation of the availability of family labourers resulted in a new critical threshold for farm growth strategies.
Opportunities:
• Huge unmet demand for goat meat and milk - this demand is predicted to increase. • Roles of goats for Bali smallholder farmers included their inclusion in social/religious ceremonies, particularly Eid Qurban and Mecaru ceremonies. • Policy of Indonesian Government for meat self-sufficiency. • Bali Government encouraged Bali smallholder goat farmers in improving their goat productivity. • Bali Government assist smallholder farmers to build networks with the Indonesia Research Institute for Animal Production to ensure quality breeds, feeds and rearing goat management systems were used in Bali Province i.e. having simple goat recording as well as skills in selecting goats, particularly for high milk production. • To supply organic fertilizer for cropping. Increase income and nutrition of poor rural families.
Threats:
• Foot and Mouth Diseases and endemic scabies diseases occurred due to lack of biosecurity of goat bought from outside. • Cultural shift as more rural people move to urban areas to gain employment in business and tourist associated trade. • Lack of capital and competition with other demands for farmer's attention (goats are a sideline enterprise).

The roles of Indonesian Government policies and practices were also reviewed and these were used in this study. The database of household labourers and their profiles, goats and their profiles as well as the environmental resources assessments, market assessments, managerial practices of the 38 smallholder farmers with their 142 goats, and 19 goat farmers who had just sold all or portion of their goats in this study were presented. Proposed SWOT analysis and Analytic Hierarchy Process research framework that involved interviewing 38 households with 142 goats from April to September in 2018 in Tabanan Regency is summarized in Figure 1. The strengths and weaknesses of the current reproductive and productive efficiency of goat farming under smallholder production systems in Tabanan Regency, as well as their socio-economic analysis and their opportunities and threats originating were determined using the SWOT matrix. The information obtained from the SWOT matrix was integrated into the AHP hierarchy to identify the most important factors as well as the optimum strategies for improving goat production (Figure 1) (Kurttila *et al.*, 2000; Ho, 2008 and Saaty, 2008).

RESULTS AND DISCUSSION

The database of the current goat production in Tabanan Regency was mapped using a hybrid method composed of SWOT and AHP analyses. Goat production practices in Tabanan Regency were constrained by a variety of factors. A pairwise ranking method was employed to assess the detail of these problems that were associated with specific parameters of goat production. The result of this pairwise ranking analysis showed that, in most cases, the Pearson correlation ranked the factors influencing goat production such as: Size of land cultivated per household (ha) and Labourer ratio to flock size per household ($P<0.05$); Number of household labourers and Size of land cultivated per household (ha) ($P<0.05$); Number of household labourers and Flock size per household ($P<0.05$);while no significant correlation between Education level

of the smallholder goat farmers and Size of land cultivated per household (ha) or Education level of the smallholder goat farmers and Gross margin per doe per household (IDR million) (P>0.005). The identification of mechanisms, actions, innovations developed by 38 smallholder farmers with their 142 goats, for reducing their constraints and responding to their challenges, as well as the opportunities for improving their goat production are summarised in Table 1.

This study revealed that 33% smallholder goat farmers sold their goats prior the clove and coffee harvest time in July-September 2018, due to the competition of limited family labourers on doing the farming activity and rearing goats at the same time. Moreover, during the harvesting, Bali Hindus celebrate Galungan and Kuningan Days that are celebrated every 210 days besides other celebrations. It is common for Bali Hindus do a lot of preparation for the Galungan and Kuningan Ceremonies. By planting *Pennisetum purpureum* cv. Mott, farmers could learn how to make them silage. By feeding the silage to their goats, farmers could save time and energy at the peak of harvest time along with the preparation for Hindu Ceremonies. Farmers do not necessarily spend more time to cut roughage and feed their goats or sell their goats.

Only the farmers who kept rearing goats were able to sell goats prior Eid Qurban on the 21st August 2018 for the better price. Not only the farmers got more profit by selling more goats prior the Eid Qurban, they also got more goat manure as organic fertilizer to maintain high production of clove and coffee plantations. Doloksaribu (2017) revealed that a household labourer who handled 20 goats in a flock size of 39 goats including 10 does sold 37 goats annually that provided IDR 4,707,000 gross margin/doe/year. Similarly Singh *et al.* (2011) reported that large flocks of goats achieved higher profits than small and medium flock sizes. Guntoro (2012) recommended 25 to 28 goats per ha would be enough to produce goat manure as organic fertilizer to produce 2,450 kg coffee or 2,185 kg cacao annually. Nevertheless, cultivating 0.9 ± 0.1 hectare per smallholder household in Tabanan Regency could be one of the development strategies that will help in improving their income by fertilizing the land with organic fertilizer and selling more coffee and clove commodities along with more goats. Strategies for improvement of goat production in Tabanan Regency therefore could be achieved by:

The proportional number of does and bucks in a flock.

The availability of does and bucks in a flock that were well managed for their reproductive performance could be one of the development strategies that will help in improving their goat production. The presence of sufficient does and bucks in larger flocks generated more offspring that was then available for breeding stock for selection programmes (Peacock, 1996). Doloksaribu (2017) revealed that there should be a third of the flock was reproductive does.

The proportion of labourers to flock size

The number of household labourers to the number of goats managed per household that were well managed for their reproductive performance could be one of the development strategies that will help in improving their goat production. Doloksaribu *et al.* (2014) and Doloksaribu *et al.* (2015) revealed that to sustain positive GM(A-B) and GM/doe, households in Karangasem Regency had to have at least a flock of 8 productive does that produced 24 kids in 2 years; so they were able to plan to sell goats just prior to Eid Qurban for higher profits.

Education level/knowledge/skill/experience of goats rearing management of smallholder goat farmers

Improving the knowledge, experience and skill of the Bali smallholder goat farmers is critical in improving the efficiency of rearing goats. One of the ways to achieve those improvements is to improve their awareness of the particular feed resources available in neighbourhood to sustain feed particularly during harvest times, dry season and Bali Hindus ceremonies. This study revealed that farmers who substituted particular size of their coffee plantation to be planted with *Pennisetum purpureum* cv. Mott enabled them to sustain feed resource for their goats. In Karangasem Regency, as farmers grew crops they also fed their livestock with dagdag soup consisting of boiling water with rice pollard, salt, urea and chokos, cabbage, young jackfruits, sweet potatoes, cassava leftovers from their vegetable harvestings (Doloksaribu *et al.*, 2014; Doloksaribu *et al.*, 2015). This could be one of the development strategies that will help in sustainability of quantity and quality of feeds for their livestock, practical and convenient feed resources as well as reducing feed cost thus ensuring high income per household from goat production as well as their integrated farming.

CONCLUSION

Based on the assessing current goat production in Tabanan Regency particularly on the constrains to and opportunities for improving goat productivity, therefore, planting *Pennisetum purpureum* cv. Mott and improving farmer's skill to make the *Pennisetum purpureum* silage as sustainable feed resource were highly recommended. It is expected to improve goat

productivity particularly during dry season where feed was limited or during harvest time where family labourer was limited. This is anticipated that smallholder farmers will not sell all or portion of their goats prior the harvest time of their crop plantations thus enable them to gain more profits by selling more goats prior Eid Qurban and selling more crop productions.

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