ECO EFFICIENCY OF ETAWA CROSSBRED GOAT CARRYING CAPACITY IN VILLAGE GROUP SYSTEM AT YOGYAKARTA IN INDONESIA

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ABSTRACT

This research was conducted to describe condition of goat carrying capacity, with pen efficiency, tree leaves and water availability so goat carrying capacity sustainability of Etawa crossbreed goat at Yogyakarta can be known. It located in Nganggring, Kemiri Kebo and Sukorejo subvillages taken with purposive sampling method. Analytical tool used was table analysis. Limited labor in raising caused dominant management by head of household that make the goat cannot meet pen density standard. Tree leaves availability in village group system is not sufficient for existed goats so farmer should look for tree leaves input from public area. Sandy land and often land slide make naturally uncontinuous water availability. Although carrying capacity of goat in village group system pen , tree leaves, and water is not efficient, pen and tree leves have met sustainability of Etawa crosbreed goat in village group system while water availability have not supported sustainability.

Research Keywords : Etawa crosbreed goat , village group system , goat carrying capacity

Introduction

Tourism is the largest and fastest growing industry in the world, and its rapid growth is fuelling the economy in many developing countries, especially in Asia. The tourism industry's impact on the environment and the potential for change cannot be underestimated in 1995 alone, tourism has produced close to 11% of world GDP and generated an estimated US$ 3.4 trillion in gross output **(http://www.iisd.ca/consume/unep.html)**. Development of rural tourism in Yogyakarta is carried out with among others, farm tourism of Etawa crossbreed goat in Girikerto village of Turi district in Sleman. Etawa cross-breed goat farm with village group system as superior farm commodity is public goods whose existence should be kept.

Environmental sustainability is a pillar in supporting farm sustainability so it support of natural resource that support Etawa crosbreed goat in village group system should be taken into account. Because of its 'intangible' nature, the service sector such as tourism has traditionally been behind in embracing the concepts of eco efficiency and cleaner production. Eco efficiency starts from issues of economic efficiency which have positive environmental benefits while cleaner production starts from issues of environmental efficiency which have positive economic benefits. The concept of Cleaner Production was introduced by UNEP Industry and Environment in 1989. Cleaner production is the continuous application of an integrated preventive environmental strategy applied to processes, products and services to increase eco-effi ciency and reduce risks for humans and the environment. It applies to: 1) production processes: conserving raw materials and energy eliminating toxic raw materials and reducing the quantity and toxicity of all emissions and wastes ,2) products: reducing negative impacts along the life cycle of a product from raw materials extraction to its ultimate disposal,and 3) services: incorporating environmental concems into designing and delivering services. Cleaner production requires changing attitudes responsible environmental management creating conducive national policy environments and evaluating technology options.

Based on eco efficiency that measure sustainability of natural resource and economic profit balance and environment as environment management instrument, it requires plan to consider whether environmental factor as farm supporters in group pen in term of pen efficiency, tree leaves and water availability is sustainable or not.

Material and Methods

One hundred and sixteen farmers belonging to three farm groups "Mandiri" in Nganggring subvillage, "Pangestu" in Kemirikebo subvillage and "Sukorejo I" in Sukorejo subvillage were taken as sample. Direct interview used questionnaire to obtain primary data relating to amount of goat, pen width, daily feeding, tree leaves area, and availability of water resource in village group system. Pen efficiency, tree leaves and water availability were determined using table analysis.

Results and Discussion

Pen efficiency relates to ratio of pen width and amount of goat owned. When amount of goat accord to pen density and its status composition is heterogeneous, it has tendency to be sustainable group pen. Pen width standard for male adult goat is 1.25 x 1.50 m^2, for doe $(1.00x1.25)^2$, and post weaning kid $(1.00x1.25)m^2$ or in average 1.50 m^2 for a goat (Sodiq et al 2005). Amount of goat the group members own is six goats, so it needs $9m^2$ pens. Average farmer's pen width is 12-$15m^2$, which indicated high empty level or inefficient goat density. Farmer is provided with village's land for $100m^2$ pen with objective to develop the farm with wider pen. It is opportunity for farmers when they can optimize farm population growth. Based on goat composition in the pen, most farmers raise doe and pre- and post-weaning kid when male is not had by each farm because village group system provide male as pemacek. It means that farmer still keep heterogeneous condition of the farm to avoid pen emptiness. Limited labor in raising that cause dominant management by head of household result in goat cannot meet pen density standard. Therefore, pen carrying capacity is not efficient to support sustainability of Etawa crosbreed goat group pen.

Feed from tree leaves efficiently relates to feeding and feed availability. When feeding in pen have suit, it is efficient. When feed production accord to feed requirement, to accommodate goat, efficiency to support sustainability of Etawa crosbreed goat in village group system will be achieved. Nitis et al (1988) stated that farm potential will be achieved maximally according to its genetics potential when there is good feed in quality and quantity side. Ideally, need for tree leaves is one-tenth of body weight, but in wet season, feeding may be up to twice. For example, goat body weight is 50 kg, then forage provided daily is transition from dry to wet season is 5 kg consisting of grass and legume of 70% (3,5 kg), 20% brush (1 kg) and 10% leaves (0.5kg), while in wet season it reach 10 kg. (Kustantinah et al, 2006). Murtijo (1993) indicated daily need for goat feed is 7 kg/animal. Feeding frequency is twice a day. In morning, it may one-third of feed requirement, while afternoon, it is more because it is used until next morning. Based on result of interview, daily capability of farmer to look for tree leaves is maximally 40 kg for 4 adult goats. When they have more than 4 goats, farmers usually add concentrate to meet feed. Average ownership is 6 goats so every day each goat gets only 3.33 kg. It indicated that feeding in pen is still below standard tree leaves feed.

Table 1. Kind and Species Tree Leaves for Feed in Turi Region Sleman Yogyakarta Indonesia

Tree leaves kind	Species name
Leguminosa	Kaliandra(*Calliandra calothyrsus)*, lamtorogung (*Leucaena lucocephala)*, gamal (*gliricidae sepium)*, sengon (Albizzia faltacaria), dadap (Erythrina subumbrans)
Non leguminosa	waru, nangka(*jackfruit*), apokat (*Phyllanthus gratissima*), mahoni (*brillantaisia majestica*), kopi (*coffee arabica*), jipang (*Sechium edule*), melinjo (*gnetum gnemon*), pisang (*banana fusilier*), salak (*salacca zalacca*), ketela pohon, (*cassava*), pepaya (*papaya*),mindi (*Melia azederach*), katu
Grass	kalanjana, rumput gajah (*Panicum Maximum*), rumput raja (*King Grass*), kedelai (Glycine Max), jagung (Malay)
Bushes	Krenyu (Lacaballera), suruh (Piper betle), pakis (*cymodoce spinula*), teh

Sources : Interview with farmer, 2007

Tree leaves availability in research site is abundant, either for legume, non legume, grass or bushes (table 1). However, feed the farmer provided legume because it is abundant and easy to get. In addition leguminous is protein source of goat. Most existing legume is kaliandra (*Calliandra calothyrsus*), gamal (*gliricidae sepium*), lamtorogung (*Leucaena lucocephala*) and turi (*sesbania grandiflora*). Farmer get village's land of $150m^2$ for tree leaves. With assumption of production of kaliandra, turi and glirisidae ot 2-ton/ha/y, lamtoro 5 ton/h/y, (Farm Service, 2006), then availability of tree leaves for $150m^2$ is 976 kg/y. Maximally, farmer get forage of 40 kg so in less than 22.5 days, the tree leaves run off. Legume plant rotation is about 3-4 months so forage availability cannot be sufficient for accommodating farm so farmer should look for added tree leaves(mugut, in javanese) in form of grass or leaves around the village group system location or outside village group system location. in addition to tree leaves, farmer use agricultural waste of tofu dreg as concentrate beside purchasing pollard or dedak. It indicated that availability of forage around village group system site have not supported sustainability of Etawa crosbreed goat in village group system. Therefore, it needs to optimize village group system area to plant tree leaves in

order to decrease frequency of looking for tree leaves outside in village group system that take time due to long distance from village group system to tree leaves site (± 5 km). Actually, tree leaves area have been prepared in village group system but its production is not sufficient for meting daily tree leaves need or, in other word, availability of tree leaves is still less. With each farmers has 6 goats, average consumption is 5 kg/goat/day, production of kaliandra 2 kg/m^2 and harvest age (rotation) for 90 days, then feed consumption/day is (6 goats x 5 kg)=30 kg. Land block is 30 kg/2kg/m^2=15 m^2, so tree leaves land should been available according to formula of Voisin (1959) cit Reksohadiprodo (1985) is (90+1) x 15m^2=1365m^2 or 0.1365 ha. Therefore, there should be tree leaves area that meets farm need of 1365 m^2 to secure available tree leaves. The calculation can be recommendation of tree leaves wide area that should be available in village group system location. In addition, it should be made tree leaves silage to deal with limited feed in dry season. Silage can be made to condition grass feed and legume in anaerobic manner 2-3 weeks added with urea to accelerate silage process (Kartadisastra, 1997).

Water carrying capacity is also important, particularly for drink and washing. Sandy land and land slide cause uncontinuous water availability. Farmer in Nganggring subvillage to meet water need should take from Krasak river through pipe lane made in 1997 with 3 km long and Rp 33 million cost. Kemiri Kebo subvillage and Sukorejo subvillage have no alternative for meeting water needs so farmer still rely on well existing in group pen, although in dry season the well is dysfunction due to dryness. The condition indicated that role of water as supporting resource have not been able to support sustainability of group pen.

In whole, environment carrying capacity of tree leaves, pen and water have not met eco-efficiency concept. It is due to potential carrying capacity, which actually can support sustainability of village group system , have not been optimized by farmer so there is inefficiency of environment carrying capacity in meeting farm requirement.

Conclusions

Although farm carrying capacity in village group system consisting of pen, tree leaves, and water is not efficient yet but pen and tree leaves have meet sustainability while water availability has not supported sustainability. Therefore it is necessary policy to make efficient pen density by increasing population growth, make special tree leaves area and right management through regular fertilizing to increase tree leaves production, looking for tree leaves form public area such as river flood plain, forest, pasture land, planting legume tree leaves with high nutrient content and improving infrastructure through water reservoir.

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