Is The Reproductive Performance of Goats That are Kept Intensively Different from those Maintained by Small Farmer? A Review

S Suyadi¹, T E Susilorini¹, W A Septian¹, A Furqon¹, C D Nugroho¹ and R F Putri¹

¹Faculty of Animal Science, University of Brawijaya, Jl. Veteran, Malang 65145, Indonesia

suyadi@ub.ac.id

Abstract. Reproduction in most important factor determining the effectivity of the goat farming through the success of increasing number of animal in the herd or population. Reproduction performance is the phenotypic trait and those more influenced by management factor than by genetic factor. However, the Indonesian local goat was reported having high adaptability and tolerance to the tropical climate with high environmental daily temperature and humidity, low quality feed and some parasites. This paper reviews the reproduction performances of local goats under intensive management in the company and when those kept by small holder farmers. The data analysis showed that the reproductive parameters in intensively were higher than those of managed by small farmers (Service per Conception, litter size, pre-weaning mortality, and birth weight), the weaning weight were similar in both groups, while Days Open and Kidding Interval were significant lower in intensive farming than those maintained by small farmers as well as extensive farming. In conclusion, the reproduction performances that were controlled by good management system, good feeding and management will improve service per conception, litter size, birth weight, and reduced pre-weaning mortality, while on the other hands, the extensive farming increased the performances of days open and kidding interval time.

1. Introduction

Goat plays an important role for the farmer family in village areas in Indonesia. This role includes that raising goats is a side activity in addition to the main activities as an agricultural farmer, in order to increase additional income for farmers and as a capital savings. The interesting thing is the maintenance of goats has special function namely as capital savings, where farmers will sell their goats if they need a large amount of funding, such as to pay for their children's school fees and for other household needs [1].

Goat population in Indonesia increased of 513,000 heads or 2.81 per cent between 2017 (18,208,000 heads) and 2018 (18,721,000 heads). The goat population in East Java Province in 2018 was noted as 3,426,967 heads and as the second largest population after Central Java Province of 4,108,188 heads [1]. The most goat breed in East Java is Etawah Grade as known as Peranakan Etawah (PE) and Kacang Goat. The Kacang Goat is believed as the original goat in Indonesia, while the PE goat is resulted from
unstructured crossing between Kacang Goat and exotic goat introduced from Gujarat India during Dutch colonialization era [2].

As reported formally by the Indonesian Government, the goat population increased very slowly of 2.81 per cent. The most important factor affecting the population growth is the reproduction performance of the does that affected by management of rearing system. Generally, the rearing system of goat in East Java Province could be divided into two groups, the goat is maintained traditionally by the most farmer in the villages [3], and they are maintained more intensively by the company or Government Livestock Agency Services [4, 5]. Breed of goat and environment climate such as altitude, temperature and relative humidity of pens influence also reproduction performances and healthy as well as the immune system of goats [6]. This paper presents the reproduction performances of goat in East Java under different rearing system.

2. Characteristics of goat rearing system

Goat farms in East Java are spread throughout 34 existing district areas, ranging from rural areas to urban districts. There is not correct data reported in East Java about the number of farmers according to type of goat farming in East Java Province [7]. However, the goat farming system in East Java Province could be generally divided into three types (1) traditional farming by small holder farmer and this is the most number farming system; (2) semi intensive management goat farming by small to medium farming scale, begin to business purposes; and (3) intensive farming by Government Agency or private company with medium to large farming scale for economic and business purposes (Table 1).

| Characteristics                      | Traditional Farming | Semi Intensive Farming | Intensive Farming     |
|--------------------------------------|---------------------|------------------------|-----------------------|
| Farming size                         | Small holder        | Small to medium        | Medium to large       |
| Purpose                              | Subsistence         | Begin to business      | Economic and business |
| Housing or pen                       | Simple housing      | Permanent housing      | oriented              |
| Feed and feeding                     | Mostly free grazing | Mostly feeding in the  | Intensive feeding with |
|                                     | for feeding         | stall                  | forages               |
| Additional feed                      | Without any additional feed | Occasionally with additional feed | Calculated nutrition requirements |
| Reproduction and breeding management | No breeding and reproductive management | With simple breeding and reproduction management | Intensive breeding program and reproduction management, used the elite genetic |
| Data availability                    | No data about farming | Part of data may be available | Data of farming is available |
| Marketing of products                | No marketing program | Bring to market        | Programmed market     |

3. Age at first kidding

Age at first kidding (AFK) refers the age of young doe to deliver firstly a kid or offspring. This variable is important to indicate the fertility of dam and as indicator of quality management of farming. The shorter AFK could reduce the young period production cost and therefore increase the benefit of farming. The first age of kidding of PE goats kept in traditionally management by farmers was similar in three Regency areas (Lumajang, Malang dan Trenggalek Regencies) ranged 17.19 to 17.48 months old, although different age at first kidding (AFK) at high land (16.75 months) reached earlier than those
4. Days open (DO)
Days Open (DO) is one of the important indicators to express the reproduction performances in goat management. Day Open of mature does was influenced by environment condition, breed of goat and rearing system. To achieve optimum kidding interval of 8 month each, the DO value should be about 3 moths or 90 days. In PE goats reared in farmer condition in Lumajang, Malang and Trenggalek Regencies ranged 104.6 days to 120.1 days according to the altitudes, the higher altitude area tend to contribute better support in shortening the Days Open [4, 9]. Days Open in PE goat reared intensively in Singsosari Government Livestock Agency (SGLA), East Java showed significantly longer according to parities 136.5, 120.03 and 126.6 days for Parity 1, 2 and 3, respectively [5]. While for Kacang goats reared extensively in Fish Pond of Eastern area of Sidoarjo Regency showed significant shorter DO (72 days) than PE goat [10].

5. Service per conception and conception rate
Service per Conception (S/C) and Conception Rate (CR) are important indicators for assessing in reproduction efficiency improvement. Decreasing value of S/C means reducing breeding and insemination cost, and shortening kidding interval, while CR (Per cent of does that pregnant form first service) express the success rate of breeding and insemination process. CR indicates also the fertility of female, male and the management quality by the farmer. Limited data were found for S/C and CR in the goat farming under farmer condition. The PE goat under intensive management showed lower S/C value = 1.15 with CR = 86%, than those under farmer management S/C=1.76 [4, 5]. Conception Rate of does under farmer condition could not be calculated because there is no data the number of mating to result pregnant does.

6. Litter size and birth weight
Litter Size (LS) and Birth Weight (BW) are good indicator for predicting fecundity and maternality of dam during pregnancy period and delivering kid. Litter Size and Birth Weight are affected by breed of goats. PE goat and its cross with Boer goat reared intensively showed higher LS (1.8) than Kacang goat under extensive farming, that only with LS = 1.31 [11, 12]. The body weight of PE goat was not affected by farming system both for intensive farming (2.94 kg) and under farmer condition (2.88 kg) [9, 11]. The data of BW in Kacang goat are not found because the farmer have not weighed the kid during born [11].

7. Kidding interval and reproduction index
Kidding Interval (KI) is interval time between time of delivering kid to the next birth of dam. It is valuable indicator to express the productivity of does. While the Reproduction Index express more complex and real of dam productivity with consider the LS, kid mortality and KI [4]. With assumption of LS = 2.0, Kid Mortality = 5%, and Kidding Interval = 0.75 year, then the Reproduction Index of dam = 2.53. Kid mortality at extensive rearing of Kacang goat was significant higher that reached 20.7%, than PE goat under farmer condition that only 0.5 to 4%. With the Kidding Interval of Kacang goat of 7.41 months [11] and 8.3 to 9.4 months for PE goat under farmer condition [9], the Reproduction Index were 1.69 and 2.37, for Kacang and PE goat respectively. Although Kacang goat showed significant shorter Kidding Interval than those for PE goat, however, the Kid Mortality of Kacang goat was very high value than normal. This condition resulted the low value of Reproduction Index of dam than those for PE goat. This because during the daytime, all goats are released freely in the fishpond area, and this
is very dangerous for the safety of the goat kids. As a result, as many as 20 percent of goats enter the pond and cause deaths that are unknown to farmers.

8. Conclusion
Goat is a domestic animal that very adaptable to the different farming system from the extensive farming without any control in feeding and grazing, traditional housing and management by farmer until intensive farming system conducted by Government Agency and Company. Reproduction performance of dam was influenced by breed of goat, management system and environment or climate condition, although in general all the system are acceptable for maintain the normal reproductive process of dam. Super extensive of Kacang goat farming, that farmed on the fish pond embankment was sufficient for showing normal reproduction, although high accident risk of kid was occurred and cause of deaths. More control during free grazing is needed to avoid high kid mortality.

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