

Country Report 1

Dairy Goats in Indonesia: Potential, Opportunities and Challenges

Astuti, D.A. & A. Sudarman*

*Faculty of Animal Science, Bogor Agricultural University, Campus IPB Darmaga,
Jalan Raya Darmaga, Bogor, Indonesia*

**Email of corresponding author: dewiapriastuti@yahoo.com*

Potential

Indonesia has the world's second largest animal biodiversity. Farmers in Indonesia have been introduced to animal agriculture that includes dairy goats. In fact the population of goats in Indonesia has increased gradually at an average rate of 4.6% in the last ten years, from 12 million in 2000 to 16.8 million in 2010, involving 3.5 million households (BPS, 2010). The goats are spread throughout 33 provinces with the highest population of 3.5 million heads (20%) in Central Java followed by East Java with 2.7 million heads (16%) and West Java with 1.6 million heads (9.5%). Goats offers good business opportunities in Indonesia because they are very well-adapted to the tropical environment and require low investments. Farmers usually rear a few animals without intensive management, as a living bank for emergencies and expenses and as a source of fertiliser for crops. Also, they play an important role in the social life of the villagers. Goats are usually reared to produce meat and milk. In Indonesia there are many goat breeds for example the bali, boerawa, etawah, gembrong, jawa randu, kacang, kosta, marica, muara, samosir, kapra, etawah crossbreds and saanen. Among them only etawah, etawah crossbred (etawah × local kacang goat) and saanen goats are dairy goats. The breeding center of dairy goats in Indonesia is in Kaligesing-Purworejo, Central Java. From the centre, animals are distributed to areas, which have potential to improve their performance, like Yogyakarta, Bogor, Bandung and Pasuruan.

The nutrient composition of goat milk is 17 to 13% DM, 3.3 to 4.9% CP, 4 to 7% fat, 4.6% carbohydrate, 129 mg Ca, 106 mg P, 185 mg vitamin A and 0.3 mg niacin. Moeljanto, et al. (2002) reported some benefits of goat milk over cow milk including flouride concentration being 10 to 100 times higher in goat than cow milk, thus it can be used as natural antiseptic, alkaline and healthy food. The milk is safe to consume and could neutralise stomach pH, digestible smooth proteins, easy to digest small size of fat particle, high sodium, calcium and phosphorus minerals content, white color with no odor and protective properties against osteoporosis.

Milk production in Indonesia has increased in the last five years from 616,549 tonnes in 2006 to 927,838 tonnes in 2010, with an average increment of 9.25% per year, but most of the milk comes from dairy cattle. In a few regions, the dairy goat has contributed to the total milk supply, especially in big cities such as Jakarta and Surabaya fetching high prices of US\$ 2.5 to 3.0 per litre.

Opportunities

The population of Indonesia is on the increase and consequently the need for healthy food has also increased. In 2008, the consumption of meat was 7.75 kg/capita/year, an increase of 7.4% over the previous year. Egg consumption was 17.42 kg/capita/year while milk

consumption was 6.92 kg/capita/year. The infant milk powder and sweet canned liquid milk are the major contributors to the overall milk consumption. Thus the production of fresh milk could potentially increase to meet increasing demands for either processed or fresh milk. Milk consumption in 2009 (0.17 L/capita/d) increased compared with that of the previous year (0.13 L/capita/d), the demand cannot be met by local production. Thus to meet this requirement, the government had to import milk powder. To overcome the lack of local milk supply, goat milk can play a role as an alternative source. Deficit of fresh milk supply from the cow is equivalent to approximately 750,000 lactating goats, which means an estimated 75,000 small farmers or households can contribute to the dairy farming business. This certainly will provide opportunities for the dairy goat farmer. Goat milk however is still not as popular as cow milk, although it is consumed for health purposes even at a high cost of US\$ 5/L. The dairy goat industry in Indonesia needs to be supported by the business and research community.

Business

One good example of a dairy goat small business in Indonesia is at Unggul farm in Bogor District. In this farm, in 2007, the dairy goat population increased by 129% compared to other districts in Bogor. A case study of a smallholding dairy goats in Unggul farm in the Ciampea district, Bogor, which has 50 animals showed that it has good business indicators, with Net Present Value (NPV) of Rp 359,966,477 or US\$ 36,000, an Internal Rate Return (IRR) 127%, a Net Benefit Cost Ratio (Net B/C) of 5.77 and a Payback Period (PBP) of 2 years. Another farm in West Java is the Ciangsana farm specialising in breeding dairy goats. They breed the SAPERA goat, which is a crossbred of a male Saanen with a female Etawah.

At Turi District-Yogyakarta, a cooperative dairy goat farming named Suyadi Farm supervised by the Faculty of Animal Science, Gadjah Mada University, has been running an intensive dairy goat farm over the past ten years. In this farm, milk production from the lactating goats is 0.5–1.2 L/d at market price of US\$ 2.5 to 3.0/L. In this district, the goat population is around 250 heads with 38 households and the average milk production is 2.7 L/head/d.

Another district, Kemirikebo in Yogyakarta, has 623 goats involving 65 households. Urine and feces of the animals are used as fertilizer at market price of US\$ 1.5/L and US\$ 5/zak, respectively. The ‘wastes’ are sold to the Salak fruit plantation in the vicinity of the farm. This business has improved the income of the goat farmers. In case of overproduction, the excess milk is processed into caramel milk candy, ice cream, milk crackers, ‘dodol’ and yoghurt with a variety of flavors including strawberry, apple and coconut.

Rosyidi from the Pakem district of Yogyakarta is a progressive farmer who has a milking machine for his goats and a mini-factory for making yoghurt. Another farmer, Bondan from the Condongcatur district of Yogyakarta, has introduced a special way to sell the fresh milk by a door-price system (Kompas, 2011).

Research

Universities and research institutions of the Department of Agriculture have provided information and technology on good farming practices to improve production performance of dairy goats. Feed is the most important in production animals. One study determined the requirement and utilisation of traditional rations (native grass plus rice bran) in digestion, metabolism and dynamics of nutrients for lactating goats, as shown in Table 1 (Astuti et al., 2000). This study also developed equations to calculate the energy and protein requirements of the lactating etawah crossbred goats using multiple regression analysis of independent metabolic and performance parameter data as follows:

$$\text{ME (Mj/d.kg BW}^{0.75}) = 0.50 + 0.068 \text{ RE (Mj/d) or}$$

$$\text{ME (Mj/d) = 4.23 + 0.71 RE + 0.003 ADG + 0.006 RP + 0.002 MY}$$

$$\text{Protein (g/d.kg BW}^{0.75}) = 10.81 - 0.02 \text{ RP (g/d)}$$

$$\text{Protein (g/d) = 85.05 - 5.36 RE + 0.055 ADG - 0.16 RP + 0.068 MY}$$

Table 1. Digestion, metabolism and glucose kinetics of lactating Etawah crossbred goats

Nutritional parameters	ad lib	90% of ad lib	80% of ad lib	SEM
DM intake (g/d)	865 ^a	765 ^b	620 ^c	38
Protein intake (g/d)	158 ^a	152 ^{ab}	135 ^b	17
Energy intake (MJ/d)	16.0 ^a	14.0 ^b	11.4 ^c	0.70
DM digestibility (%)	70	69	65	7
Protein digestibility (%)	66	63	62	5
Energy digestibility (%)	69	67	68	5
ME intake (MJ/d)	7.8 ^a	6.6 ^{ab}	6.5 ^b	1
ME/DE (%)	83	82	84	3
HP (MJ/d)*	6.3	5.5	5.2	1
Retained Energy (MJ/d)	1.6	1.2	1.3	0.6
Retained Protein (g/d)	32 ^a	25 ^b	14 ^c	3
Glucose kinetics:				
Plasma glucose (mg/dl)	104	99	98	5
Pool glucose (g/head)*	3.3 ^a	2.2 ^b	1.9 ^c	0.4
Glucose flux (mg/min.head)*	29 ^a	24 ^b	15 ^c	3
TQ (%)*	14.7	13.6	14.7	2
GNG (mg/min.head)*	26 ^a	20 ^a	13 ^b	6

Values are means

^{a,b,c}Means in the same row with different superscripts are significantly different ($P < 0.01$); * isotope technique. SEM = Standard error of mean.

Tempe (fermented peanuts) is one of the popular Indonesian foods. Tempe waste, which is produced as a by-product of the home industry, has potential to be used in dairy goat rations. Solid waste still has a good quality with 16% crude protein and liquid waste is available as a drink. Processing technology has introduced ways to improve the quality of tempe waste by using *Aspergillus niger* to ferment the waste to be used in dairy goat rations. A study on the use of tempe waste (Table 2) was conducted in the field on dairy goats at Yogyakarta under the supervision of the IPB-Gadjah Mada University collaboration project (Astuti et al., 2003). Nutrient uptake by the mammary gland was determined, based on the mammary artero-venous difference (Sastradipradja et al., 1996).

Table 2. Milk yield and nutrient uptake in the mammary gland of Etawah Crossbred goats fed with tempe waste.

Parameters	Control	Tempe waste	
		Fresh	Fermented
Milk yield (mL/d)	1070 ^b	700 ^c	1545 ^a
Total milk protein (g/d)	51.45 ^b	29.90 ^c	74.90 ^a
Total milk fat (g/d)	42.90 ^b	29.00 ^c	63.30 ^a
Total milk lactose (g/d)	37.50 ^b	27.30 ^c	57.76 ^a
Nutrient uptake:			
Glucose	51 ^b	35 ^c	72 ^a
Triglycerides	45 ^b	30 ^c	54 ^a
Total protein	45 ^b	38 ^c	60 ^a
Acetic acids	30 ^b	2 ^c	45 ^a

Values are means

^{a,b,c}Means in the same row with different superscripts are significantly different ($P < 0.01$); Control = ration with 50% grass: 50% concentrate; Fresh tempe waste = ration with 50% grass: 25% concentrate: 25% fresh tempe waste; Fermented tempe waste = ration with 50% grass: 25% concentrate: 25% fermented tempe waste.

Challenges

Government Support

The number of dairy goats in Indonesia is still small compared to total animal agriculture. Information on the population, milk production and on dairy goat business centres is still scarce and not common knowledge. However, the industry can blossom if both the government and private sectors provide support and focus on increasing dairy goat production. Presently Indonesia is still improving strategies to promote dairy goat industry by increasing goat population (breeding), counseling and applying high technology production.

Breeding centre

The biggest breeding centre of etawah goats in Indonesia is in the Kaligesing district, Central Java, which is supported by the government. Presently, the activities and breeding programmes in the centre have decreased due to changes in the government roles, increase in capital requirement, lack of market priority (export), high rate of sterile doe slaughter and limited post-harvest technology and facilities, among others.

Drinking fresh milk goat culture

The low milk consumption in Indonesia is not only caused by low milk production and the high price of the product, but also by culture and preference. Very few Indonesians like and can afford goat milk. Although the government had attempted to promote drinking of goat milk through programs such “Milk Day”, it has not been sustainable.

References

Astuti, D.A., E.B. Laconi and D. Sastradipradja, 2003. Studies on milk production of Etawah crossbreed goat fed with tempe waste. XIXth EAAP Conference, Rostock, Germany.

Astuti, D.A, D. Sastradipradja and T. Sutardi, 2000. Nutrient Balance and Glucose Metabolism of female growing, late pregnant and lactating Etawah crossbreed goats. *Asian-Australasian J. Anim. Sci.* 13 (8): 1068–1075.

BPS, 2010 (Livestock Statistics 2010). Department of Agriculture RI. CV. Ella Citra Utama, Jakarta.

Moeljanto, R. Damayanti and Wiryanta, 2002. The potency of goat milk. Agromedia Pustaka Depok Indonesia. <http://www.susukambing.net>. (Accessed on October, 15).

Kompas, 2011. *Etawah goats increase the farmer income and solved environment*. Eds. Tim Website Kompas News, 10: 51: 19 WIB, July 6, 2011.

Sastradipradja, D. and D.A. Astuti, 1996. Milk productive potential of Etawah crossbreed goats based on mammary artero-venous difference of nutrient contents and milk composition. VIIIth AAAP Congress, Tokyo, Japan, October 1996.