

## **A field investigation of forage composition, distribution and supply pattern in cattle farm of East Java and West Java**

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**Abstract.** Forage plays an important role to the development of ruminant farming as it sources of main feed. This research survey was conducted to investigate the current agricultural practice of feed production system in small, medium and big scale of farmers' community or enterprise and forage value chain. This research survey was carried out in 3 months from August – October 2018. Survey location were conducted in two provinces. The location was carried out in West Java and East Java as following: 1) West Java Province: Dairy farm in Pangalengan, Lembang – Bandung Regency and Cibungbulang-Bogor Regency; Cattle in Jonggol - Bogor Regency; 2) East Java Province: Dairy farm in Malang Regency; Cattle in Tuban Regency. The selected locations for the survey are based on the high density of population of dairy and beef cattle. Descriptive statistics are used to describe the basic features of the data in this study. Farmers generally provide sufficient quantities of feed for ruminants in accordance with the needs of the livestock. The type of forage depends on the type of livestock and the availability of forage around the farm location. In large scale farms, farmers will buy forage during a large number of planting seasons and then processed and stored it in the form of silage. While for small scale farmers, forage purchases are made based on daily needs. These research concluded that forage type and distribution depend on forage availability on farm and supplier level.

### **1. Introduction**

Forage plays an important role to the development of ruminant farming as it sources of main feed. Livestock production is influenced by both the nutritive value and forage intake [1]. In 2009-2013, ruminants and non-ruminants marked the largest increase of population grew by 5.9% and 4.4% a year [2]. In that period, the consumption of cattle marked the largest increase by 15.8%, this consumption is still projected increase in line with the positive growth of economic trend.

Growing demand of livestock's products shall be followed by increasing supply of animal and feed itself from domestic source to reduce dependence on imports. Therefore, Indonesia through The Ministry of Agriculture in 2014 sets target that Indonesia shall be self-sufficient for beef in 2026. To meet the challenge, effective and efficient production starting from forage production to milk and meat production should be taken in place by farmers.

Knowledge of forage composition is essential for informing animal management [3]. Composition is relatively easy to measure in broad vegetation classes by field measurement is complicated and rare because of high variability of vegetation[4]. Forage distribution is well documented in some area and consumption by domestic livestock is easily estimated from known stocking rates [5-6]. However, there were some ways of growing forages in Indonesia that resulted varied quality and yield production [7].

This research survey was conducted to investigate the current agricultural practice of feed production system in small, medium and big scale of farmers' community or enterprise and forage value chain.

## 2. Material and methods

### 2.1. Time and location

This research survey was carried out in 3 months from August – October 2018. Survey location were conducted in two provinces. The location was carried out in West Java and East Java as following: 1) West Java Province: Dairy farm in Pangalengan, Lembang – Bandung Regency and Cibungbulang-Bogor Regency; Cattle in Jonggol - Bogor Regency; 2) East Java Province: Dairy farm in Malang Regency; Cattle in Tuban Regency. The selected locations for the survey are based on the high density of population of dairy and beef cattle.

### 2.2. Methods

**2.2.1. Data collection.** Data and information were collected from primary data through interview by using questioner. Purposive sampling was conducted to collect representative respondents of each area. The number of respondents in survey location was 48 farmers that represented small, medium and big scale farmers, forage trader and community cooperations.

**2.2.2. Statistic.** Descriptive statistics are used to describe the basic features of the data in this study. The analysis provided simple summaries about the sample and the measures with simple graphics analysis.

## 3. Results and discussion

### 3.1. Forage production system

Farmers generally provide sufficient quantities of feed for ruminants in accordance with the needs of the livestock. Table 1 shows the type of forage used by dairy and beef cattle farmer.

**Table 1.** Type of forage used by dairy and beef cattle farmer

Forage	Farmer (%)	
	Cattle Farmer	Dairy Farmer
Native grass	32.56	3.57
Elephant grass	9.30	42.86
King grass	-	1.79
Odot grass	2.33	14.29
Rice straw	41.86	14.29
Corn waste	2.33	-
Corn leaf	-	19.64
Crop waste	4.65	-
Peanut straw	6.98	-
Silage	-	1.79
Kaliandra (legume)	-	1.79

The type of forage depends on the type of livestock and the availability of forage around the farm location. Many beef cattle get low quality forages such as native grass and rice straw. Whereas dairy cattle get higher quality forages such as elephant grass, odot grass, and corn leaves. These forages come from their own farm and buying from farmers and forage traders. The purchasing system is carried out individually or collectively through farmer groups that mainly related to forage transportation.

### 3.2. Forage types

The types of forages provided depend on the type of livestock and the location of the farm environment. The survey results show that there are around 11 types of forages used as animal feed (Table 1). Table 1 show differences in the types of forage given between dairy cattle and beef cattle. Generally dairy farmers get forages planted by farmers or bought from forage traders, such as relatively high-quality forages such as elephant grass (*Pennisetum purpureum*), corn leaves (*Zea mays*) and odot grass (*Pennisetum purpureum* var. Mott). Low quality forage such as corn straw is only given during dry season or when the availability of high-quality forage is low. Some dairy farmers use legumes (*Calliandra calothyrsus*) and self-processed silage. This is different from beef cattle farms, where the main forage given is rice straw and native grass. Rice straw is the main forage as the main by-product of rice farming, whereas native grass can be taken from around the farms. Rice straw nutritional value is varied widely depend on cultivation season and fertilizer application [8] or forage processing [9]. The low nutritional value and bulky volume of forages in beef cattle farms affected on dependable nutrient sources from concentrates.

### 3.3. Forage production system

The forage provision system for beef cattle and dairy cows in the surveyed areas is cut and carry system. Forages are obtained either through purchasing, taking it from around the farm, or from their own grass field. Forage planting is generally carried out by dairy farmers, in West Java there are 40% while in East Java it reaches 50% (Table 2). Forage lands in East Java are larger than in West Java. Some farmers plant forage on their own land, rented land, or cooperating with the private sector and the government (PT Perhutani). Cooperatives in East Java collaborate with Perum Perhutani so that the planting area can reach 15 Ha.

**Table 2.** Forage plant in dairy cattle farming

Area	Farmer	
	West Java	East Java
Percentage of Forage Supply	40%	50%
Forage Land Area	0.15 - 2.0 Ha	0.75 - 15 Ha
Land Ownership	Private	Private, Rent, Collaborate with Perhutani

### 3.4. Forage supply

Forage products are generally available on farms during the harvest season. Dairy farmers generally buy from land worker while beef cattle farmers can get it from their own farms or from other farmers. The system for providing forage by product is generally done individually or in groups without structure. Farmers can buy directly individually from agricultural areas. Whereas group procurement is usually carried out for forage purchases from other areas far from the farm. For the transportation, farmers will rent vehicles and pay for the fuel costs. Forage products and food crops by products are purchased by forage agents from areas with a surplus of forage production or food production centers. Forage products usually have economic value for farmers (Table 3). Forage agents get economic value from the process fee of transportation from the production location to the location. Forage products

usually do not provide economic value to farmers directly but more on labor costs for transportation to vehicles or forage delivery by pickup car transportation.

**Table 3.** Percentages of forage supply and price in dairy and meat cattle

Forage	Dairy farmer		Meat farmer		Price (IDR/kg)
	Supplier	Farmer	Supplier	Farmer	
Corn leaves	16.7	75.0	-	-	150-600
Rice straw	14.3	85.1	41.5	4.87	200-400
Elephant grass	4.17	-	9.75	-	200-500
Odor grass	-	25.0	2.43	-	250-400
Crop waste	-	-	12.9	2.43	100-200

Forages are supplied by farmers and forage agents who work together with cooperatives or farmer groups. In large scale farms, farmers will buy forage during a large number of planting seasons and then processed and stored it in the form of silage. While for small scale farmers, forage purchases are made based on daily needs. Forage by products are generally available on farms during the harvest season. Dairy farmers generally buy it from farmers while beef cattle farmers can obtain from their own farms or from other farmers. The system for providing forage by product is generally done individually or in groups without structure. Farmers can buy directly individually from agricultural areas. Whereas group procurement is usually carried out for forage purchases from other areas far from the farm. Farmers will rent a vehicle and paying fuel costs for transporting the forage by product. In East Java, forage traders buy it from crop farmers, bring it to forage markets or forage shops and then farmers can buy it directly. In West Java, the number of forage traders is relatively smaller and sales are mostly made directly between forage producers and farmers. Forage sources originate from the central agricultural areas (Table 5) around the farm area.

**Table 5.** Location and Distance of Forage Source in West- and East-Java.

Forage	Sources			
	West Java	Range (km)	East Java	Range (km)
Corn leaves	Soreang	35	Jombang	20
	Ciawi	25	Pare	40
	Banjaran	10		
	Cimaung	25		
Rice straw	Soreang	35	Sragen	165
	Cimaung	25	Kediri	132
			Lamongan	51
			Bojonegoro	71
Elephant grass	Soreang	35	Batu	30
Crop waste			Ngimbang	52
			Mojokerto	97

### 3.5. Problem of providing forage in dry season

In long dry season conditions, farmer usually provide forage from agricultural production waste. Based on the result of survey, dry season in West and East Java in different, depend on location. In dry season, farmers will have a hard time to provide feed for their cattle, especially forages. Rice straw availability at the harvest season makes farmers in Jonggol or Tuban use it as a feed. Using rice straw as a feed is common in Indonesia when dry season without processing it first affected on low forage quality [10].

#### 4. Conclusion

Forage type and distribution depend on forage availability on farm and supplier level. Planting areas for forage in farmer centers is still relatively small thus the fulfillment is done by purchased the forages from outside farm area that make the farmers need to pay for transportation costs.

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