

## **Database of Nutrition Status, Production and Reproduction Performance, and Social Economy of a Farmer of a Beef Cattle Farm in Sumberpucung District, Malang Regency**

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**ABSTRACT:** Sumberpucung District, Malang Regency has the potential for developing beef cattle. This study aimed to analyze the nutrition status, production, and reproduction performance of beef cattle as well as examine the socio-economic of farmers. The research method is a survey to obtain a database about beef cattle kept by a farmer. This study involved 50 respondents spread over 4 villages, namely Senggreng, Jatiguwi, Trenyang, and Sambigede. The results of the research showed that the average age of farmers was only 14% who were under 40 years old. The number of cattle ownership was an average of 2-3 heads with the largest breed of cattle being Simmental crossbreeds. The system of breeding and rearing was wholly AI and in the cage. Feed that was usually given in general was rice straw followed by corn straw, sugarcane top, elephant grass, field grass, and rice bran. The average feed intake of rice straw, corn straw, and elephant grass were 17.865 – 22.9 kg/head/day, 10.23 – 20.5 kg/head/day, and 17-31.3 kg/head/day respectively. The chest girth of the male adult group had the highest value of 162.5 cm and the female adult group of 165.7 cm. The highest estimated live weights for male and female adults in Jatiguwi village were 340.40 kg and 352.31 kg respectively. The highest and the lowest average gestation length were 235 days and 224 days respectively. The highest and the lowest average of S/C were 5.5 times and once. The average calving interval of a cow in Senggreng, Trenyang, Sambigede, and Jatiguwi villages were 440 days, 399 days, 420 days, and 403 days respectively. The number of cattle that were pregnant in the first AI, second AI, and more than the second AI were 27 heads, 32 heads, and 24 heads. Based on the type of feed and its intake, it can be said that the nutrition status of beef cattle in Sumberpucung District is highly good. Effects of nutrition status can be seen from the performance of production and reproduction of cattle in terms of chest girth, live weight, and calving interval.

**Keywords:** Database of beef cattle; Nutritional status; Production; Reproduction; Socioeconomics.

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## **INTRODUCTION**

The development of the livestock sub-sector is part of the food security development system. One of the livestock that has great potential to be developed is beef cattle, this is indicated by the potential for an increase in consumption of fresh meat along with population growth.

The population and productivity of beef cattle are strongly influenced by various factors such as feed, breeds, and maintenance management. The factors that influence the development of beef cattle by 92.3% are influenced by land area, availability of forage, labor, and capital. Generally, beef cattle that are kept in Indonesia are carried out by small-scale farmers and are not yet oriented to production or business. Besides that, the rearing management, health, and marriage management that are still not good will have an impact on low productivity and livestock reproduction and high livestock mortality.

The continuity of the availability of meat supply is generally related to the population and production of beef cattle in an area. Sumberpucung District, Malang Regency has the potential for developing beef cattle, this can be seen from the beef cattle population in 2020, which is 249 heads with a density of 0.06ST/ha. From these data, it is shown that in Sumberpucung District, the people like to raise beef cattle. One of the evidence that Sumberpucung District has the potential as a center for beef cattle, can be seen from one of the villages, namely Senggreng village which is a village under the Red Meat Producers Research Group, Faculty of Animal Science, Universitas Brawijaya. From the temporary data obtained, productivity, reproducibility, and business efficiency have not been so good, effective, and efficient.

Based on this, it is necessary to conduct comprehensive research to find out the database on the potential of beef

cattle in terms of nutritional status, production performance, reproductive performance, and socio-economic status of the farmers. By knowing the current basic data, if there are problems related to the development of the beef cattle business, it will be easier to formulate and the solutions offered are more accurate and are expected to improve and maintain the quality of the beef cattle that are kept.

The objectives of this research are (a). to assess the nutritional status of livestock which includes the availability and type of feed, and the quality of the feed given to livestock (b). to examine the performance of livestock production which includes body size, body weight, and body weight gain of livestock (c). to assess reproductive performance which includes estrus period, S/C, days open, calving interval, etc. in livestock and (d). to examine other problems at the farmer level from the socio-economic side

## **MATERIALS AND METHODS**

This research was conducted on a beef cattle farm in Sumberpucung District, Malang Regency. The location selection was done by the purposive sampling method. The respondent's criteria are they must have more than 3 years of livestock experience and have at least two beef cattle. The determination of the research location is based on the consideration that Sumberpucung District is one of the districts with the largest population of beef cattle in Malang Regency. The research method used is a survey method, in which primary data was taken from respondents using a questionnaire, and secondary data was taken from the relevant agencies.

The research variables taken include: (a). The nutrition status of cattle includes the type of feed given, feed consumption, and body weight (b). Cattle production performance includes the breed of cattle, and body measurements such as height, body length, and chest girth (c). Reproductive performance

includes S/C, days open, conception rate, and calving interval (d). The socioeconomic status of the farmers includes age, education, and the main occupation of the farmers.

The data obtained from the respondents were then tabulated. The data analysis used in this research is descriptive. The results of the analysis are presented in the form of numbers which are then explained in a description.

## **RESULT AND DISCUSSION**

Sumberpucung is one of the 33 districts in Malang Regency. Sumberpucung District consists of 7 sub-districts/villages including; Karangates, Sumberpucung, Jatiguwi, Sambigede, Senggeng, Trenyang, and Ngebruk. Sumberpucung District has located between 112.2751 to 112.3154 East Latitude and 8.1021 to 8.0944 South Latitude. The total area of Sumberpucung District is around 35.90 km<sup>2</sup> or about 1.21% of the total area of Malang Regency (BPS Malang Regency, 2019).

### **Profile of farmer and cattle**

This study involved 50 farmer respondents spread over 4 villages in Sumberpucung District, namely Senggeng, Jatiguwi, Trenyang, and Sambigede. The distribution of number of respondents consists of 36% in Senggeng and 36% in Jatiguwi, 22% in Trenyang, and 6% in Sambigede.

This study involved 50 farmer respondents spread over 4 villages in Sumberpucung District, namely Senggeng, Jatiguwi, Trenyang, and Sambigede. The distribution number of respondents consists of 36% in Senggeng 36% in Jatiguwi, 22% in Trenyang, and 6% in Sambigede.

Farmer education of respondents surveyed showed that 34% of elementary school, 30% of junior high schools 18% of high school, and 18% did not graduate from elementary school.

Based on the formal education level of the respondents, most of them

graduated from elementary school or did not even finish elementary school, indicating that the respondent's education level is still relatively low. The level of education has the smallest effective contribution compared to other changes, but it cannot be ignored because formal education has a very effective role in the formation and development of personality, talents, attitudes, mental, knowledge, and intelligence including creativity and analytical power (Sumarno, 2010). Even though they are classified as having low education, they are quite advanced and innovative, which is probably because they received non-formal education such as training provided by animal husbandry offices, universities, and industry.

Most of the respondents' main occupations are farmers, which reach 36%, followed by farmers at 32%, 2% are employees and 30% of respondents have other jobs as their main livelihood. Based on BPS Malang Regency data, agriculture is the second highest main occupation after service jobs in Malang Regency (Malang, 2020).

The population of cattle in 4 villages were Srenggeng village 139 heads, Trenyang village 102 heads, Sambigede village 111 heads, and Jatiguwi village 106 heads. The number of cattle ownership per farmer ranges from 2-3 head. This number of ownership indicates that the beef cattle farming business owned is small in scale, such as those found in beef cattle farms in various regions in Indonesia. The number of livestock owners is one of the factors that determine the income and progress of the beef cattle business (Indrayani & Andri, 2018).

Based on the type of livestock, the highest number of cattle was adult females reaching 83 heads, followed by 17 female calves, 11 adult bulls, and 9 male calf cattle. Based on this, it can be said that the orientation of the farmers is beef cattle breeding (80%) and the

fattening orientation is only 20%. Most of the beef cattle kept in Sumberpucung District are Simental cattle (62%) followed by limousine cattle and others such as PO and Brahman cattle (38%). The marriage system carried out by farmers in Sumberpucung District is 100% IB. The maintenance system carried out by farmers in Sumberpucung District is 100% caged.

**Feeds**

Feed is the most important aspect of the maintenance and business of livestock. The feed that is usually given to beef cattle in the Sumberpucung District is generally rice straw followed by corn straw, sugarcane shoots, elephant

grass, and field grass, while the concentrate feed ingredients that are usually given are rice bran and commercial concentrate. Forage is the main feed for ruminants, so the supply of forage and its quality will determine livestock productivity. Concentrate feeding by farmers in Sumberpucung District in general is still rarely done. Farmers in Jatiguwi Village use rice bran as additional feed, while in Senggreng Village are given rice bran and commercial concentrate. The results of the analysis of various forage feed ingredients and concentrates can be seen in Table 1

**Table 1.** Nutrient content of feed commonly given to beef cattle in the Sumberpucung District

Jenis Bahan	DM (%)	OM* (%)	CP* (%)	CF* (%)	CF* (%)	TDN* (%)
Rice straw	90.43	83.42	3.63	1.23	27.65	40.43
Corn straw	89.47	86.76	5.58	1.13	27.75	31.53
Sugarcane top	87.65	86.85	5.23	2.40	17.30	53.45
Elephant Grass	17.49	90.21	8.86	1.84	32.43	66.98
Native grass	15.47	87.69	7.93	2.39	26.89	51.03
Rice bran	89.56	85.62	9.56	5.45	13.78	69.43

It can be seen in Table 1 that the forage content of agricultural waste such as rice straw, corn straw, and sugarcane shoots has a CP content below 6% and a TDN below 5% which is reasonable because agricultural waste is a fairly old plant. Meanwhile, other forages such as elephant grass and field grass contain sufficient CP and TDN. Meanwhile, concentrate materials such as rice bran contain higher CP and TDN than forages. This research was carried out during the dry season so that the type of forage that was mostly given as agricultural waste.

The four villages used as research

locations as a whole have the potential for local feed ingredients in the form of rice straw. However, Soejono and Widyanoro (1987) stated that rice straw given ad libitum could not meet the nutrient needs of livestock because it had a digestibility of 35-37% with a crude protein content of 3-4%. The types of forage that are usually given to livestock are generally not mixed, but only one type except under certain conditions. The following is the amount of forage given to livestock per head per day (Table 2).

**Table 2.** Feeding that is usually given to beef cattle in Sumberpucung District

Forages	Age	Village				Average
		Senggreng	Trenyang	Sambigede	Jatiguwi	
Rice straw	Adult	20865	23915	-	26.3	23.61
	Calf	9.4	7795	15.25	13.5	10.37
Corn straw	Adult	10,83	-	-	20.5	15.34
	Calf	-	-	-	10.34	10.34
Elephant grass	Adult	38	28.1	-	18	28.45
	Calf	8.67	-	-	12.45	10
Native grass	Adult	23564	26075	-	23.6	24.41

In general, the amount of feed given to adult animals in the form of agricultural waste such as rice straw was 23.61 kg/head/day while the corn straw was 15.34 kg/head/day. The feeding of fresh forage such as elephant grass and native grass was given at 28.45 kg/head/day and 24.41 kg/head/day, respectively. Santosa (2005) states that, in principle, forage given to ruminants is around 10% of the body weight, which is between 30-40 kg/head/day 2-3 times a day.

Feeding the calf in the form of agricultural waste such as rice straw is 13.35 kg/head/day while corn straw is 10.34 kg/head/day.

Feeding of fresh forage such as elephant grass and field grass was given at 10.34 kg/head/day and 11.79 kg/head/day, respectively.

Feed consumption is a very important aspect to evaluate the nutritional value of feed ingredients.

**Table 3.** Feed consumption in adult cattle

Village	Feeding of forages (kg/head/day)				
	Rice straw	Corn straw	Sugarcane top	Elephant grass	Others
Senggreng	17.865	10.23	-	31.3	22.564
Trenyang	22.055	-	-	24.9	24.025
Sambigede	-	-	-	-	-
Jatiguwi	22.9	20.5	-	17	21.4
Average	20.34	15.1		23.67	22.47

**Production**

Based on the survey results, it is known that there is a diversity of chest circumference, body weight, height, and body length of beef cattle in Sumberpucung District (Table 4).

**Table 4.** Average chest circumference, body weight, height, and body length and beef cattle in Sumberpucung District

Age	Senggren	Ternyang	Sambigede	Jatiguwi
	Chest circumference			
Male adult	142.5	160	150	162.5
Male calf	144	91.75	90	82
Female adult	164.7	159	163	165.7
Female calf	131.5	100	78	78.25
	Body weight			
Male adult	270.60	331.24	295.84	340.40
Male calf	275.56	129.39	125.44	105.16
Female adult	348.57	327.61	342.25	352.31
Female calf	235.62	148.84	100.00	100.50
	Body Height			
Male adult	129	110	124	109
Male calf	132.15	102	130.8	102.5
Female adult	123	120	122	89
Female calf	130	97	142	90.5
	Body Length			
Male adult	127.5	109	127	123
Male calf	135	96.25	137.05	101.5
Female adult	156	110	128	99
Female calf	150	97	149.7	86.5

In the adult male group, the chest circumference with the highest value was in Jatiguwi Village of 162.5 cm. In the adult female group, the highest value was in Jatiguwi Village, which was 165.7 cm. The variation in the average chest circumference in cattle is caused by differences in the ability of cattle to change the nutrients they consume, which is influenced by differences in cattle rearing management. Beef cattle in the Sumberpucung area are kept in cages throughout the day, and feed and drinking water are provided by the farmers on an *ad libitum* basis. This maintenance management causes animals to be more effective in converting the feed ingredients they consume into nutrients needed for bone growth, one of which is the bones that make up the animal's chest

circumference (Iqbal, et al., 2019).

The average body weight (estimated by the formula of chest circumference) was highest in adult male and female adult cattle in Jatiguwi village, namely 340.40 kg and 352.31 kg, respectively. Meanwhile, Senggren Village has the highest average body weight of male and female calves, namely 275.56 kg and 235.62 kg, respectively.

Based on the results of the table above, it is known that adult male cattle in Ternyang Village have the highest average height of 132.15 cm, while male adult cattle in Sambigede Village have the lowest average height of 123 cm. Syaiful, Khasrad, and Maulida (2020) stated that adult bulls have a height of 127 cm. The size of the body height in various livestock can be



influenced by many factors, including feed, genetics, maintenance management, and mating patterns, namely inbreeding (Heryani, Susari, and Gunawan).

Based on the data obtained from the research, it is known that the average height of adult female cows in Senggreng Village is 124 cm, Ternyang Village is 130.8 cm, Sambigede Village is 122 cm and Jatiguwi Village is 142 cm. The average value of height in female adults is higher than that of male adults.

Based on the results of the survey presented in Table 4, the average body length of an adult male was the highest, namely those in Sambigede Village.

The average body length of beef cattle is still within the range reported by Hartati,

et al. (2009) in female PO cattle in Sumbergeneng District, Tuban regency ( $124.3 \pm 7.1$  cm), Brondong District, Lamongan Regency ( $134.3 \pm 7.6$  cm), and in Jiken District, Blora Regency ( $125, 7 \pm 5.6$  cm). The average body length of adult female beef cattle in Senggreng Village is lower than in other villages. Differences in maintenance management, especially feed, are the cause of differences in the body length of cattle.

**Reproduction**

The average reproductive performance of beef cattle in Sumberpucung district can be seen in Table 5.

**Table 5.** Average Reproductive Performance of Beef Cattle in Sumberpucung district.

Desa	Length gestation (day)	Service period (day)	Calving Interval (day)	S/C (%)
Senggreng	232	150	440	5,5
Trenyang	224	146	399	2,25
Sambigede	230	154	420	1
Jatiguwi	235	138	403	1,9

Based on table 5, Jatiguwi village has the highest average gestation period, which is 235 days, while livestock in Ternyang village has the lowest gestation period, which is only 224 days. Cows in Senggreng village had the highest mean S/C of 5.5 times, in Ternyang village 2.2 times, in Jatiguwi village 1.9 times, and the lowest in Sambigede village of 1 time. S/C is the number of inseminations carried out until the animal is pregnant. The S/C figure is ideal if it is in the range of 1.6-2. The lower the number obtained indicates that the more efficient the reproductive activity of the cow and the lower the costs incurred in the management process (Setiawan, 2018).

Based on the data obtained from the interviews, it is known that the average value of the calving interval in Senggreng Village is 440 days, Ternyang Village 399

days, Sambigede Village 420 days, and Jatiguwi Village 403 days.

The longest Calving interval among the four villages is Senggreng Village with an average of 440 days. The calf weaning age affects the calving interval. Mothers who are lactating will secrete the hormone prolactin at high levels. High levels of the hormone prolactin will provide negative feedback to the hypothalamus and pituitary gland resulting in a decrease in levels of gonadotropin hormones which function to stimulate estrus and ovulation (Suharyati and Madi, 2015). According to Al-Amin. et al, (2017) Calving interval (CI) in cattle farms in several districts/cities of Lampung Province, among others, is influenced by the length of days open, length of dry time, and length of lactation. Incorrect estrus detection time causes a

longer empty time and pregnancy failure, resulting in a longer calving interval. Based on data obtained from interviews with 50 farmers, a total of 83 acceptors, it is known that the number of cattle that were pregnant in the first AI was 27 heads, 32 heads in the second AI, and 24 heads pregnant in AI more than 2 times. The percentage of conception rate was 32.5%. This value is still relatively low when compared to the research results of Setiawati, et al. (2018) which showed that the CR value of beef cattle in smallholder farming areas was 65%. Kaufmann, Drillich, Tenhagen, Fonderung, and Heuwieser (2009) stated that reproductive efficiency in terms of pregnancy success is said to be good if the CR value reaches 65-75%. Evaluation of pregnancy success based on CR can be used as an indicator to measure the fertility level of livestock. The timeliness of AI implementation is one of the factors that determine the success of livestock pregnancy. In addition, the management of feeding livestock is one of the factors that influence the success of pregnancy. It is known that in smallholder farms, the nutritional content of animal feed still does not meet the nutrient needs. This is related to the secretion of reproductive hormones. Pratami, et al. (2015) added that nutritional deficiencies in adult cattle for a long period can cause a decrease in ovarian activity so that an irregular estrus cycle is accompanied by anestrus.

## **CONCLUSIONS**

### **Conclusion**

The type of feed that is usually given to beef cattle includes rice straw, corn straw, sugarcane top, elephant grass, native grass, and rice bran. The average forage consumption is 10.865 – 19.9 kg/head/day. Based on the type of feed given and its consumption, the nutritional status of cattle is still quite good. Effects of the nutritional status of animals can be seen from the performance of production and reproduction. Based on the estimation of chest circumference, the highest average body weight in adult male and female

cattle was in Jatiguwi village, namely 340.40 kg and 352.31 kg, respectively. Meanwhile, in Senggeng Village, the highest average male and female calf body weights were 275.56 kg and 235.62 kg, respectively. Based on the calving interval, Senggeng Village is 440 days, Ternyang Village 399 days, Sambigede Village 420 days, and Jatiguwi Village 403 days. From the number of calving intervals, it can be said that the reproductive performance is quite good even though the standard should be around 365 to 420 days.

### **Suggestion**

Further research is needed, especially research that focuses on the on-farm feeding trial method so that the nutritional status and reproductive and reproductive performance of livestock are truly measurable.

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