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Characteristics of Beef Cattle Breeders in the Artificial Insemination Technology Service Program in Pohuwato Regency

Yusri T. Datau[1], Mahludin Baruwadi[2], Muhammad Sayuti, La Ode Sahara[2]

[1]Undergraduate Student, Department of Animal Science, Gorontalo State University, Indonesia.

[2]Lecturer, Department of Animal Science, Gorontalo State University, Indonesia.

Corresponding author: muhammad.sayuti@ung.ac.id

Abstract

This study aims to analyze the characteristics of livestock breeders in the Artificial Insemination Technology Service Program in Pohuwato Regency. This study used a survey method with primary data collection through interviews and questionnaires with livestock respondents. Secondary data were obtained from relevant agencies. Data analysis used descriptive statistical analysis. The results showed that 56.7% of livestock farmers receiving Artificial Insemination Program services in Pohuwato Regency were in the productive age range of 41-60 years. Most, or 64.45% of livestock farmers only had an elementary school education or equivalent and had more than 10 years of livestock farming experience. Farmers owned between 1-3 beef cattle (46.67%). The scale of livestock ownership was relatively small and only a side business so it was included in the category of smallholder livestock. Farmers who had received and adopted artificial insemination technology for more than 9 years were 51.11%. The majority of farmers were considered to have had sufficient adoption experience so that supporting the success of artificial insemination services depended not only on semen quality and inseminator skills, but also on the farmer's experience in reproductive management.

Keywords: Breeders, Beef Cattle, Artificial Insemination

INTRODUCTION

Beef cattle development plays a strategic role in supporting food security and increasing the income of smallholder farmers. However, the rate of beef cattle population growth at the regional level remains relatively slow compared to the growing demand for meat. One of the main causes of this condition is low livestock reproductive efficiency due to the continued

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dominance of a poorly controlled natural mating system and limited access to superior bulls. This condition results in low livestock productivity and long calving intervals.

Artificial insemination is a reproductive technology designed to improve reproductive efficiency and the genetic quality of beef cattle. Technically, the success of artificial insemination is generally measured through reproductive performance indicators such as Service per Conception (S/C) and Conception Rate (CR). Under optimal conditions, the S/C value for beef cattle ranges from 1.3 to 1.6, while the CR is in the range of 60 to 75% (Herdiansah et al., 2024). Achieving these indicators indicates that artificial insemination has the potential to increase the chance of pregnancy and accelerate beef cattle population growth when supported by good and adequate husbandry management.

Pohuwato Regency is one of the regions in Gorontalo Province that has the potential for developing beef cattle based on smallholder farmers. In 2025, the beef cattle population in Pohuwato Regency was recorded at 15,328 (Central Statistics Agency of Pohuwato Regency, 2025). Artificial insemination programs have been implemented sustainably as a primary instrument for increasing the livestock population. However, the results of the artificial insemination program implementation in the field show varying levels of success across regions and farmer groups. Several reports indicate that the S/C value of artificially inseminated cattle in Pohuwato Regency is still in the range of 1.4-1.8, while the CR ranges from 60-70%, indicating that the effectiveness of the artificial insemination program is not yet fully optimal (Mukhtar et al., 2019).

One important factor influencing the success of artificial insemination programs is the characteristics of the cattle breeders, the primary actors in the livestock production system. Most Gorontaloan beef cattle breeders are small-scale farmers, owning only a few livestock, and consider livestock farming a side activity (Sahara et al., 2019). From a socioeconomic perspective, the education level of these breeders is generally low, with livestock farming experience passed down through generations. This situation has implications for breeders' limited knowledge of reproductive management, particularly in detecting signs of estrus and determining the appropriate insemination timing for successful fertilization.

Another frequently encountered problem is the low frequency of livestock reproductive recording and delays in reporting estrus to inseminators. In practice, some breeders still rely on simple visual observations without accurately understanding estrus indicators, resulting in inseminations often performed at inappropriate times. Furthermore, semi-intensive to extensive husbandry systems with fluctuating feed quality also affect the physiological condition of female cattle and reduce the chances of successful pregnancy.

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These characteristics of cattle breeders indicate that the success of an artificial insemination program is not solely determined by the technical aspects of reproduction but is also significantly influenced by human factors as livestock managers. Limited knowledge, low technology adoption, and weak husbandry management are the main challenges in developing beef cattle through the artificial insemination program in Pohuwato Regency. Based on these conditions, a scientific study is needed on the characteristics of beef cattle breeders in the implementation of the Artificial Insemination Technology Service Program in Pohuwato Regency.

METHOD

Study Site

The research location was Pohuwato Regency, one of the beef cattle development areas in Gorontalo Province, where artificial insemination technology is used. The study was conducted over three months, from March to May 2024.

Population and Sample

The population in this study was a community of cattle breeders who raise beef cattle. Sampling was conducted in stages, starting from the sub-district and village levels, down to the sample of cattle breeders. The sample sub-districts stretched from east to west and were purposefully selected based on regional considerations: 1) the largest beef cattle population, 2) those handled by inseminators actively implementing artificial insemination programs, and 3) active participation in Ishiknas reporting. Sample villages within each sub-district were determined based on the village with the largest cattle breeder population. A description of the sub-districts and sample villages can be seen in Table 1.

The livestock breeders sampled in this study were community members in each sample village, selected based on the consideration of actively implementing artificial insemination programs. Based on livestock breeder statistics in the sample villages, the minimum sample size was determined. The minimum sample size was calculated using the Yamane formula (Sugiyono, 2022). The tolerable percentage margin of error for sampling was 0.1.

Table 1. Determination of Sample Districts and Sample Villages

No.	Kecamatan Sampel	Desa Sampel	Jumlah Peternak (orang)
1	Patilanggio	Iloheluma	143
		Balayo	90

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		Dulomo	16
3	Randangan	Sari Murni	411
		Manunggal Karya	170
		Imbodu	12
2	Popayato Barat	Dudewulo	80
		Persatuan	64
		Molosipat Utara	16
		Total	1002

Source: Primary data (2024)

$$n = \frac{N}{1 + N(e)^2}$$

Information:

n = Number of samples

N = Population size

e = Sampling error

Based on the calculations, a sample size of 90 people was obtained. The number of samples in each sample village was then determined proportionally. The sample composition for each village is presented in Table 2.

Table 2. Determination of Sample Breeders

No.	Village	Farmers (people)	Sample (people)
1	Iloheluma	143	13
	Balayo	90	8
	Dulomo	16	1
2	Sari Murni	411	37
	Manunggal Karya	170	15
	Imbodu	12	1
3	Dudewulo	80	8
	Persatuan	64	6
	Molosipat Utara	16	1
	Total	1002	90

Source: Processed Data (2024)

Data Collection

The collected data was then analyzed using descriptive statistics. Data on the characteristics of

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beef cattle farmers participating in the artificial insemination technology service program were then tabulated and processed using numbers, averages, and percentages, then presented in tables.

Data Analysis

The collected data was then analyzed using descriptive statistics. Data on the characteristics of beef cattle farmers participating in the artificial insemination service program was then tabulated and processed using numbers, averages, and percentages, then presented in tables.

RESULTS AND DISCUSSION

Respondent Characteristics

Respondent characteristics encompass all aspects of the livestock farmers, including: age range, education level, and livestock farming experience. Based on the research results, the respondents' age range, education level, and livestock farming experience are shown in Table 3.

Tabel 3. Respondents of Farmers Based on Age, Education, and Experience

Age Range (years)	Number (people)	Percentage (%)
- 15 - 40	34	37.80
- 41 - 64	51	56.70
- > 64	5	5.50
Total	90	100
Education Level		
- Elementary School or Equivalent	58	64.45
- Middle School or Equivalent	23	25.55
- High School or Equivalent	9	10
Total	90	100
Livestock Experience (years)		
- 1 - 5	11	12.22
- 6 - 10	21	23.33
- > 10	58	64.45
Total	90	100

Sumber: Processed Data (2024)

Table 3 shows that the majority of respondents were in the productive age group, namely

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those aged 41-60 years (56.7%). This age group reflects a mature, productive age group, which generally has extensive work experience. This indicates that respondents are at an age capable of working and developing their businesses. n line with this, Robbins and Judge stated that individuals in mature age tend to have job stability and the ability to manage a business. Productive age indicates an open mindset, making it easier to adopt knowledge and technology, including artificial insemination technology.

According to the Central Statistics Agency (2023), the productive age population can be arranged according to age groups. Age can be categorized into three groups: young (<15 years), productive age (15-64 years), and non-productive age (≥65 years). The 15-64 age range falls within the productive age category, where many people are completing formal education, building careers, and starting families. Productive age is the working age group capable of producing goods and services. Breeders within this age group have the potential to actively develop beef cattle farming through artificial insemination programs.

Table 3 also shows that 64.45% of livestock farmers only have an elementary school education or equivalent. The majority of livestock farmers still have a basic education. This impacts the implementation of artificial insemination programs. Limited understanding of livestock reproductive innovations slows the adoption of technologies such as artificial insemination. Mulyono (2017) stated that education level plays a crucial role in farmers' ability to understand technology and implement more modern practices.

The small number of livestock farmers with a high school education, which is only 10%, indicates that technological literacy within the livestock community is still relatively low. However, a high school education is necessary to understand operational standards, reproductive techniques, and the use of digital applications for pregnancy monitoring and reporting artificial insemination results. Suryana et al. (2021) stated that the success of artificial insemination is greatly influenced by reproductive literacy and the intensity of outreach to livestock farmers.

Table 3 also shows that the majority (64.45%) of farmers have over 10 years of livestock farming experience. This indicates that the majority of farmers have extensive experience in beef cattle farming. Dawit et al. (2021) stated that farmer experience plays a role in determining the sustainability and success of a livestock business, as well as the success or failure of the livestock business. Farmers' experience in running their businesses will facilitate problem-solving. Experience also determines the success or failure of a farmer in running a livestock business.

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Characteristics of Breeders Based on Artificial Insemination Technology Services

Livestock ownership or the number of beef cattle raised reflects the scale of the business, its farming capabilities, and its readiness to accept artificial insemination technology services. A description of beef cattle ownership can be seen in Table 4.

Tabel 4. Beef Cattle Ownership.

No.	District	Number of Livestock Owned (heads)			Total
		1 - 3	4 - 6	7 - 9	
1	Patilanggio	14	8	-	22
2	Randangan	22	22	9	53
3	Popayato Barat	6	5	4	15
	Total	42	35	13	90
	Percentage (%)	46.67	38.89	14.44	100

Sumber: Processed Data (2024)

Table 4 shows that 46.67% of livestock farmers own between 1 and 3 head of livestock, thus categorizing themselves as smallholders with relatively small livestock holdings. The scale of beef cattle farming in rural areas, particularly in developing countries, is still largely small, operating as a side business and as a form of savings (Sahara, 2019).

Smallholder livestock farming is still dominated by traditional management practices that have not fully implemented profit-oriented business management principles. Smallholder livestock farming is generally not managed profitably, but rather as a side business, long-term family savings, or a way to utilize spare time. Therefore, it has not yet become a primary source of income for livestock farmers, with relatively small livestock holdings ranging from 2 to 3 heads per household (Directorate General of Livestock and Animal Health, 2018).

Long-term use of artificial insemination increases the experience and knowledge of farmers, enabling them to support artificial insemination technology service programs for beef cattle. A description of farmers' experience in implementing artificial insemination is shown in Table 5.

Tabel 5. Experience in Artificial Insemination Application

No.	Subdistrict	Experience of Artificial Insemination Implementation (year)				Total (people)
		1 - 3	4 - 6	7 - 9	> 9	
1	Patilanggio	8	4	6	4	22

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2	Randangan	-	5	8	40	53
3	Popayato Barat	6	4	3	2	15
	Total	14	13	17	46	90
	Persentase (%)	15.56	14.44	18.89	51.11	100

Sumber : Processed Data (2024)

Table 5 shows that 51.11% of livestock farmers have used artificial insemination technology for more than 9 years. Artificial insemination allows farmers to produce good calves at an affordable cost without using a bull. According to Susilawati (2011), the success of artificial insemination is influenced by several factors, including the quality of the female animal, the skill of the inseminator, the timing of the artificial insemination, heat detection, and semen quality.

Differences in experience between sub-districts also reflect variations in access to artificial insemination services and the intensity of inseminator assistance. Equitable access to artificial insemination services and increasing the capacity of livestock farmers are key factors in increasing pregnancy rates and beef cattle productivity (Directorate General of Livestock and Animal Health, 2023). The success of artificial insemination depends not only on semen quality and the skill of the inseminator, but also on the farmer's level of experience and knowledge in reproductive management (Wahyuni et al., 2019).

CONCLUSION

The research revealed that 56.7% of livestock farmers receiving Artificial Insemination Program services in Pohuwato Regency are in the productive age range, between 41 and 60 years. The majority, or 64.45%, have only completed elementary school or equivalent and have more than 10 years of livestock farming experience. The majority of livestock farmers are of working age and capable of developing their businesses. These farmers come from groups with primary education but have considerable experience in beef cattle farming.

46.67% of cattle breeders own between 1 and 3 beef cattle. Their livestock ownership is relatively small and is primarily used as a side business, making them classified as smallholder breeders. 51.11% of breeders have used artificial insemination technology for more than 9 years, indicating that the majority of breeders are considered to have considerable experience. The success of artificial insemination depends not only on semen quality and the inseminator's skill,

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but also on the breeder's experience in reproductive management, such as the ability and accuracy of estrus detection.

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