



UDC 332

ANALYSIS OF BREEDERS' PREFERENCE FACTORS TOWARDS BEEF CATTLE STRAW IN ARTIFICIAL INSEMINATION SERVICES OF GORONTALO DISTRICT, INDONESIA

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ABSTRACT

This research aims to analyze the characteristics of livestock cultivation systems in beef cattle development areas and breeders' preference factors for beef cattle straw in Gorontalo Regency. The total sample was 98 people with an error limit in sampling of 0.1. Primary and secondary data were collected through distributing questionnaires, observation and documentation. The distribution of data collected is tabulated, processed and analyzed using descriptive statistics through calculating averages, percentages and standard deviations. The results of the research show that 70.87% of breeders cultivate Balinese cattle, 71.17% of the source of livestock seeds comes from purchases, 48.98% raise livestock using a semi-intensive pattern, and 52.04% are oriented towards breeding. The average intrinsic aspect score is 295 with an average level of agreement of 60.20%. The highest score for the intrinsic aspect is found in the indicator of ease of giving birth to AI results of 386 out of a total ideal score of 490 with an approval level of 78.78%, making it a priority consideration in breeders' preferences for beef cattle straw. The average score for the extrinsic aspect is 345 with an average level of agreement of 70.31%. The selling price indicator for AI-produced livestock has the highest score of 435 with an approval level of 88.78%, making it a priority consideration in breeders' preferences for beef cattle straw.

KEY WORDS

Breeder preferences, livestock straw, beef cattle, artificial insemination.

The Indonesian government continues to strive to increase the beef cattle population in order to achieve beef self-sufficiency. This effort starts from reproduction, breeding, production, feed technology and related regulations. Beef cattle self-sufficiency has not been achieved optimally so Indonesia is still depended on beef imports. One of the efforts made by the government is implementing the Artificial Insemination (AI) program which is expected to optimize livestock production and reproduction to increase the beef cattle population.

AI activities are a form of implementation of reproductive technology which aims to increase the beef cattle population with better genetic quality. It is aimed that with this technology, the Distribution of superior beef cattle seeds can be carried out quickly through an easier process and at affordable costs for breeders.

All districts in Gorontalo Province, including Gorontalo Regency, have implemented AI activities in beef cattle. The realization of AI in the livestock development area in Gorontalo Regency over the last three years, which ran from 2020 to 2022, shows developments that are still fluctuating. AI activity in 2020 was recorded at 13,176 head, in 2021 it increased by 15,579 head, and in 2022 it decreased to 12,146 head (Gorontalo Regency PKH Service, 2023).

Implementation of AI can increase production (Sholikah and Sumartono, 2021) and beef cattle population if high pregnancy rates can be achieved, birth spacing is optimal, and mortality rates can be reduced. However, if the AI implementation is not managed well, it has a weakness that it can eliminate the breed characteristics of local beef cattle in a short time. AI activities also depend on the skills of the inseminator, the availability of frozen semen (straw), and the distribution of straw from producers, which named artificial insemination centers, to inseminators to breeders as final consumers.



The successful of implementing AI in livestock is determined by several important factors, such as: acceptor female cattle, inseminators, breeders, equipment, and diagnostics (Priyanto, 2021). Breeders have different preferences for livestock straw based on livestock characteristics and breeder needs. This is an important reason why breeders' preferences for beef cattle straw are important to research. The objectives to be achieved in this research are to: 1) analyze the characteristics of livestock cultivation systems in beef cattle development areas and 2) analyze breeders' preference factors for beef cattle straw in Gorontalo Regency.

METHODS OF RESEARCH

This research was carried out in Gorontalo Regency. The research location was determined by considering its potential, such as: 1) the location for the development of beef cattle livestock commodities (RI Minister of Agriculture No. 50 of 2012) and 2) has the largest population of beef cattle in Gorontalo Province, reaching 101.73 thousand (PKH Department, 2023).

Analysis of livestock cultivation characteristics and preferences of beef cattle breeders in AI services was carried out in sample sub-districts representing 19 sub-districts in Gorontalo Regency (BPS Gorontalo Regency, 2023). The Gorontalo Regency area geographically stretches from East to West with a different typology (Sahara at al, 2019), which are:

- Eastern Region; was a land where most of the area is located around Lake Limboto, including the sub-districts: *Telaga, Tilango, Telaga Jaya, Telaga Biru, Limboto, West Limboto, Tabongo, Batudaa, and Batudaa Pantai*;
- Central Region; was a land which located between the East and West regions with dominant land topography of dry land and hills, covering the sub-district: *Tibawa, Pulubala, Bongomeme, Dungaliyo, and Biluhu*;
- Western Region; was a land whose territory is located around the *Paguyaman River*, covering the sub-districts: *Bilato, Boliyohuto, Mootilango, Tolangohula, and Asparaga*.

The population in this study was all AI acceptor breeders in the beef cattle development area in Gorontalo Regency. In 2023, AI acceptor breeders registered at the Gorontalo Regency Livestock and Animal Health Service which numbered 7,931 people. Sampling preferences of breeders used purposive sampling taking into account breeders who were active and registered at the Gorontalo Regency Livestock and Animal Health Service.

Table 1 – Sample District Determination

Region	District	Breeder Acceptor (People)	District Sample
East	Telaga	374	West Limboto Tabongo
	Tilango	65	
	Telaga Jaya	44	
	Telaga Biru	378	
	Limboto	482	
	West Limboto	567	
	Tabongo	597	
	Batudaa	218	
Central	Batudaa Pantai	-	Tibawa Pulubala
	Tibawa	647	
	Pulubala	699	
	Bongomeme	290	
	Dungaliyo	630	
West	Biluhu	-	Tolangohula Asparaga
	Boliyohuto	517	
	Bilato	42	
	Mootilango	340	
	Tolangohula	748	
	Asparaga	753	
	Total	7,391	

Source: Secondary Data, 2023.



The sampling technique was carried out in stages from the sub-district level to the breeder level. The sub-district samples were determined by considering the beef cattle development areas that have the most AI acceptor breeders. The sample subdistricts were determined using purposive sampling taking into account the geographical area. Two sub-districts with the largest population of AI acceptor breeders were taken to represent each region. A description of the determination of sample subdistricts can be seen in Table 1.

Based on existing breeder population statistics, the minimum sample size can be determined. The error limit in sampling is 0.1. Based on the calculations carried out, the sample size of 98 breeders was obtained. The minimum sample size is calculated using the Yamane formula (Sugiyono, 2022), which the formula is:

$$n = \frac{N}{1 + N(e)^2} = 98 \text{ people}$$

Details: n = Total Sample; N = Total Population; e = Error Limit.

The number of sample breeders in each sample subdistrict was then determined proportionally. The composition of the sample of breeders in each sub-district is presented in Table 2. The sample of breeders was determined taking into account breeders who are still actively cultivating beef cattle and are registered with the Gorontalo Regency Livestock and Animal Health Service as acceptors of beef cattle AI.

Table 2 – Breeder Respondents Sample

No	District Sample	Breeder (people)	Breeder sample (people)
1	West Limboto	567	14
2	Tabongo	597	15
3	Tibawa	647	16
4	Pulubala	699	17
5	Tolangohula	748	18
6	Asparaga	753	18
	Total	4,011	98

Source: Secondary data processed, 2023.

Based on the source, this research data consists of secondary data and primary data. Secondary data comes from related agencies, such as: Animal Husbandry and Animal Health Service (PKH) and Gorontalo Regency Central Statistics Agency (BPS). Secondary data collection is carried out through document or documentation searches of existing documents. Other supporting secondary data comes from libraries, such as: national and international scientific journals and relevant theoretical books.

Primary data comes from respondents from AI acceptor breeders in Gorontalo Regency. Primary data collection was carried out through observation and questionnaires to respondents. Data on breeder characteristics was collected using a questionnaire distributed to breeders who were recorded as active in the last three years, namely 2020 - 2023. Data on breeder preferences in the beef cattle development area in Gorontalo Regency was collected using a questionnaire distributed to breeders. The questionnaire distributed is a list of closed questions arranged based on a Likert Scale.

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$$s = \sqrt{\frac{\sum(x_i - x)^2}{n}}$$

Where: S = Standard Deviation; xi = i value; x = Average; n = Data Total.

The Likert scale was used to measure attitudes, opinions and perceptions (Sugiyono, 2022) regarding aspects of breeders' preferences for beef cattle straw. The attitude scale is arranged with gradations ranging from very agree to very disagree. Qualitative statements are quantified by giving a score of 1 - 5, i.e.: Very Agree: 5; Agree: 4; Not Sure: 3; Disagree: 2; Very Disagree: 1.

The score for each item is obtained from multiplying the score options 1 - 5 by the number of respondents. The total ideal score for all items is obtained by multiplying the highest score by the number of respondents (for example 100 people) to obtain 5 x 100 = 500. The results of the score calculation can then be depicted using a continuum line, as in Figure 1. The percentage level of agreement with the variables is obtained from the results calculation of the total item score divided by the total ideal score multiplied by 100%.

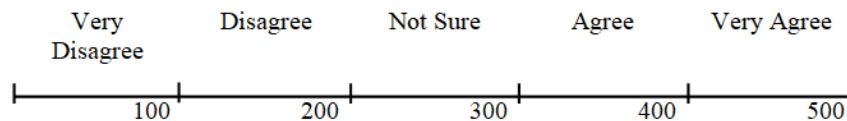


Figure 1 – Continuum Line

RESULTS AND DISCUSSION

The livestock cultivation system is the core activity of beef cattle development in a region. Aspects of the livestock cultivation system that are important to pay attention to are: type of livestock, source of seeds, maintenance patterns and business orientation.

Livestock is the main commodity in livestock activities. The choice of livestock type can be adjusted to regional conditions, breeding goals, and the breeder's abilities. The types of beef cattle which owned by AI livestock acceptor breeders in the beef cattle development area in Gorontalo Regency can be seen in Table 3.

Table 3 – Types of Beef Cattle Owned by AI Acceptor Breeders

No	Beef Cattle Type	Frequency	Percentage (%)	Average	Standard Deviation
1	Bali	69.46	70.87	11.58	4.49
2	Madura	2.14	2.19	0.36	0.59
4	PO	10.19	10.40	1.70	1.79
5	Ongole	1.00	1.02	0.17	0.41
6	Brahman	0.37	0.38	0.06	0.15
7	Limousin	13.77	14.05	2.29	1.99
8	Simental	1.07	1.09	0.18	0.30
	Total	98.00	100.00		

Source: Research Result Data, 2024.

Table 3 shows that the majority or 70.87% of AI acceptor breeders cultivate Balinese cattle. This is in line with the map of local cattle seed source areas which shows that Gorontalo Province is one of 11 provinces that are source areas for Bali cattle seeds and Distribution in Indonesia (Susilawati, 2017). Breeders also breed more *Ongole* crossbreed cattle (PO) and Limousin cattle.

Traditional beef cattle farms tend to develop livestock using local seeds. Locally cultivated cattle have many advantages, but have not been developed optimally. The



advantages of local cattle include good adaptation to the environment, the ability to consume low quality feed, and good reproduction.

Beef cattle that are cultivated come from various sources, such as: family inheritance, purchases, breeding, and government donation. An overview of the sources of beef cattle owned by AI livestock acceptor breeders in the beef cattle development area in Gorontalo Regency can be seen in Table 4.

Table 4 – AI Acceptor Breeder's Livestock Source

No	Livestock Source	Frequency	Percentage (%)	Average	Standard Deviation
1	Inheritance	4.12	4.20	0.69	1.68
2	Purchase	69.75	71.17	11.62	4.22
3	Breeding	16.13	16.46	2.69	2.04
4	Donation	8.00	8.16	1.33	3.27
	Total	98.00	100.00		

Source: Research Result Data, 2024.

Based on Table 4, it is known that the majority or 71.17% of the sources of cultivated beef cattle seeds come from purchases at livestock markets. The sources of cultivated seeds are quite varied, but it can be seen that generally existing breeders are not completely dependent on government assistance. This situation is good because it shows that the initiative and motivation of breeders for breeding is high enough so that it is good for the development of beef cattle.

Beef cattle cultivation consists of three maintenance patterns, such as: 1) extensive; raising livestock in pastures, 2) semi-intensive; raising livestock where they are grazed during the day and penned at night, and 3) intensive; keeping livestock in cages all day long. An overview of livestock rearing patterns owned by livestock AI acceptor breeders in the beef cattle development area in Gorontalo Regency can be seen in Table 5.

Table 5 – Beef Cattle Breeding Patterns for AI Acceptor Farmers

No	Breeding Patterns	Frequency	Percentage (%)	Average	Standard Deviation
1	Extensive	37.00	37.76	6.17	5.34
2	semi-intensive	48.00	48.98	8.00	5.62
3	Intensive	13.00	13.27	2.17	3.92
	Total	98.00	100.00		

Source: Research Result Data, 2024.

Based on Table 5, it is known that 48.98% of breeders choose to raise beef cattle using a semi-intensive pattern. Areas that still have large areas of land can apply extensive patterns, but according to Achmadi (2010), intensive pattern maintenance is more economical than extensive patterns which require large areas of land for grazing.

The beef cattle business can be developed with a breeding or fattening orientation. An overview of the orientation of the beef cattle business by livestock AI acceptor breeders in the beef cattle development area in Gorontalo Regency can be seen in Table 6.

Table 6 – AI Beef Cattle Acceptor Breeder Orientation

No	Business Orientation	Frequency	Percentage (%)	Average	Standard Deviation
1	Breeding	51.00	52.04	8.50	5.43
2	Fattening	30.00	30.61	5.00	4.82
3	Combination	17.00	17.35	2.83	2.56
	Total	98.00	100.00		

Source: Research Result Data, 2024.

Table 6 shows that the majority or 52.04% of breeders are breeding-oriented. Some breeders view the breeding business as easier and more profitable. Traditionally developed beef cattle breeding businesses mostly run breeding businesses using local livestock seeds,



while fattening businesses are mostly run by breeders who have large capital. Sholikah and Sumartono (2021) stated that efforts to increase beef cattle production can be done with AI.

Preference is a priority that someone wants or can also be interpreted as a choice or liking or inclination towards something (Kotler, 2012). Generally, a person's choices and preferences can be influenced by various factors. Preference for beef cattle straw can be influenced by the innate characteristics of the animal (intrinsic aspect) and human intervention or interference (extrinsic aspect). The intrinsic aspect has several indicators that can influence breeders' preferences in the beef cattle development area in Gorontalo Regency.

There are various indicators of intrinsic aspects that can be taken into consideration by breeders in choosing livestock straw, but in this research, it is only limited to four indicators, such as: 1) Giving birth to AI Cattle easily, 2) animal resistance to disease, 3) typical as working livestock on agricultural land, and 4) Well-detected Lust. A description of the intrinsic aspects of breeders' preferences for beef cattle straw in the beef cattle development area in Gorontalo Regency can be seen in Table 7.

Table 7 – Scores and Levels of Agreement on Intrinsic Aspects of Breeder Preferences

No.	Intrinsic Aspects	Score	Level of Agreement (%)
1	Giving birth to AI-produced Cattle easily	386	78.78
2	Animal resistance to disease	282	57.55
3	Typical as working livestock on agricultural land	291	59.39
4	Well-detected Lust	221	45.10
	Average	295	60.21

Source: Research Result Data, 2024.

Table 7 shows that the highest score is found in the indicator of ease of giving birth to AI results of 386 out of the total ideal score (criterium) of breeders' preferences, namely 490. The average value of the intrinsic aspect score is 295, indicating that the intrinsic aspect is in the Important gradation, which illustrates that breeders consider Intrinsic aspects are important in breeders' preferences for beef cattle straw.

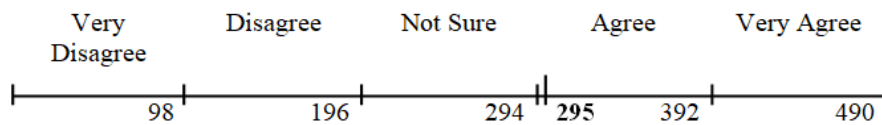


Figure 2 – Continuum Line of Intrinsic Aspect Score

The average level of agreement for all intrinsic aspects was 60.21%. The aspect of ease of giving birth to AI-produced cattle has the highest level of approval, it was 78.78%, so it is the first priority in the preferences of AI cattle acceptors for beef cattle straw. Generally, breeders are afraid that their livestock will experience dystocia or have difficulty giving birth to AI-produced cattle, which can cause risks to the cattle and mother, which in the end will be economically detrimental to the breeder.

Traditional breeders also want AI-produced cattle to be able to use their energy as working livestock on agricultural land to pull plows or to pull carts to transport agricultural products. The livestock's resistance to disease and the stress of the hot tropical climate are also things that breeders take into account.

Indicators of extrinsic aspects that are taken into consideration by breeders in choosing the type of livestock straw are: 1) ease of cultivating AI-produced cattle, 2) ease of providing animal feed, 3) selling price of livestock on the market, and 4) rates for AI services by inseminators. A description of the extrinsic aspects of breeders' preferences for beef cattle straw in the beef cattle development area in Gorontalo Regency can be seen in Table 8.

The description in Table 8 shows that the selling price of livestock has the highest score, it was 435, out of the total ideal score (criterium) for breeders' preferences, it was 490. The average value of the extrinsic aspect score is 345, which on a continuum can be



described as seen in Figure 3. This value shows that extrinsic aspects are in the Important gradation which illustrates that extrinsic aspects are considered important in breeders' preferences for beef cattle straw.

Table 8 – Scores and Levels of Agreement on Extrinsic Aspects of Breeder Preferences

No	Extrinsic Aspects	Score	Level of Agreement (%)
1	Ease of cultivating AI-produced cattle	313	63.88
2	Ease of providing animal feed	327	66.73
3	Selling price of livestock on the market	435	88.78
4	AI Services Rate	303	61.84
	Average	345	70.31

Source: Research Result Data, 2024.

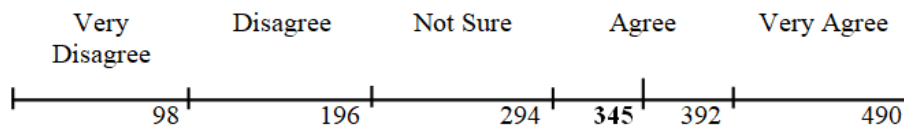


Figure 3 – Continuum Line of Extrinsic Aspect Score

The average level of agreement for all extrinsic aspects was 70.31%. The selling price of livestock has the highest level of agreement; it was 88.78%, so it is the first priority in the preferences of livestock AI acceptor breeders for beef cattle straw. Every breeder certainly wants to make a profit from the livestock business they carry out, so the selling price of AI-produced livestock is an important consideration in choosing beef cattle straw.

The ease of providing feed and cultivating AI-produced beef cattle is also a factor that is considered important by breeders. This is because each type of livestock has different characteristics in terms of feed requirements and maintenance patterns. Local beef cattle, such as Balinese cattle, have better adaptability to tropical climates than European cattle, so they can be cultivated extensively.

CONCLUSION

Based on the description of the research results, it can be seen that the majority of AI acceptor breeders have livestock cultivation characteristics, such as: 1) breeders cultivate Balinese cattle, 2) the source of livestock seeds comes from purchases, 3) livestock breeding is carried out in a semi-intensive pattern, and 4) breeding oriented. The highest score for the intrinsic aspect is found in the indicator of ease of giving birth to AI-produced cattle, while the highest score for the extrinsic aspect is found in the selling price indicator for AI-produced cattle. These two indicators have the highest level of agreement so they are a priority consideration in breeders' preferences for beef cattle straw in the beef cattle development area in Gorontalo Regency.

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