

# The role of alternative feed in the sale value of beef cattle in North Minahasa Regency, North Sulawesi

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## ABSTRACT

This study aims to analyze the effect of alternative feed utilization on the productivity of the cattle business and the farmer's income. It also analyzes the government's policy model in the alternative feed development for cattle to improve production, reduce production costs, and increase income. The study was done in North Minahasa Regency, North Sulawesi Province using a survey method using questionnaires-based interviews. Four districts were selected based on the highest cattle populations, i.e. Kauditan, 2,117 individuals, Talawaan, 1,986 ind., Likupang Timur, 1,908 ind., and Wori, 1,564 ind., respectively. Data were analyzed descriptively and in regression. This study focused on the use of hay, silase, ammoniase, urea molasses block (UMB), and other alternative feed in the beef cattle business and its role in the market value. Results showed that the alternative feed cost ( $BP_A$ ) positively influenced the sale value of the cattle. The t-test of 3.689 indicated a very significant effect ( $p < 0.01$ ). The effect of the labor flow ( $TKP_A$ ) in the alternative feed processing on the sale value of the cattle showed non-significant effect. Likewise, the t test result was -0.238 with a significance test result of 0.812 showing that the effect was not significant ( $p > 0.05$ ).

**Keywords:** Role, alternative feed, sale value, beef cattle.

## Introduction

Demands for beef in Indonesia are increasing with population growth and increased people's income so meat consumption gets higher. Cattle farms in North Sulawesi are mostly still conducted traditionally on a small scale as public farms [1,2]. One of the regions developed for a public cattle farm is North Minahasa Regency because its natural resource potential is appropriate for cattle farm development. This area has three districts with the highest districts, Kauditan, 2,492 ind., Dimembe, 2,098 ind., and Talawaan, 2,327 ind. [3].

The government, through the provincial and regency Animal Husbandry Department, or educational institutions, such as universities, continues to strive to help develop these people's livestock with educational programs, such as practical technology regarding feed, maintenance management, disease management, assistance with livestock, breeding, and others [4]. One of the important factors influencing cattle farm development is feed, particularly feed nutrition in

carcass composition, such as fat content [5]. Feed is the largest component in a cattle production business, and feed proportion can reach 70% of total production costs, so feed becomes a determinant of the farmer's success, besides seeds and farming management. Good feed management will be the key to the farm's success, such as feed supply, feed formulation, and feed processing technology [6].

Major feed for cattle consists of forage, leguminosa, concentrate feed, and agricultural waste from food crops around the farm area [7]. In general, cattle farmers feed the cattle wild grass and agricultural wastes as forage sources. Such type of feed often contains low nutrition [8,9]. Moreover, during the dry season, the cattle are given minimal food and this does not meet their needs, resulting in a decrease in production, such as weight loss. As a result, farmers are often forced to sell their livestock because of the shortage of forage. In this condition, the cattle have a low selling value, so the farmer's profits are also inadequate [10].

Cattle farm development in this area is the local forage is limited and not enough to meet the need for the cattle population development. Insufficient availability of feed results in difficulties in the cattle population development. Several farmers who got training or learned through online media concerning alternative feed processing, such as hay, silage, and Urea Molase Block, have tried to take advantage of agricultural wastes to make alternative feed [11]. The use of the alternative feed can substitute the limitation of the forage and can positively contribute to the body weight increment, but the production costs can rise. Therefore, the present study analyzes the effect of alternative feed utilization and labor costs for feed processing on the sale price of cattle in North Minahasa Regency. The present study gives the government inputs to adopt policies on alternative feed utilization to support meat self-sufficiency and national food security programs.

## Method

This study was carried out in North Minahasa Regency by selecting four of 10 districts possessing the highest cattle population based on the statistic office data of North Minahasa Regency [27], i.e. Kauditan, 2,117 ind., Talawaan, 1,986 ind., Likupang Timur, 1,908 ind., and Wori, 1,564 ind., respectively.

Data collection used a survey method following Hardani et al. [13]. Field data were obtained from the cattle farmers, whereas the secondary data were taken from related government institutions. The former was collected through questionnaire-based deep interviews with the respondents.

Sample determinations used a purposive sampling method, in which the researchers took samples using certain characteristics or particular considerations [13]. The sample

respondents were chosen under the following criteria: having obtained information and using the alternative feed, owning beef cattle of 2 individuals at minimum, and having cattle farming experience of at least 2 years. Fifteen cattle farmers were selected in each district so there are a total of 60 respondents used in this study (Table 1).

**Table 1.** Number of beef cattle farmers as respondents with farming locality.

No	Sample farmer locality	No. farmer respondents
1.	Kauditan district	15
2.	Talawaan district	15
3.	Likupang Timur district	15
4.	Wori district	15
Total		60

The study used descriptive and regression analyses. The cattle farm business productivity was measured by the sale value of the cattle ( $NJ_{TS}$ ) which is influenced by the alternative feed cost ( $BP_A$ ) and labor cost for feed processing ( $BT_{PA}$ ) formulated below:

$$NJ_{TS} = f(BP_A, BT_{PA})$$

$$NJ_{TS} = \beta_0 + \beta_1 BP_{TS} + \beta_2 BT_{PA} + e_i$$

where

$NJ_{TS}$  : Sale value of the cattle based on the cattle sale or the market price of the cattle cultured for a year (IDR yr<sup>-1</sup> respondent<sup>-1</sup>)

$BP_A$  : Alternative feed costs, materials and alternative feed technology implementation equipment for a year (IDR yr<sup>-1</sup> respondent<sup>-1</sup>).

$BT_{kPA}$  : Labor costs of the alternative feed, wages (owner labor<sup>-1</sup>) in alternative feed processing implementation for a year (IDR yr<sup>-1</sup>respondent<sup>-1</sup>).

$\beta_0$  : Constant coefficient

$e_i$  : Error coefficient

## Results and Discussion

### Respondent's characteristics

The respondent farmers were mostly >50–60 years old, 46.67%, and >40–50 years old, 33.33% meaning that 80% of respondents belong to productive age according to the category of Statistic Center Office [14], the age range of 15–64 years old. Running a cattle farming business needs a strong physical condition to feed, bathe, and lead the cattle to the plantation

area. This finding is in line with previous studies [15, 16,17,18] that the age range of 40-60 years belongs to a productive age in which farmers still have sufficient strength to do cattle farming. The education level of the respondent farmers was mostly high school (68.33%) (Table 2). However, it is found [15] that 81% of cattle farmers have no formal education, basic school, and elementary school. The previous finding [16] showed that 69% of the cattle farmers in Banyuwangi, East Java, have only basic school education. Education level can affect the adoption of new knowledge. The cattle farmer's education in North Minahasa regency was mostly dominated by high school. This finding is supported by the previous work [17] that the highly-educated farmers are more advanced so they are easier to receive new knowledge on alternative feed through training and or social and online media as recently developed.

Table 2. The characteristics of beef cattle farmer respondents using the alternative feed North Minahasa Regency.

Variable	Category	Number	Percent
Age	$\leq 20$	-	-
	> 20 – 30	2	3.33
	> 30 – 40	3	5.00
	> 40 – 50	20	33.33
	> 50 – 60	28	46.67
	> 60	7	11.67
Education	Elementary School	-	
	Junior High School	17	
	High School	41	
	University	2	
Experience	$\leq 10$	2	
	> 10 – 20	6	
	> 20 – 30	24	
	> 30 – 40	21	
	> 40 – 50	7	
	> 50	-	

The respondent's experience in beef cattle farming was mostly > 20 – 30 years and >30 – 40 years (Table 2). It indicates that the farmer samples are highly experienced in cattle farming. The farming experience was obtained from their parents. Most farmers (69%) have 1- 20 years of farming experience [19], whereas the average farming experience of 11.6 years and 16.7 years, respectively [16, 20] reflecting that the cattle farmers in North Minahasa Regency have more experience and understand how to solve problems in the cattle farming.

### Introduction to alternative feed technology.

The alternative feed technology for cattle generally provided through counseling or training in Indonesia was hay processing, silage, ammoniase, and urea molasses block. This training was given to the use of agricultural wastes so that the cattle feed could be available and its nutritional value rise. The information on this technology is obtained formally by the farmers through training obtained from the Agricultural/Animal Husbandry Department [21]] or universities, online media, social media [11], and friends or other people. The present study found that the information source concerning the alternative feed was mostly obtained from friends or other people (Table 3). It could be explained that the farmers did not have time to attend the formal farming training. They prefer to see friends to learn how to make good cattle feed. Communication between farmers in groups or personal can also enrich their knowledge [22].

**Table 3.** Information source and alternative feed technology introduction.

No	Description	No. information sources
1.	Governmental trainer	17±0.28
2.	Academician/university	7±0.12
3.	Newspaper/social media/blog/youtube	12±0.20
4.	Friends/other person	60±1.00

The present study showed that conventional feed consisted of local grass/agricultural wastes, tree legumes, and concentrate feed. The feed was obtained from the farmer's plantation area or other places as agricultural wastes or wild grass. Grass and corn stalks are the largest amount (Table 4) due to their high availability in North Minahasa Regency.

**Table 4.** The use of alternative feed and conventional feed.

No.	Feed types	Mean amount farmer <sup>-1</sup> (Kg)
1.	<b>Conventional feed:</b>	
1.1.	Corn stalk	6,735.59 ±4,141.44
1.2.	Legumes	389.33 ±598.78
1.3.	Concentrate	5,976.00 ±3,674.40
	Total	13,100.92 ±8,225.18
2.	<b>Alternative feed</b>	
2.1.	Hay	733.33±495.22
2.2.	Silage	146.00±623.93
2.3.	Amoniase	340.67±1,285.41
2.4.	Urea molasses block (UMB)	170.33±948.61
2.5.	Mix	298.08±587.74
	Total	1,688.42±2,506.17

Feeding the cattle was done by leading them grazing, and collecting fresh grass, cassava leaf, and corn crop residue [18, 16]. In previous studies, it was found [18, 20] that the quality of conventional feed used by the farmers is not good enough to support animal performance.

Feeding alternative feed in North Minahasa Regency is aimed at increasing cattle performance using trained technology to obtain the quality conventional technology. The use of this alternative feed is one of the governmental programs to increase the feed quality [23, 2]. In North Minahasa Regency (Table 4), hay is the largest part fed to the cattle,  $733.33 \pm 495.22$  kg yr<sup>-1</sup>. Hay made from grass and corn stalks was very highly used due to the abundant availability of grass and corn plant wastes. The alternative feed used the lowest part of ammoniase,  $146 \pm 623.93$  kg yr<sup>-1</sup> farmer<sup>-1</sup>, of the total alternative feed. The feed technology practiced in Bostnawa, South Africa is the hay of the natural grass and salt lick block [17].

### Cattle farmer's income

The sale price of the cultured cattle or the sold one was average IDR.  $29,840,625.00 \pm 19,452,498.91$  yr<sup>-1</sup> farmer<sup>-1</sup> and the income of the respondent labor's wages was IDR.  $21,500,000.00 \pm 13,177,407.48$  (Table 5). The cattle farm in the study site is generally a dual function, as working cow and beef cattle. The labor cows were used to carry the farm crops, especially coconut, which were highly planted in North Sulawesi [24]. Labor cows have recently not been used as a soil processing tool since the farmers have used agricultural machines. The income gained from the use of cows as a transportation tool for the plantation crops contributes only 8.21 % to the farming business [25] whereas in Kalawat district, North Minahasa Regency, it contributes as much as 15.92% [24], meaning that cows are still used both as a transportation tool and beef cattle.

**Table 5.** Revenue of cattle and wages for labors.

No	Description	Mean cattle revenue per farmer (IDR)
1.	Cattle value	$29,840,625.00 \pm 19,452,498.91$
2.	Labor's wages	$21,500,000.00 \pm 13,177,407.48$
Total		

### (1) Analysis on the effect of alternative feed utilization on the sale value of cattle in North Minahasa Regency

The success of animal husbandry sub-sector development in production increment is not separated from the role and the use of science and technology in animal husbandry. Factors that need to be considered in beef cattle development are natural resources, human resources,

and continuous availability of feed resources [26]. The technology adoption is a crucial effort to increase productivity in various production systems, i.e. the producer obtains the benefit of the technological implementation either through the chance to reduce the production cost, increase the output of the same input, or maintain the same output of the increased input.

The contribution of alternative feed cost ( $BP_A$ ) and labor cost for feed processing ( $BT_{PA}$ ) on the sale value of cattle ( $NJ_{TS}$ ) was analyzed using a multiple regression equation:

$$NJ_{TS} = \beta_0 + \beta_1 BP_A + \beta_2 BT_{PA} + e_i$$

**Table 6.** Multiple regression on the effect of feed processing and labor costs on the sale value.

Model	SS	Df	MS	F	Sig.	
1	Regression	442709219024	2	221354609512320	7.049	.002**
		6404.000		2.000		
	Residual	178984909347	57	314008612890413		
		53592.000		.900		
	Total	223255831249	59			
		99996.000				

Note: \*\* - highly significant at  $P < 0.01$

The effect of alternative feed cost ( $BP_A$ ) and alternative feed processing labor ( $BT_{PA}$ ) on the sale value of the cattle ( $NJ_{TS}$ ) with the  $F_{\text{calc.}}$  of 7.049 was highly significant ( $p < 0.01$ ). It means that the alternative feed costs (raw material, feed technology tools, processing labor) highly significantly affect simultaneously the sale value of the cattle ( $NJ_{TS}$ ).

**Table 7.** Parameter coefficients of Multiple Regression Analysis.

Independent variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	35550827.037	2946122.709		12.067	.000**
Alternative feed cost ( $BP_A$ )	.019	.005	.441	3.689	.001**
No. labors for the alternative feed ( $TK_{PA}$ )	-.277	1.163	-.028	-.238	.812

Note: \*\* - highly significant effect.

Based on the multiple regression analysis, the following equation was obtained:

$$NJ_{TS} = 35550827,037 + 0,019 BP_A - 0,277 TK_{PA} + e_i$$

Table 7 demonstrates the alternative feed cost ( $BP_A$ ) with a positive coefficient influences the sale value of the cattle due to increased production quality of the cattle. The t-test of 3.689 indicated a very significant effect ( $P < 0.01$ ). This means that an increase in cattle production could be achieved by raising the feed quantity and quality [27]. It is in agreement

with Hartono ([15] that production development theoretically lies in the improvement of feed quantity and quality.

The effect of labor flow( $TKP_A$ ) in the alternative feed processing on the sale value of the cattle indicated a negative coefficient, meaning that the labor flow in the alternative feed processing is not effective. The labor's work is not enough to increase the sale value of the cattle. Also, the t-test of -0.238 at the significance level of 0.812 indicated a non-significant effect ( $p > 0.05$ ). This finding shows that the labor flow in the cattle farm business. It is different from the previous studies that the more efficient the labor flow the higher the sale value.[15, 28]

## References

- [1] S. Dally, E. Wantasen, S. D. Anis and S. P. Pangemanan, "Profit analysis of traditional beef cattle farm in Minahasa Regency, Indonesia". Online Journal of Animal and Feed Research Vol. 5(3), 2015, pp. 90-94. [in Indonesian]
- [2] J. Lainawa, P. Kindangen, T. O. Rotinsulu and J. F. A. Tumbuan. Strategy for Beef Cattle Agribusiness Development in North Sulawesi. International Journal of Applied Business & International Management, Vol. 4 No. 1, 2019.
- [3] Statistic Office of North Minahasa, 'Livestock populations with districts and type of livestock in North Minahasa Regency', 2014-2015. 2016 [in Indonesian]
- [4] E. Nugroho, S. Azizah, T. Susilawati and I. Novianti, "Socio-economic potential of Indonesian native cattle in supporting meat self-sufficiency in Indonesia". Livestock Research for Rural Development vol. 25(11), 2013.
- [5] C. D. Gaina, F. U. Datta, M. U. E. Sanam, M. M. Laut, T. R. Yohanes, M. R. Simarmata, and F. A. Amalo, "The utilization of feed processing technology to overcome cattle feed problems in Camplong II". Jurnal Pengabdian Masyarakat Peternakan vol 4(1), 2019, pp. 71-84. [in Indonesian]
- [6] Sudibya, "Cattle feed processing training using corn stalk silase and ammoniation technology to handle the cattle feed rarity in Ngudi cattle groups of Jendi production, Selogiri District, Wonogiri Regency". Journal of Rural and Development 4(1):33-41. [in Indonesian]
- [7] F. Ilham, M. Sayuti, and T. A. E. Nugroho, "The rice straw quality development as beef cattle feed through ammoniation using urea in Central Timbuolo, Gorontalo Province". J. Pengabdian Kepada Masyarakat, vol. 24(2), 2018, pp.717-722 [in Indonesian]
- [8] P. C. Paat. "Ruminasia cattle integration prospects in coconut plantation through superior forage introduction in North Sulawesi". Prosiding Seminar Nasional Peternakan. Medan, 19 Mei 2012, pp. 65-72. [in Indonesian]
- [9] I. Susilawati, N. P. Indriani and U. H. Tanuwiria, "Technological innovation of local resources-based beef cattle feed in Pasirbungur and Purwadadi Barat". 2014. [in Indonesian]
- [10] T. F. D. Lumy, "Simulation of government policy in order to improve the household income of cattle farmers in Bolaang Mongondow Regency of North Sulawesi". Journal of Research in Agriculture and Animal Science vol. 2(9), 2014, pp. 27-37



- [11] Suratini, P. Muljono, C. T. Wibowo, "The use of social media to support agriculture extension activities in Minahasa Regency, the Province of North Sulawesi". *Jurnal Penyuluhan* Vol. 17(01), 2021, pp. 12-24. [in Indonesian]
- [12] Statistic Office of North Minahasa. "North Minahasa Regency in numbers of 2023. North Minahasa Regency, Airmadidi". 2023 [in Indonesian]
- [13] H. Hardani, N. H. Auliya, H. Andriani, R. A. Fardani, J. Ustiawaty, E. F. Utami, D. J. Sukmana and R. R. Istiqomah, "Qualitative and Quantitative Research Method". CV. Pustaka Ilmu, Yogyakarta. 2020 [in Indonesian].
- [14] Statistic Office of North Minahasa. "North Minahasa Regency in numbers of 2023. North Minahasa Regency, Airmadidi". 2023 [in Indonesian]
- [15] B. Hartono, "Economic analysis of the beef cattle farm households in Damsol District, Donggala Regency, Central Sulawesi Province". *J. Ternak Tropika* 12, 2011, pp. 60-70. [in Indonesian]
- [16] E. Nugroho, S. Azizah, T. Susilawati and I. Novianti, "Socio-economic potential of Indonesian native cattle in supporting meat self-sufficiency in Indonesia". *Livestock Research for Rural Development* vol. 25(11), 2013.
- [17] O. I. Oladele and K. Rantseo, "Determinants of cattle farmers' perceived relevance of livestock technologies in Botswana". *Livestock Research for Rural Development* vol. 22 (5), 2010.
- [18] A. O. K. Adeshinwa, J. O. Okunola and M. K. Adewumi, "Socio-economic characteristics of ruminant livestock farmers and their production constraint in some parts of Southwestern Nigeria". *Livestock Research for Rural Development* 16(8), 2004.
- [19] B. Hartono and E. S. Rohaeni, "Contribution to income of Traditional Beef Cattle farmer household in Tanah Laut Regency, South Kalimantan, Indonesia". *Livestock Research for Rural Development* 26(8), 2014.
- [20] D. A. Iyai, D. T. R Saragih and F. P. Rumbiak, "Effect of traditional cattle farming system on farmer's knowledge, cattle performance, and agribusiness in West Gune-Potential in west new Guinea- Papua Barat Province, Indonesia". *Animal and Veterinary Sciences*. Vol. 4(1), 2016, pp. 5-10
- [21] W. D. P Pelawi, Rosnita and R. Yulida, "Institutional analysis of agricultural extension in Kamar Regency, Indonesian". *Journal of Agricultural Economics (IJAE)* Vol. 8 (1), 2017. [in Indonesian]
- [22] M. Fauzi, M. Sulisyati and S. Winaryanto, "Relationship of the interpersonal communication behavior and the fulfillment rate of farmer's need for information in dairy cow farming". *Fakultas Peternakan. Universitas Padjajaran, Bandung*. [in Indonesian]
- [23] H. Mayulu, C. Sunarso, Imam Sutrisno and Sumarsono, "Beef cattle farm development policy in Indonesia". *Jurnal Libang* vol. 20(1), 2010, pp. 201 [in Indonesian]
- [24] Y. Olli, M. A.V. Manese. J. Pandey and I.D.R. Lumenta, "The influence of the cattle farm business on the farmer's income in Kalawat district, North Minahasa Regency". *Jurnal Zootek* Vol. 33(1), 2013, pp. 27-34(Juli2013). [in Indonesian].
- [25] A. Panawa, J. Lainawa, G. D. Lenzun, and F. H. Elly, "Cattle farm contribution as transportation tool by coconut plantation farmer in Jailolo district, west Halmahera". *Jurnal Zootek* Vol 34 (spec. edition), 2014, pp. 37-50. [in Indonesian]

- [26] H. Hajirin and Suryahadi, "Bali beef cattle development strategy of Barru Regency". *Manajemen IKM* 15(1), 2020, pp. 48-61. [in Indonesian]
- [27] T. F. D. Lumy and R. E. M. F. Osak, "The role of an appropriate technology of the traditional feeding of the beef cattle business in North Dumoga District, Bolaang Mongondow Regency". *Prosiding Seminar Nasional Teknologi Peternakan dan Veteriner 2015*. Balitbangnak, Jakarta. [in Indonesian]
- [28] E. Wantasen, B. Hartono, H. Nuhfil and V. V. J. Panelewen, "Household economic behavior of traditional cattle farmers in utilizing artificial insemination technology: A Case Study in Village of Kanonang III, Minahasa Regency of Indonesia". *J Agric Food Tech.* 2, 2012, pp. 141-152.