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Analysis of Factors Influencing Inseminator Performance Towards Increasing Beef Cattle Production in Deli Serdang Regency

Ismail D[1], Tri Martial[2], Rasidin Karo-Karo Sitepu[3]
*([1,3]*Universitas Islam Sumatera Utara, [2]Universitas Medan Area*)*
ismail.d@dosen.pancabudi.ac.id

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Abstract
Deli Serdang Regency is one of the key beef cattle production centers in North Sumatra, playing a crucial role in efforts to achieve self-sufficiency in meat production at both the provincial and national levels. However, in recent years, the population and production of beef cattle in this region have fluctuated, while the demand for beef remains unmet. Therefore, this study aims to identify the factors influencing the performance of inseminators in improving beef cattle production in Deli Serdang Regency. This research employs a non-random sampling method using judgment sampling techniques. The sample consists of all inseminators from the Department of Agriculture and Livestock of Deli Serdang, totaling 42 respondents. The collected data were analyzed using the SEM method with the assistance of SmartPLS4 software. The results indicate that variables such as rewards, leadership, communication, and knowledge have a positive but statistically insignificant impact on inseminator performance (P Value > 0.05). Meanwhile, skills have a positive and significant influence on inseminator performance (P Value < 0.05). Indirect testing reveals that rewards, leadership, and communication influence motivation but are not significant. Similarly, knowledge affects ability but is also not significant. However, skills have a significant impact on inseminator performance. Between 2018 and 2022, the beef cattle population in Deli Serdang Regency increased by 1.44%, reaching 102,985 heads. Conversely, beef production declined by -1.27%, with a total production of 2,040,172 tons.

Keywords— Ability, Artificial Insemination (AI), Beef Cattle, Communication, Motivation, Performance, Reward, Leadership, Knowledge, Skills, Inseminator.

Introduction

Indonesia is an agricultural country where the livelihoods of most of its population are in the agricultural sector. The agricultural sector provides food for most of its population and provides employment for some people, especially in rural areas. The shrinking agricultural land encourages farmers to try to increase their income with other complementary activities. One of these activities is the cattle breeding and fattening business (Rusdiana & Praharani, 2019).

One of the agricultural sectors with great potential for development is beef cattle farming, which is part of the livestock sub-sector. The demand for beef in Indonesia has shown an increasing trend every year, along with a continuous rise in imports at an accelerating rate, including both beef and feeder cattle imports. This situation requires stakeholders to promptly implement a national beef cattle farming development strategy to reduce dependence on imports and, gradually and sustainably, achieve self-sufficiency in meeting the country's beef needs (Ariningsih, 2014).

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The general objective of livestock development is to improve the quality of policies and programs that lead to the utilization of local resources to build competitive and sustainable livestock and to build a national livestock system that is able to meet the needs for livestock products and improve the welfare of livestock farmers. Meanwhile, the specific objectives of livestock development are (1) to increase the quantity and quality of livestock seeds, (2) to develop cultivation efforts to increase the population, productivity and livestock production, (3) to improve and maintain animal health status, (4) to increase the guarantee of animal food security that is ASUH (safe, healthy, intact and halal) and (5) to improve excellent service to the livestock community.

Cattle, especially beef cattle, are one of the sources of food production in the form of meat which has high economic value and is important in people's lives. Because one or a group of cattle can produce various kinds of needs, especially as food in the form of meat, milk,besides other by-products such as manure, skin, bones, and so on.

One of the centers of beef cattle farming in North Sumatra province is Deli Serdang district, the amount of beef production in Deli Serdang district continues to increase every year along with the increase in the population of beef cattle in Deli Serdang district, although in general there is an increase in the population and production of beef in Deli Serdang district, but beef consumption per capita per year is still very low, namely 0.004 kg / week or 0.169 kg / capita / year (BPS, 2023), this consumption is still lower than the national beef consumption of 2.4 kg / capita / year (BPS, 2023) based on these data shows that beef production in Deli Serdang district has not met the needs of the community in Deli Serdang Regency.

The government continues to strive to increase the cattle population and beef production in Indonesia so that the need for beef in Indonesia is met and the community can consume meat according to the standards targeted by the government. Through the SIKOMANDAN program which is a continuation program of the UPSUS SIWAB program where increasing births is a strategic activity and the key to the success of the implementation of SIKOMANDAN activities, which begins with the identification of acceptors, IB-PKb services until birth. To support the implementation of this increase in births, a series of activities are needed from preparing acceptors, preparing IB tools and materials,procuring and distributing frozen semen and Liquid N2, IB mating services, pregnancy checks to reporting births (Kementan, 2023)

Reproductive technology and reproductive management in the form of natural mating intensification (INKA) and artificial insemination (AI) that have been implemented so far seem to have not been fully successful in boosting population growth. In fact, AI technology has been introduced in Indonesia since the early 1950s. However, the need for frozen semen until now still has to be imported from abroad (Amran et al., 2017).

Population growth and increased meat production in the district Deli Serdang is inseparable from the role of artificial insemination officers (Inseminators) who carry out the insemination process on cattle aimed at breeding aspects (genetic quality) and production aspects. Based on the above, the author is interested in conducting a study entitled analysis of factors that influence performance inseminator in increasing beef cattle production in Deli Serdang Regency.

Literature Review

(Suprianto & Djuliansah, 2018). Factors affecting the success of artificial insemination (AI) programs in beef cattle. The results of the acceptor performance evaluation showed that the knowledge of farmers in detecting estrus was on average high (tau) while the average value was moderate (64.95%) indicated in the discipline of farmers in reporting, the accuracy of farmers in reporting, the accuracy of farmers in detecting estrus, this was likely due to transportation and communication tools that were less affordable, a sense of concern for livestock was lacking

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because farmers were busy with their main businesses. In this study, it can be concluded that the failure of the AI program was likely due to the low performance of farmers (64.95%) and the appearance value of livestock with a BCS value of <5 (thin) ± 72.92%.

(Rinah et al., 2021). Evaluation of the National Program: Special Efforts for Mandatory Pregnant Breeding Cows in Tanjungpinang City. The results of the study indicate that the national Upsus Siwab program in Tanjungpinang City has been implemented effectively, albeit with certain limitations. One of the main challenges lies in the availability of facilities and budget, which remain inadequate. As a recommendation, policymakers should conduct comprehensive outreach and education programs for both farmer groups and individual livestock breeders in Tanjungpinang City. Additionally, the local government of Tanjungpinang should allocate a dedicated budget for livestock development to ensure the uninterrupted implementation of the national Upsus Siwab program without constraints related to infrastructure and resources.

(Sarini & Dewantari, 2020). With the title of the study identifying factors influencing the performance of inseminators in supporting the success of artificial insemination in the upsus siwab program in Bali. In this study, the indicators used to measure inseminator performance and the success of AI are the number of livestock that can be AI per year, service per conception, conception rate and calving rate. The results of the study showed that the average number of AI/year was 540.76 Heads, Service per Conception (S/C) was 1.19 times, Conception Rate was 63.76 (%) and Calving Rate was 55.17%. The conclusion of this study is that inseminator characteristic factors can be identified as contributing to inseminator performance in supporting the success of AI such as: age, level of education, number of families, time owned, length of technical training, length of time as an inseminator, distance of work area and employment status. The length of technical training, length of time as an inseminator and distance of the work area have a real role, but the length of time as an inseminator plays the biggest role in the performance of inseminators in efforts to support the success of AI in the Upsus Siwab program in Bali.

(Amidia et al., 2021) Analysis of the Performance of Artificial Insemination (AI) Officers at the Animal Husbandry and Fisheries Service of the Regency ofBungo. The conclusion of this study is that the results of artificial insemination in cattle are still low in each artificial insemination area in Bungo Regency, an average of 576 heads per year, when compared to the number of livestock in Bungo Regency, which is only 3000 heads, while the need for livestock in Bungo is 4000 heads per year, and the shortage is 1000 heads, this shows that the target of the district government has not been achieved by the Bungo Regency Animal Husbandry and Animal Health Service.

(Niken et al., 2022) The Effect of Work Compensation on Inseminator Employee Performance with Work Motivation as an Interventing Variable at the Situbondo Livestock and Fisheries Service. Based on the results of data analysis and discussion that have been described, several conclusions can be drawn from the overall research results, namely: 1) Compensation has a significant positive effect on motivation (H1 is accepted), 2) Compensation has a significant positive effect on performance (H2 is accepted), 3) Motivation has a significant positive effect on performance (H3 is accepted) 4) Compensation on performance through motivation has a significant positive effect (H4 is accepted).

Research Method

The study used a descriptive method with a case study form to answer the factors that influence the performance of IB officers in Deli Serdang Regency in increasing the cattle population in Deli Serdang Regency. Descriptive research is a type of research that can describe something that is happening at the time the research is conducted and examine the causes of a particular symptom.

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Data collection techniques were carried out by means of direct observation, interviews, interactive discussions, and distributing questionnaires obtain primary data and literature studies to obtain secondary data. The sampling technique was carried out using a non-random sampling method, namely intentionally using the judgment sampling method. This is based on considerations of the expertise and knowledge of the respondents, where the objects studied and the parties who became respondents were selected intentionally. In this study, the sample that. The number of inseminators used in the Deli Serdang Agriculture and Livestock Service was 42 people.

Results

1. Overview of the Region

Deli Serdang Regency is one of the 30 Regencies/Cities in North Sumatra Province. In general the topography of Deli Serdang Regency is divided into coastal land of 63,002 Ha, lowland of 68,965 Ha, highland of 111,970 Ha, with an average rainfall of 24° C - 27° C (BPS, 2023). The ideal conditions for developing beef cattle are with a temperature range of 10° C-27° C.

2. Respondent Characteristics

The description of respondent characteristics is described based on gender, age, last education, length of service, and employment status.

The characteristics of the respondents can be seen in the table as follows:

Table 4.1 Characteristics Based on Gender of Inseminator Officers in Deli Serdang Regency in 2023

Jenis Kelamin	**Jumlah**	**%**
Laki-Laki	37	88,1
Perempuan	5	11,9
Total	**42**	**100**

Source: SPSS v. 25 Output Results (Processed Data, 2023)

Based on Table 4.1, it is known that the gender of the respondents is 37 respondents (88.1%) male and 5 respondents (11.9%) female. Traditionally, men are considered to have more skills and knowledge in the field of animal husbandry, including beef cattle farming.

3. Analysis Results.

a. Measurement Model

The analysis of the measurement model or outer model in this study was carried out using validity tests and reliability tests. Validity tests consist of convergent validity and discriminant validity. While the reliability test is stated in calculating the composite reliability and Cronbach's Alpha values. Discriminant validity can be seen in the loading factor as in Figure 5.6, as follows:

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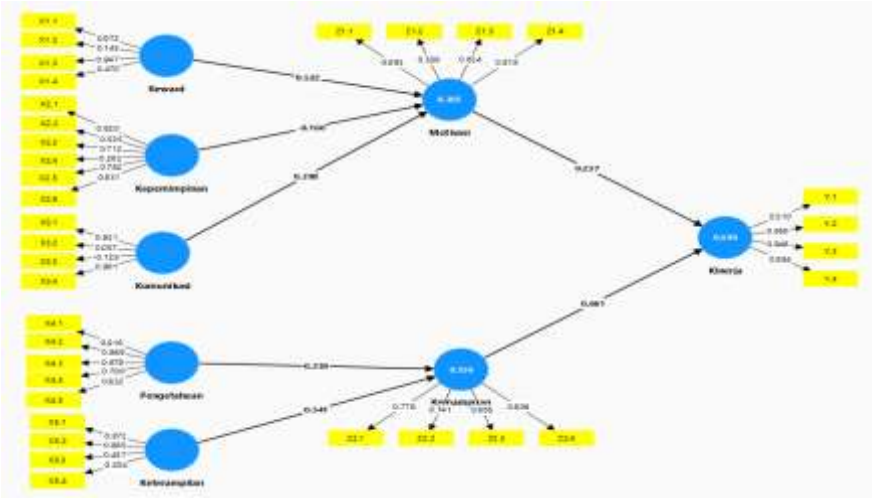


Figure 4.1 Path Diagram and Loading Factor Values

Source: SmartPLS v.4 Output Results (Processed Data, 2023)

Based on Figure 4.1, it shows the results of the loading factor calculation and the results obtained show that the loading factor value is not yet above 0.70. Based on the first data processing with the performance variable, there is 1 invalid instrument (Y1), the reward variable has 2 invalid instruments (X1.2, X1.4), the leadership variable has 3 invalid instruments (X2.1, X2.2, X2.4), the communication variable has 2 invalid instruments (X3.2, X3.3). The knowledge variable has 1 invalid instrument (X4.3). The variableSkills there are 2 invalid instruments (X5.3, X5.4). The following is the result of the second model image.

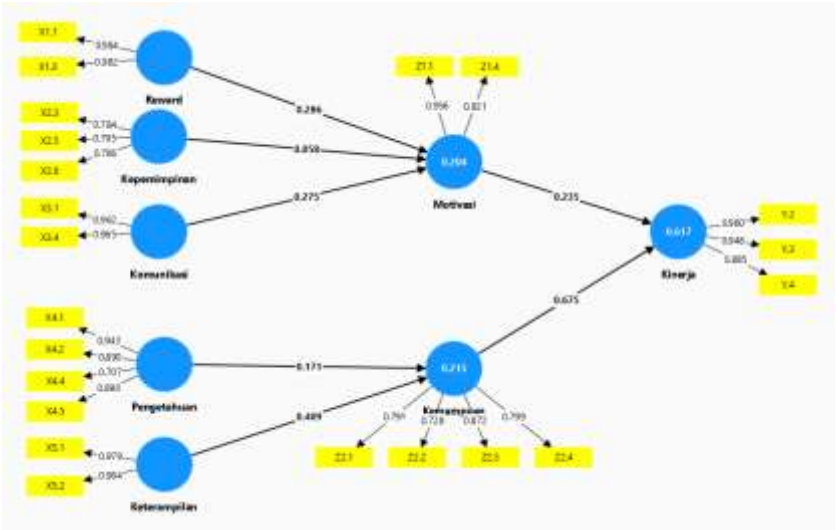


Figure 4.2 Results of Phase II Data Processing

Based on Figure 4.3, it shows the results of the loading factor calculation and the results obtained show that the loading factor value is above 0.70, so that the indicator has met the convergent validity requirements and has the required validity based on the rule of thumb used in accordance with what has been tested previously.

b. Structural Model

The structural model (Inner Model) defines the relationship between latent constructs by looking at the results of parameter coefficient estimation and its significance level (Siswoyo & Parwoto,

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2012). The inner model can be measured by calculating the R-square for the dependent construct, t-test and the significance of the structural path parameter coefficient. There are three categories in the R-square value grouping. If the R-square value is 0.75, it is included strong category for R-square value 0.50 is included in moderate category and 0.25 is included in weak category (Sitepu & Sebayang, 2023)

c. Path Analysis

Path analysis is used to test the hypothesis in this study, namely whether the role of Motivation and Ability in Reward, Leadership, Communication, Knowledge and Skills on the Inseminator Performance variable. This test is conducted to determine the presence of a mediation effect or not from this study.

The first stage carried out in this path analysis is to create a path diagram that is arranged based on the framework of thought that will be developed.

d. Beef Cattle Population and Production in Deli Serdang Regency

Deli Serdang Regency is one of the centers of beef cattle production in North Sumatra which is supported by available resources, both natural resources and human resources. Based on data from the statistical center in the last 5 years (2017-2022), the population and production of beef cattle in Deli Serdang Regency generally experienced fluctuations in increases and decreases in certain years caused by various technical and non-technical factors in the field. The increase and decrease in the beef cattle population in Deli Serdang Regency has a direct impact on the beef produced, thus having an impact on meeting the needs of the community for meat. data on the population of beef cattle and production of beef cattle in Deli Serdang Regency in the period the last 5 (five) years can be seen in the following table:

Table 4.11 Population and Production of Beef Cattle in Deli Serdang Regency 2017-2022

Tahun	Populasi Sapi Potong (Ekor)	Persentase (%)	Produksi Sapi Potong (Ekor)	Persentase (%)
2017	93.598	-	2.182.436	-
2018	94.533	0,99	2.001.185	-8,30
2019	95.508	1,02	2.021.197	1,00
2020	106.096	9,98	2.019.189	-0,10
2021	101.606	-4,42	2.019.982	0,04
2022	102.985	1,34	2.040.172	1,00
Rata-rata		1,78		-1,27

Source: BPS Deli Serdang Regency 2023

Based on Table 4.3.1, it can be explained that the beef cattle population in Deli Serdang Regency in the last 5 (five) years (2017-2022) generally showed an increase of 1.78%, where a very significant increase in the beef cattle population occurred in 2020 of 9.98%, but in 2021 there was also a fairly drastic decline of -4.42%, while in 2022 there was another increase of 1.34%.

Next, in the production of beef in a 5-year period the last (2017-2022) generally experienced a decrease in production of -1.27% where a very drastic decrease occurred in 2018 of -9.30% and in 2020 the decrease was -0.10%, while in 2019 and 2022 there was an increase of 1% in 2021 the increase in beef production was 0.04% based on these data shows that beef production in Deli

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Serdang Regency in the last 5 years has not experienced a significant increase in beef production even though there was a fairly high increase in the cattle population in 2020.

Discussion

1. Direct Influence

Based on the results of the direct influence test, it is known that rewards have a positive but insignificant effect on the performance of beef cattle inseminators in Deli Serdang Regency, where the path coefficient value of the reward is 0.067 and the insignificance is 0.348>0.05, which means that rewards have a positive but insignificant effect on performance in inseminators in Deli Serdang Regency, thus the first hypothesis is accepted. The effect of rewards on inseminator performance is because the form of reward obtained by the inseminator is compensation for the services of implementing AI provided by the farmer and in accordance with the agreement between the inseminator and the farmer, in addition to the support provided by the agricultural service to inseminators as a form of reward by giving awards to officers who achieve an AI success rate of >85% and are able to produce quality calves.

The influence of rewards on inseminator performance is due to the rewards received as a form of compensation being a motivation for inseminators towards morale to improve family welfare and economy and discipline in working, this is in accordance with (Rahmanda et al., 2020) which states that rewards or compensation very sensitive because it is a driver or motivation for someone towards morale and discipline in working. The inseminator's motivation is directed at improving family economy and work capacity, this is in accordance with the opinion of (Niken et al., 2022) which states that motivation is one of the factors that can support the achievement of maximum performance, because motivation is a person's internal state that activates and directs their behavior towards certain targets. With the motivation within the inseminator, it is hoped that it will be able to improve his performance and will have an impact on the compensation or reward that he will receive.

The results of the direct influence test on leadership have a positive but insignificant effect on inseminator performance, where the path coefficient value of leadership is 0.014 and its significance is 0.798>0.05, which means that leadership has a positive but insignificant effect on inseminator performance in Deli Serdang Regency, thus the second hypothesis is also accepted. Leadership isone of the driving aspects to improve inseminator performance in achieving IB success targets which have an impact on increasing the beef cattle population in Deli Serdang Regency. Leadership is very much needed to direct inseminators in achieving planned performance targets. This is in accordance with (Mardyantoro, 2016) who stated that leadership is a process of influencing or directing the behavior of others, both individuals and groups, to achieve certain goals.

The results of the direct influence test on communication have a positive but insignificant effect on inseminator performance, where the path coefficient value of communication is 0.065 and is not significant at 0.276>0.05, which means that leadership has a positive but insignificant effect on inseminator performance in Deli Serdang Regency, thus hypothesis 3 is also accepted.

The results of the direct influence test on knowledge also had a positive but not significant effect on inseminator performance, where the path coefficient value of knowledge was 0.115 and was not significant at 0.256>0.05, which means that knowledge has a positive effect on inseminator performance in Deli Serdang Regency, thus

The 4th hypothesis can be accepted. Knowledge is one of the factorsachievement of inseminator performance is also a supporting factor for the success of artificial insemination, the indicators

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measured in the knowledge variable in this study are knowledge of estrus detection, estrus cycle, cow health, feed technology and frozen semen quality. However, in this study, knowledge has a negative and insignificant effect on performance and ability, this is because inseminators in Deli Serdang Regency have more mature and longer experience, besides that inseminators in Deli Serdang Regency also have formal education that supports knowledge and skills, this is in accordance with the statement of (Yusniar et al., 2021) one way to improve the knowledge and skills of inseminators in carrying out AI activities is through formal and informal education such as courses, training and internships.

2. Indirect Influence

Based on the results of the indirect influence test (table 4.10) on rewards, it has a positive and insignificant effect on inseminator performance through motivation, where the path coefficient value of the reward is 0.067 and the insignificant value is 0.348>0.05, which means that rewards have a positive effect on inseminator performance through motivation, thus the 6th hypothesis is accepted. The effect of rewards on inseminator performance through motivation shows that giving rewards can increase inseminator motivation in carrying out the task of providing IB services to farmers, thus will not directly affect the performance of IB officers in Deli Serdang Regency.

Based on the results of the indirect influence test, leadership has a positive and insignificant effect on inseminator performance through motivation, where the path coefficient value of leadership is 0.014 and the insignificant value is 0.798, which means that leadership has a positive influence on inseminator performance in Deli Serdang district through motivation, thus the 7th hypothesis is accepted.

Furthermore, based on the results of the indirect influence test on knowledge, it has a positive and insignificant effect on inseminator performance through ability, where the path coefficient value of knowledge is 0.115 and the insignificant value is 0.256, meaning that inseminator knowledge has a positive effect on inseminator performance in Deli Serdang district through ability, thus the fifth hypothesis is accepted.

3. Analysis of Beef Cattle Population and Production in Deli Regency Serdang

The results of statistical calculations of beef cattle population data in Deli Serdang Regency in the last 5 (five) years (2017-2022) generally show an increase in the beef cattle population of 1.78% with a distribution in each year, namely in 2018 there was an increase of 0.99% (935 head) then in 2019 by 1.02% (975 head) and in 2020 by 9.98% (10,588 head) but in 2021 there was a decrease in the beef cattle population of 4.42% (-4,490 head) then in 2022 there was another increase of 1.34% (1,379 head) with a total beef cattle population of 10,985 head.

The increase in the beef cattle population in Deli Serdang Regency was very significant in 2020, where the beef cattle population in 2019 was 95,508 and in 2020 it increased to 106,096, so that the increase from 2019 to 2020 was 10,588 or 9.98%. In 2021 there was a decrease in the population of 4,490 or -4.42%.

Conclusion

Based on the results and discussion in this study, it can be concluded that concluded, as follows:

1. In the Reward variable, leadership and communication have a direct but insignificant influence on Inseminator Performance at the Deli Serdang Regency Agriculture Service.

2. On the Knowledge variable, there is a direct but insignificant influence, while the skills variable has a direct and significant influence on Inseminator Performance at the Deli Serdang Regency

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Agriculture Service.

3. In the Reward, leadership and communication variables, there is an indirect but insignificant influence on the Inseminator Performance at the Deli Serdang Regency Agriculture Service through the Motivation variable.

4. On the Knowledge variable, there is an indirect and insignificant influence, while on the Skill variable, there is an indirect and significant influence on the Performance of Inseminators at the Deli Serdang Regency Agriculture Service through Ability.

5. The population of beef cattle in Deli Serdang Regency in the last 5 years (2017-2022) generally experienced an increase of 1.44% with a population of 102,985 head, while beef production in Deli Serdang Regency generally experienced a decrease of 1.27% with a total production of 2,040,172 tons.

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