



Sustainable Livestock Development Strategy Through Artificial Insemination Evaluation In Nganjuk

Efi Rokana¹⁾, Zaenal Fanani²⁾

¹⁾Kadiri Islamic University

²⁾Brawijaya University

E-mail: ¹⁾evie_evyy@gmail.com

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Abstrack

The aims of this research are to analyze the role and success level of artificial insemination to support sustainability livestock development strategy in Nganjuk district. This research was held in Rejoso subdistrict, Nganjuk district for 6 months. The research materials were 45 cow with different breed and parity which inseminated with Limousin's straw. This was survey research which primary data were collected used purposive sampling method, with respondents criterias were 5 years minimum beef cattle experiences, 3 beef cattles minimum to managed, and respondents as artificial insemination beef cattle acceptor minimum for 5 years. The variable of this research was the success level of artificial insemination which counted from S/C (Service per Conception) value of artificial insemination. The data were analyzed with descriptive analysist. Statistical analysist used logistic regression to identify correlation between success of artificial insemination based on breed and parity. The research result concluded that Limousin straw give higher response on pregnancy as the success level of artificial insemination in research area which inseminated to Brahman and Simmental than Ongole and Limousin itself. The higher parity gave better S/C value which mean the level success of pregnancy getting higher, however the level success of pregnancy will be decline after reached the peak related to cow's age. Artificial insemination technology could impelemented in research area in order to support sustainability livestock development strategy because of correlation between principle of sustainability development criterias with livestock resources, such as ecological, economical, socio cultural, organization and technological factors.

Key words: reducing losses, milk production, social and economical analysis

Introduction

Food needs from livestock products will be increasing along as population increased, incomes increased, urba-nization, nutrition awareness, and dietary changes. FAO (2009a) reported that urban society have changes their lifestyle and dietary which higher incomes than villagers. This causes decreased of major food and grain diversity, otherwise demand of fruits, vegetables, meat, milk and fish will increased, as reported FAO (2009b). Diwyanto et al. (2002) stated that incomes increased will increase the demand of food from livestock prod-

ucts, one of them is meat.

In order to supply domestic meat, import of meat and beef cattle policy have done until causes uncontrolled import value increased which could effect the domestic inflation. Otherwise, when import of meat and beef cattle policy have stopped and restricted, domestic beef cattle supply reduced in uncontrolled amount. There are many productive cows and local steers and heifers have slaughtered for many reasons, such as competitive price, limited capital, money demand and consumer special requested.

Artificial insemination technology is one

of sustainable livestock development strategy in order to population increased. This strategy could implemented on local and exotic breed of beef cattle in purebreed management and crossbreed management. Implementation of this strategy in purebreed management ensure the sustainability of local genetic resources. Implementation of this strategy in crossbreed management to develop meat production with directed crossbreed management. It mean that implementation of this strategy could realize national sustainable livestock development. For that goal, government apply this policy in all Indonesia territory.

One of them, in Nganjuk district, especially in Rejoso subdistrict. In this area, farmers have good understanding of artificial insemination. Farmer's review stated that artificial insemination is more effective than natural insemination, which shown from artificial insemination genetic quality of beef cattle crossbreed is higher than natural insemination. This causes all of farmers in this area prefer artificial insemination beef cattle crossbreed than local beef cattle, which the most popular is Limousin crossbred, than next sequences are Simmental crossbred, Ongole's hybrid and Brahman crossbred. Therefore, need artificial insemination evaluation research in this area, which the aims are to analyze the role and success level of artificial insemination to support sustainability livestock development strategy in Nganjuk district.

Material and Methods

This research was held in Rejoso subdistrict, Nganjuk district for 6 months. The research materials were 45 cow with different breed and parity, which inseminated with Limousin's straw. The details of materials research as see on Table 1.

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cial insemination beef cattle acceptor minimum for 5 years. The variable of this research was the success level of artificial insemination which counted from S/C (Service per Conception) value of artificial insemination.

The data were analyzed with descriptive analysist. Statistical analysist used logistic regression to identify correlation between success of artificial insemination and breed and parity. Model test used were Hosmer & Lemishow test and chi-square tes in order to test logistic regression. The success level of artificial insemination measured by probability equation of pregnancy. Descriptive analysist was used to analyzed ecological, economic, socio-culture, organization and technological aspects which support artificial insemination technology programs as sustainability livestock development strategy in Rejoso subdistrict, Nganjuk district.

Result and Discussion

Research Area Review

The research area is forest area adjacent to Bojonegoro district and have agricultural potentials although majority area use rain-fed system. Livestock business is popular subsistein with an easy handle management because of feed abundant in this area. The animal market is the place to sell their livestock which held once for 5 days, every "Wage" in Javanese calender.

The Success Level of Artificial Insemination-Based on S/C Value for Different Breed and Parity

Logic equation from this result is : $Z = -2,887 + 4,094 \text{ Brahman} + 1,628 \text{ Ongole} + 3,829 \text{ Simental} + 0,637 \text{ Paritas Brahman}$'s regression coefficient is 4,094 ($p=0,004$), interpretation of this value that the level success of artificial insemination with 1 Brahman straw is higher and give significantly differences than Limousin. Ongole's regression coefficient is 1,628 ($p=0,148$), interpretation of this value that the level success of artificial insemination with 1 Ongole straw is higher and did not give significantly differences

Table 1. Material Research

No.	Breed of Cows	Parity						Amount (tails)
		0	1	2	3	4	5	
1	Limousin cross	3	5	4	3	1	1	17
2	Simental cross	5	2	2	-	2	-	11
3	Ongole cross	3	3	1	-	1	-	8
4	Brahmancross	3	1	-	3	2	-	9
Amount (tails)		14	11	7	6	6	1	45

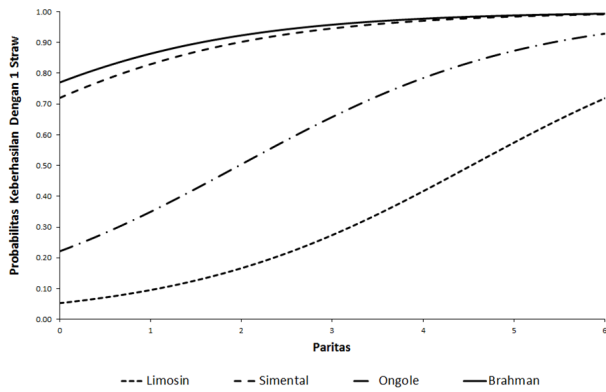


Figure 1. The Success Level Curve

than Limousin. Simmental’s regression coefficient is 3,829 ($p=0,002$), interpretation of this value that the level success of artificial insemination with 1 Simmental straw is higher and give significantly differences than Limousin. These value show that the level success of artificial insemination based on breed sequentially from highest to lowest are Brahman, Simmental, Ongole and Limousin. Parity’s regression coefficient is 0,637 ($p=0,048$), interpretation of this value that the level success of artificial insemination with 1 straw will increase with the parity’s increase. The pattern of level success of artificial insemination based on different breed and parity show in Figure 1.

Brahman and Simmental have the high success level on all parity level and gave similarities level after parity 3. The success probability of Ongole reach 50% or higher start from parity 2. The success probability of Limousin reach 50% or higher start from parity 4. These success level of artificial insemination counted from S/C (Service per Conception) value of artificial insemination.

This research result show that Brahman have better S/C value compared to other breeds, sequently Simmental, Ongole and Limousin. This result be expected that Simmental and Limousin (*Bos taurus*) have longer estrus cycle than Brahman and Ongole (*Bos indicus*). This research result show that the higher parity gave better S/C value. The higher parity gave S/C value getting lower, which mean the level success of pregnancy getting higher, however showed from the curve that the level success of pregnancy will be decline after reached the peak. This condition related to cow’s age. Higher parity mean getting old of cow’s age, and the fertility getting decline along with getting old of cow’s age. This condition same with Kusriatmi, et.al (2014) reported that success factors of artificial insemination are (1) the exact insemina-

tion timing; (2) environment condition; (3) feed; and (4) after birth management.

Artificial Insemination Technology Implementation in Nganjuk District In Order To Sustainability Livestock Development

The compatibility of logic regression model of this research result explained the success level measured from determinant coefficients, which Cox & Snell, Nagelkerke, and Log likelihood value change ratio, as see on Table 2.

Table 2. Model Match Level

Approach	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
Match Level	0,376	0,414	0,552

Model match level measured from determinant coefficients approach show the value between 37,6% - 55,2%. These value explain that success level of pregnancy with artificial insemination still need other factors.

Those factors directed to sustainability development factors. Anonymous (2009) stated that sustainability development concept is fusion of contradictive two phrases, which sustainability and development. Sustainability explain about to maintain resources, and development demanding changes and resources optimalization. For further, in order to get optimum benefits livestock development must meet the sustainability development criterias, such as economic, socio cultural and ecological factors. Mastuti, et.al. (2016) stated that sustainability development must meet the principle of relationship between ecological, economic, socio cultural, government institution and technological dimension. Sustainability livestock development must meet the relationship between principle of sustainability development criterias with livestock resources.

Rohaeni, Hartono, Fanani and Nugroho (2014) reported that sustainability livestock development affected by environment resources, economic resources, social resources, technology resources and human resources. From that report knew that the highest loading factor coefficient, it is obtained information that the indicator of livestock management mastery indicates the strongest indicator of technological resources variables gauge compared to tech-

nology mastery. Farmers can master the livestock management mastery better such as cattle disease prevention, lair age capacity and estimating cattle body weight if they will be sold. For the technology information such as cattle farms quality, feed technology, reproduction, handling/treatment of disease and lair age technology, if farmers need these, they will ask for the help from livestock technical personnel/extension workers. Sustainability of cattle farming is directly affected by the environmental resources, economic resources, technological resources, physical resources, human resources, and institutional resources. The highest CR value is resulted from technological resources, human resource, meaning that the sustainability of beef cattle farming is strongly affected by the technological and human resources, although other resources provide real effects except social resources. Technology providing effects in this study are cattle farms, feed, reproduction, diseases, lair age and knowledge of estimating animal body weight.

Based on sustainability livestock development must meet the relationship between principle of sustainability development criterias with livestock resources, create sustainability livestock development strategies, which one of them is artificial insemination technology policy implementation. Review about artificial insemination technology implementation in Nganjuk district could be use as implementation of sustainability livestock development strategy.

1. Ecological factor

Natural resourcess in Nganjuk district play a role in the success of artificial insemination implementation in research area, espically feed guaranteed availability. Wide agricultural area in Nganjuk district supported feed guaranteed availability, which forage, agricultural waste and agricultural industrial waste as feed. Population increased along with success of artificial insemination have side effect on increased volume of feces. Feces have economical value, when it processed into compost and biogas. It means that the success of artificial insemination implementation give positive effect on ecological review. Nantil, Fanani, Utami and Nasich (2017), has done a research to analyze the sustainability sta-

tus of the dimensions of economy, ecology, technology, and society, as well as organization in the integrated system of beef cattle breeding and crop farming in Jember Regency of East Java. The research result showed that the ecology condition in research area was quite supportive to the sustainability of agribusiness with the integration system between cattle and crop. Some attributes of ecology dimension were quite influential to the sustainability of the dimension, among others were the availability of processing site for RPH waste, the availability of RPH, and the supporting capacity of the feed. It was said so because the leverage rate of three attributes was greater than other attributes. It could be also said that to improve the sustainability of ecology dimension, then the abattoir must be available, nearby, and managed well, with easier access to the feed source.

2. Economical factor

Livestock reproduction biotechnology engineering, such as artificial insemination could increased the reproduction process, which also could farmers income increased (Anonymous, 2011). Optimalization of artificial insemination could shorten calving interval, which could increased population and meat production. It means that optimalization of artificial insemination could increased beef cattle productivity. Beef cattle productivity increased could increased domestic beef cattle supply and lowering it price. This condition made domestic beef cattle more competitive and able to substituted import meat. It means that beef cattle productivity increased could effect on increasing Product Domestic Bruto (PDB) and employment opprtunities.

3. Socio-cultural factor

Beef cattle management in research area have done in 2 pattern, that is own managed and "Gaduhan" pattern. Implementation of artificial insemination technology could increased population which also increased the number of beef cattle ownership. Wahyono, Fanani, Nugroho and Nasich (2017) were reported that the sign of explanatory variable in the equation of all incomes that related with beef cattle breeding at Gaduhan Pattern (RESP) was compatible with the expectancy and economical behavior from the worker who maintain the number of beef cat-

tle bred (JSP) and also from the grass-collection worker (TKSPRM). Therefore, the income of beef cattle breeding at Gaduhan Pattern (RESP) was influenced by the number of beef cattle bred and the number of grass-collection worker. The greater number of beef cattle bred, the greater also be obtained the incomes from beef cattle breeding at Gaduhan Pattern. The higher ownership rate for beef cattle was closely related with not too high production input cost. It conflicted with the finding in the ownership scale below five beef cattles. Great number of beef cattle bred would minimize the loss due to unreliable production input. Grass-collection worker was one determinant in this situation. Greater number of grass-collection worker at Gaduhan Pattern would reduce the income of beef cattle breeding at Gaduhan Pattern because production input cost was not efficient, possibly due to the excessively high cost to expend in production input. It definitely decreased farmer income. Therefore, in simultaneous manner, number of beef cattle bred, concentrate cost, number of grass-collection worker, and beef cattle development pattern, were obviously influential to the income of beef cattle breeding.

4. Organization factor

Syukur, Fanani, Nugroho, and Antara (2014) stated that the resources of beef cattle farmer consisting of financial, technological, economic, physical, social and vulnerability (seasonal vulnerability and vulnerability of security) simultaneously affected the level of farmer group dynamics. The most dominant factor affecting the level of farmer group dynamics (sustainability of the group) is a technological mastery resources and the least factor is context of vulnerability in the aspects of seasonal vulnerability and vulnerability of security. It means that in artificial insemination technology implementation, farmer group dynamics is important in order to develop sustainability livestock by increased beef cattle productivity simultaneous. Farmer group dynamics need support from government, especially local government, in order to empowered them. In research area, local government have dominant role to empower farmer groups in order to increased beef cattle productivity by artificial insemina-

tion implementation. Local government role in skilled inseminators and quality straws availability.

5. Technological factor

Artificial insemination technology give positive effect on beef cattle production. This condition indicated that artificial insemination technology implementation could increased beef cattle productivity. Production response to artificial insemination dosage are inelastic in the short term. It means that 10% increased of artificial insemination dosage could 2% increased of beef cattle productivity. This condition affected by inefficient artificial insemination technology implementation with high S/C value. Priyanto, et.al (2013) stated that livestock production response to technological response need long term because of biological factors. There are correlation between technological implementation and productivity increased. Technological implementation could change all production technical, which production resources efficiency improvements and productivity increased as output.

Conclusion

This research concluded that Limousin straw give higher response on pregnancy as the success level of artificial insemination in research area which inseminated to Brahman and Simmental than Ongole and Limousin itself. The higher parity gave better S/C value which mean the level success of pregnancy getting higher, however the level success of pregnancy will be decline after reached the peak related to cow's age. Artificial insemination technology could implemened in research area in order to support sustainability livestock development strategy because of correlation between principle of sustainability development criterias with livestock resources, such as ecological, economical, socio cultural, organization and technological factors.

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