
Micro Policy Interventions to Increase Income in Beef Cattle Business in Kupang District

Morin Mediviani Sol'uf¹, Maria Krova², Agus A. Nalle³, Matheos F. Lalus⁴, I Gusti Ngurah Jelantik⁵, Diana Meliani Sabat⁶

^{1,2,3,4,5,6}Animal Husbandry Study Program, Nusa Cendana University Kupang Jl. Adisucipto, Kupang, NTT 85001

ABSTRACT: A study has been conducted with the aim to determine the actual behavior of beef cattle farmers' income and formulate micro-policies for beef cattle farmers' income in Kupang district. Sampling in this study was conducted in stages. The first stage was purposive sampling of four sub-districts, the second stage was snow ball sampling of 40 farmers and traders and six government officials using an interview approach. The number of key informants depends on the saturation of information obtained. The software used in this research is Ventana Simulation (Vensim) PLE. The results showed that the actual behavior of calf production and income from beef cattle farmers tended to decrease, each by 20.61% and 3.73% per year, respectively. Therefore, policy interventions are needed: 1) increasing calving rate can increase the population of young beef cattle by 3.35% per year and profits by 3.49% per head per year; 2) adding feed supplementation can increase the population of young beef cattle by an average of 4% per year, fattening males by 2.81% per year, and profits by 4.03% per head per year; 3) increasing stakeholder service intensity can increase the population of young beef cattle by 3.12% per year, fattening male production by 5.04% per year, and average profits by 3.37%.

KEYWORDS: Micro-policies, calving rate, feed supplementation, stakeholder services, beef cattle business.

INTRODUCTION

In 1980, East Nusa Tenggara (NTT) was a cattle warehouse that provided beef for regions in Java. NTT was also one of the main suppliers of cattle to several other regions in Indonesia a few decades ago (Priyanto, 2016). However, the cattle population has continued to decline in recent years. This is due to the pattern of raising cattle with grazing management.

Beef cattle business is one of the businesses that has been carried out for generations by farmers in Kupang Regency. Although beef cattle farming has been practiced for generations, it is not yet market-oriented, so farmers who run it are only limited to meeting the basic livelihood needs of livestock without paying attention to productivity and livestock production. The beef cattle business has been carried out for generations without taking into account the costs and profits obtained (Sabat and Sol'uf 2022).

This condition has an impact on productivity and production as well as decreased farmer profits. Various efforts have been made by the government and other agencies such as counseling activities, providing assistance in the form of livestock to increase the productivity of beef cattle business, but it has not been optimally applied or carried out as a whole by farmers. This is due to cultural factors that are still inherent in farmers so that it is difficult for farmers to be open and adopt every technology that is socialized and livestock assistance provided by government agencies and other agencies involved in the beef cattle business. This study was conducted with the aim of increasing income in beef cattle farming in Kupang Regency. This research will show the actual behavior of productivity and production of beef cattle and the income earned by farmers in beef cattle farming where based on the actual behavior can be recommended policies that can be done to increase the income of beef cattle farmers. Related to this description, a research has been conducted with the title Micro Policy Intervention to Increase the Income of Beef Cattle Farmers in Kupang Regency.

RESEARCH METHODS

This research was conducted over a period of six months in two areas in Kupang District, namely Amfoang, which represents the beef cattle breeding area, and Amarasi, which is the beef cattle fattening area. The research areas were determined using purposive sampling. The determination of respondents for key informants was carried out using a snowball sampling approach, namely 40 farmers and 10 traders. In addition, interviews and Focus Group Discussions were also conducted with government agencies and actors involved in the beef cattle business. In this research, the number of key informants depends on the saturation of information obtained. The software used in this research is *Ventana Simulation (Vensim) PLE*. The software is used in the stages of making cause and effect diagrams, making flow charts or sub-model diagrams (*level and rate*) of the system under study, developing

Micro Policy Interventions to Increase Income in Beef Cattle Business in Kupang District

models of the system, testing model assumptions, and simulation stages. All of these will be built in a *stock* and flow diagram. In the inventory and flow diagram there are several symbols, as follows: a rectangle that states the inventory (*stock/level*), a *valve* symbol that states the flow (*rate or decision point*), the name symbol of the flow and a cloud symbol that states the boundary of the model.

RESULTS AND DISCUSSION

Actual Behavior of Beef Cattle Productivity and Production and Income of Beef Cattle Farmers in Kupang District

The decline in farmers' income is due to low productivity and production of beef cattle. This is shown through the population structure of calf cattle and the production of fattening adult male beef cattle shown in Figure 1. The simulation results from Figure 1 show that the slaughter population structure behavior of the beef cattle population structure averaged 278/head per year per population structure or 12.61% per year per population structure. In the population structure, the decline in young and adult female population is 808.47 head/year or 3.87% per year and 431.25 head/year or 2.63% per year, respectively. This could be due to the high slaughter rate of female beef cattle which reached 54% in addition to slaughter and sales at the farmer level which reached 84%.

The cutting of productive females causes an imbalance in the population structure. Feeder production decreased by 20.61% of total mature females. The decline in the population of young cows and calves is not only due to high female slaughter but also due to calf mortality which reached 26% and low birth rate of 70%. (Jelantik *et al.*, 2019) stated that feeder production per year only reached 23% of the total population. Furthermore, it is stated that this is due to the low productivity of Bali cattle (*calf crop* 70.70% and calf mortality 17-35%). Based on the results of this simulation, it is feared that in the long term there will be no replacement stock of feeders for breeding and fattening due to lower feeder production. Therefore, if there is no effort to increase beef cattle productivity through certain policies, it could lead to a decline in the beef cattle population in Kupang District.

In addition to an imbalance in the population structure, there was also a decrease in the production of fattening bulls by 21.81 head per year or 3.15% per year. The decline in production of fattening adult beef cattle is partly due to feed factors. The feed developed in NTT experienced a decrease in production in the dry season while the rainy season experienced an increase in production. This causes livestock to experience high feed stress in the dry season resulting in a decrease in body weight. (Lalus *et al.*, 2019) stated that in the dry season beef cattle experienced a body weight loss of 50 kg.

The condition of feed availability can affect the fattening time of beef cattle. If the availability of feed is abundant, the fattening time required to fatten beef cattle will also be shorter. This is supported by the results of the study (Nalle, 2016) which states that the average length of fattening beef cattle in the fattening area is 17.8 months while maintenance with good management only lasts for 3-4 months. In addition, the average length of livestock maintenance in fattening cages ranges from 3-4 months, depending on the initial condition of the livestock (age and body weight) and the ration provided (Lestari, 2022). A long fattening period will further affect the profit obtained.

The condition/trend of profit obtained by farmers tends to decrease by Rp1,697,149.86 per head per year or 3.73% per year along with the production of fattening bulls produced in the beef cattle fattening business. The decline in profits obtained by farmers can be caused by production costs incurred during the process of fattening beef cattle is not proportional to the production of beef cattle produced. (Nalle, 2016) stated that fattening beef cattle rearing management lasting 18 months and simple management can cause body weight to only reach 0.2-0.4 kg/head while the optimal weight gain for Balinese cattle can reach 0.3 -0.6 kg/head.

Farmers are only able to produce 1 bull out of 10 cows they own. The average ownership of 3.2 cows means that farmers in NTT can only sell their cattle every 3 years. Nikolaus *et al* 2019. The low productivity of cattle is also evident among cattle farmers in Ponae village, Amarasi subdistrict, Kupang district. The lengthy selling process means that farmers tend to choose other businesses to develop rather than beef cattle.

Micro Policy Analysis of Beef Cattle Business Income Improvement in Kupang District

Based on the actual behaviors shown such as the low production of fattening beef cattle and the income obtained by fattening beef cattle farmers, policies are designed to increase production and income of farmers. The policies carried out are divided into 3 namely 1) increasing calving rate; adding feed supplements to reduce mortality and provide additional body weight for fattening beef cattle; 2) increasing the intensity of stakeholder service assistance. Details can be seen in Table 1.

Table 1. Simulation Model Parameters of Actual Conditions and Engineering Scenarios of Beef Cattle Production Business to Improve Productivity of Beef Cattle Business in Kupang District.

Policy	Actual Condition	Scenario				
		I		II		III
		A	B	A	B	
Increase <i>Calving Rate</i>	0,70	0,80	0,85	0	0	0

Micro Policy Interventions to Increase Income in Beef Cattle Business in Kupang District

Addition of feed supplements to reduce beef cattle mortality:						
						0
Nursery	0	0	0	1%	2%	0
Fattening	0	0	0	1%	2%	
Increased Intensity of Institutional Assistance						
						1
Nursery	0	0	0	0	0	1
Fattening	0	0	0	0	0	

Policy I - Policy I was implemented by increasing the *calving rate* of beef cattle to 0.80 and 0.85 from the actual condition of 0.70 to determine the sensitivity of the model behavior due to this behavior. Increasing the calving rate affects the number of male and female calves in Kupang District. An increase in *calving rate* of 80% (scenario I A) will increase the population of calves by 6,766 head per year or 2.59% per year (scenario I A) and 12,711 head per year or 4.12% per year (scenario I B) and the average of scenarios IA and IB by 3.35% per year, as well as an average increase in profit of Rp5,415,646.17 per head per year or 3.49%. The dynamics of the beef cattle population continues to increase over time.

Increasing calving rate can be done by intensifying natural mating (INKA). Intensification of natural mating is an effort to increase the population of cattle / buffalo through the use and distribution of selected superior males. Intensification of natural mating is carried out considering that the beef cattle rearing system applied is an extensive system and naturally male cattle are able to know which females are in heat, so there is little possibility of delayed mating which can be detrimental in the process of increasing the beef cattle population. To implement the INKA program, a selection and *culling* system needs to be carried out on productive beef cattle that are reproductively no longer productive. To improve the quality of beef cattle *breeding* in NTT, it is necessary to improve the availability of female beef cattle that meet *breeding* standards to avoid a decrease in genetic quality and the availability of superior males in the population so that negative selection does not occur. The way to improve is by leaving good quality beef cattle in the population while beef cattle that do not meet the breeding standards are fattened and delivered. (Jelantik *et al.*, 2008) selection and *culling* system is one of the strategies that can be done by farmers in NTT with an extensive rearing system as an effort to increase the birth rate of Bali cattle in NTT.

In addition, artificial insemination (AI) technology can also be used to increase *calving rate*. IB technology is needed to ensure the availability of male beef cattle at any given time. Lack of availability can lead to the possibility of low calving rates because there are no free male beef cattle that can mate female beef cattle while grazing. In addition, the lack of stud beef cattle at the farm level can lead to *inbreeding*. This can lead to low production and appearance of the calves born. Research results (Baco and Malaka, 2023) on the pregnancy rate of beef cattle in East Nusa Tenggara (NTT) in the pasture rearing system of 45-61% The low pregnancy rate is influenced by the lack of males and the condition of female cows that do not allow mating. Similar to the research results (Sol'uf, Krova and Nalle, 2021) Bali cattle birth rate is still low and varies between 44.30% - 98.30% (average 70.70%) of the number of productive age females.

The implementation of Policy I has an effect on the profits earned by beef cattle farmers in Kupang District, which in scenario I A increased by 55.8% while scenario I B increased by 77% (Figure 5). The implementation of the two programs of Policy I has been carried out by farmers but not optimally. (Krova, 2015) that the application of artificial insemination technology is generally not well implemented by farmers due to several obstacles both from farmers, inseminators and acceptor cows. Therefore, monitoring and evaluation activities from the government are needed so that farmers can utilize and apply technology and the goal of improving community welfare through beef cattle farming can be achieved.

Implementation of Policy II- Implementation of policy II is done to cover nutrient deficiencies during the dry season. Feed supplementation can increase milk production of beef cows. (Nugroho and Ratnadhita, 2022) (Nugroho and Ratnadhita 2022) reported that by giving additional feed of lamtoro leaf meal 20%, 50% and 75% of the total ration given can increase milk production. (Syafiyullah, 2016) (Syafiyullah 2016) reported that the addition of rice bran and lamtoro leaf meal can increase cow's milk production because both feeds are sources of energy and protein. Besides being given through the mother, feed supplementation can also be given directly to calves in the form of liquid or solid feed.

In addition to being given through the mother, feed supplementation can also be given directly to calves in the form of liquid or solid feed. (Jelantik *et al.*, 2019) stated that several types of supplements that have been tried include additional forage in the form of *hay* and lamtoro, liquid feed in the form of soy milk and liquid milk enhancer feed (PCPS) made from various agricultural products of corn intercropping. The results of these studies generally show that supplementing with liquid milk-enhancing feed and starter solid feed is a very efficient strategy to reduce calf mortality. The results of almost all studies conducted recorded low calf mortality (0% calf mortality) in the supplemented calf group. Based on the results

Micro Policy Interventions to Increase Income in Beef Cattle Business in Kupang District

of the studies that have been described about the benefits of feed supplementation on the chances of increasing the beef cattle population, in this simulation, the addition of feed supplementation is carried out in order to reduce beef cattle mortality. The addition of feed supplementation is done for both breeding and fattening beef cattle, at one percent (scenario II-A) and two percent (scenario II-B) as recommended by

(Jelantik *et al.*, 2019). Additions were only made to calves, adult feedlot males and adult females. This is because the age of calves is still very critical, males for fattening and adult females for reproductive needs.

The use of supplements in beef cattle farming will add to the expenditure structure. Therefore, the supplement structure for calves, adult males for fattening and adult females was added to the farmer financial sub model. The price of supplements at each level of feeding used is assumed to be IDR 2,765.17 (scenario II A = 1% feed supplement) and IDR 5,650.98 (scenario II B = 2%).

The structure of adding supplements to beef cattle feed can reduce beef cattle mortality. Suppression of beef cattle mortality due to feed supplementation increases the population of calves by 6,687 head per year or 2.55% (scenario II A) and 28,167.6 head per year or 5.45% (scenario II

B) or an average of scenarios II A and II B by 4.0%, adult females by 8,908 head per year or 1.34%

(scenario II A) and 19,210 head per year or 2.57% (scenario II B) with an average of scenarios II A and II B of 1.95%, and fattening feeder bulls of 2,591 head per year or 2.20% (scenario II A) and 4,564 head per year or 3.42% (scenario II B) or with an average of scenarios IIA and IIB of 2.81%. (Jelantik *et al.*, 2008) reported that feed supplementation at a level of one percent can ideally increase calf body weight, but it is recommended to use a level of two percent to reduce calf mortality. The application of supplementation technology to calves, coupled with keeping calves in the daytime when the mother is released to the field, has reduced the mortality rate to 0% (I G N Jelantik *et al.* 2008).

The increase in beef cattle population due to scenarios II-A and II-B has an effect on

increasing farmer profits by Rp6,320,075.28 per head per year or 4.0%. This is because the feed supplements provided contain complete nutrients so that livestock do not lack nutrients and this affects the low mortality rate. If the mortality rate is low, the stock of livestock at the farm level will increase and the profit earned by farmers will also increase.

Implementation of Policy III - Implementation of policy III is carried out with the aim of increasing the role of the institutional side of any technology and innovation provided/socialized to farmers in order to increase the productivity of beef cattle business. Institutions are generally only limited to running the program without supervising the program socialized to farmers. Furthermore, from the farmers' side, it is also the case that any assistance in the form of technology or new innovations provided is not optimally implemented by farmers due to cultural factors / habits of the farmers themselves. If both farmers and institutions collaborate, the goal of increasing beef cattle productivity will be achieved as expected. Therefore, policy III will show the behavior of *stakeholder* service assistance on beef cattle productivity, both breeding and fattening.

Policy making III is related to the innovations and technologies provided in both feed and reproduction. Increasing the intensity of assistance to farmers in applying the technology and innovations provided can increase the population of calves by 8,579 heads per year or 3.12% and the production of 459 fattening males per year by 5.04% and a profit of Rp5,334,905.39 per head per year or 3.37%. This third scenario is the *leverage point* in running a beef cattle business.

The increase in the intensity of stakeholder services in addition to affecting the beef cattle population also affects the income or profit obtained by farmers. The profit obtained was 47.79%. Based on this condition, an increase in the intensity of stakeholder services must receive a response from the farmers so that there is a synergy of work in order to increase the productivity of beef cattle business in Kupang District. Likewise, the institutional side does not only run the program but together with the farmers work synergistically to increase the productivity of beef cattle business in Kupang Regency.

CONCLUSIONS

Based on the results and discussion, it can be concluded that in order to increase farmers' income, three micro policy designs were developed, namely increasing the calving rate to improve the structure of the livestock population, adding feed supplements to reduce the mortality rate of calves, and improving stakeholder services.

ADVICE

Suggestions from this study are divided into two, namely 1) for farmers, government and related institutions in order to increase income from beef cattle business, the right step is to increase the calving rate by 5% and the addition of feed supplements by 2%; 2) there is a need for cooperation between government agencies, farmers, and academics through regular socialization, monitoring and evaluation so that any information or technology provided can be adopted and applied by farmers and the ultimate goal of increasing income in beef cattle farming can be achieved.

REFERENCES

- 1) baco, S. And Malaka, R. (2023) "Community Empowerment To Improve The Management Capacity Of Beef Cattle Breeding Centre Villages In Enrekang District." *Dikemas (Journal Of Community Service)* 7(1).
- 2) Jelantik, I. G. N. *Et Al.* (2008) 'Improving Calf Survival And Performance By Supplementation In Bali Cattle', *Australian Journal Of Experimental Agriculture*, 48(7), Pp. 954-956.
- 3) Jelantik, I. G. N. *Et Al.* (2019) "Application Of Supplementation Technology To Reduce Calf Mortality And Increase Productivity Of Bali Cattle In Oefafi Village, Kupang Regency." *Jurnal Pengabdian Masyarakat Peternakan* 4(1).
- 4) Krova, M. (2015) "Efforts To Improve The Bargaining Position Of The Farmer Members Of The Group Will Cluster Bali Cattle In The District Of Belu And Malaka, East Nusa Tenggara." *Indonesian Journal Of Applied Sciences* 5(1):7-13.
- 5) Lalus, M. F. *Et Al.* (2019) "An Analysis Of Margin Distribution Between Marketing Beef Cattle
- 6) Institutions In Kupang District East Nusa Tenggara." *Jurnal Nukleus Peternakan* 6(2):63-70.
- 7) Lestari, A. P. (2022) 'Ta: "Beef Cattle Fattening Business Analysis In Kpt Maju Sejahtera Tanjung Sari Subdistrict South Lampung District."
- 8) Nalle, M. N. (2016) "Technical Efficiency Analysis Of Beef Cattle In Kupang District, East Nusa Tenggara Province." *Agrimor* 1(03):57-59.
- 9) Nikolaus, T. T., Jelantik, I. G. N. And Benu, I. (2019) "Cattle And Chicken Integration System Training In Order To Increase Farmers' Economic Income In Ponaen Village, Kupang District." *Journal Of Livestock Community Service Issn* 4(1):37-59.
- 10) Nugroho, D. F. And Ratnaduhita, A. (2022) "'Appearance Of Milk Chemical Quality Of Lactating Dairy Cows With Rations Supplemented With Lamtoro Leaves." *Agrisaintifika: Journal Of Agricultural Sciences* 6(2):122-29.
- 11) Priyanto, D. (2016) "Strategies To Restore East Nusa Tenggara Region As A Source Of Beef Cattle." 35(4):167-78. Doi: 10.21082/Jp3.V35n4.2016.P167-178.
- 12) Sabat, D. M. And Sol'uf, M. M. (2022) "Feasibility Analysis Of Beef Cattle Business In Amfoang Area, Kupang Regency: Feasibility Analysis Of Beef Cattle Business In Amfoang AreaKupang Regency." *Journal Of Planet Animal Husbandry* 1(2):171-76.
- 13) Sol'uf, M. M., Krova, M. And Nalle, A. A. (2021) "Farmers Management Understanding In Improving Productivity Of Beef Cattle Business In Kupang District, East Nusa Tenggara Province." *Indonesian Journal Of Animal Science* 16(2):156-63.
- 14) Syafiyullah, R. (2016) "Effect Of Rice Bran And Lamtoro On Milk Production Of Sumbawa Cows Lactation Iv Reared In Lar Filter Moyo Utara."