

ANALYSIS OF PRODUCTION CAPACITY AND CONSUMPTION LEVEL OF BEEF IN EAST NUSA TENGGARA PROVINCE OF INDONESIA

(Analisis Kapasitas Produksi dan Tingkat Konsumsi Daging Sapi di Provinsi Nusa Tenggara Timur Indonesia)

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ABSTRAK

Salah satu produk peternakan yang berperan penting dalam peningkatan ketahanan pangan di Indonesia adalah daging sapi. Peningkatan pendapatan, perubahan pola konsumsi, dan pertumbuhan penduduk serta peningkatan pengetahuan masyarakat tentang gizi mempengaruhi kebutuhan jumlah sapi yang dipotong sebagai salah satu penghasil protein daging di Indonesia. Tujuan penelitian ini adalah untuk mengetahui kapasitas produksi dan konsumsi daging sapi di Provinsi Nusa Tenggara Timur (NTT). Penelitian ini dilaksanakan di NTT selama 6 (enam) bulan, dimulai dari bulan Juni sampai dengan November 2019. Penelitian konsumsi daging sapi ini termasuk dalam klasifikasi studi kasus. Jenis data yang digunakan dalam penelitian ini adalah data primer dan sekunder yang diperoleh dari sumber-sumber yang berkaitan dengan penelitian ini. Analisis data yang diperoleh dilakukan secara deskriptif, yaitu analisis yang dilakukan dengan cara penjelasan, penulisan, dan pernyataan yang dapat berupa kata-kata (kualitatif) dan angka (kuantitatif). Analisis data dilakukan untuk mengetahui kapasitas produksi sapi potong, produksi daging sapi, dan konsumsi daging sapi. Hasil penelitian ini menunjukkan bahwa sapi potong untuk kecukupan konsumsi dan kebutuhan domestik di Provinsi Nusa Tenggara Timur masih terpenuhi untuk masyarakat dan sesuai dengan rekomendasi pemerintah (peraturan perundang-undangan) yaitu pemotongan sapi masih di bawah 10% total populasi sapi yang ada (1.041.023 ekor). Faktor-faktor yang mempengaruhi kecukupan konsumsi domestik dan permintaan daging sapi di NTT, yaitu: (1) daya beli rendah sehingga konsumsi daging sapi juga rendah; (2) masyarakat belum sadar akan pentingnya kebutuhan protein (gizi) hewani untuk konsumsi keluarga sehingga tingkat konsumsi daging sapi mencapai 12% dari total kebutuhan protein per orang; dan (3) substitusi protein hewani dari ternak lain yang lebih murah mempengaruhi pola pikir masyarakat dalam mengkonsumsi daging sapi.

Key words: Kapasitas produksi, produksi, konsumsi, sapi potong

ABSTRACT

One of the livestock products that play an important role in improving food security in Indonesia is beef. Increased income, changes in consumption patterns, and population growth and increased public knowledge about nutrition affect the need for the number of cattle being slaughtered as one of the producers of meat protein in Indonesia. The purpose of this research was to determine the production capacity and consumption of beef in the province of Nusa Tenggara Timur (NTT). This research was conducted in NTT for 6 (six) months, starting from June to November 2019. This study of beef consumption is included in the case study classification. The type of data used in this study are primary and secondary data obtained from sources related to this study. Analysis of the data obtained was carried out descriptively, namely analysis carried out by way of explanation, writing, and statements that could be in the form of words (qualitative) and numbers (quantitative). Data analysis was conducted to determine the production capacity of beef cattle, beef production, and

consumption of beef. The results of this study indicate that Slaughter cattle for the adequacy of consumption and domestic needs in the province of Nusa Tenggara Timur is still fulfilled for the community and in accordance with government recommendations (legislation), namely, cattle slaughtering is still below 10% of the total population of existing cattle (1,041,023 tails). Factors affecting the adequacy of domestic consumption and demand for beef in NTT, namely: (1) low purchasing power so that beef consumption is also low; (2) the community is not yet aware of the importance of animal protein (nutrition) needs for family consumption so that the level of beef consumption reaches 12% of the total protein requirement for each person; and (3) animal protein substitutions from other livestock which are cheaper affect people's thinking patterns in consuming beef.

Key words: production capacity, beef production, beef consumption, beef cattle

INTRODUCTION

Community food security from livestock production sources is influenced by many factors, including the carrying capacity of livestock production and the purchasing power of the community (Heryadi and Zali, 2017; Riwukore and Habaora, 2018). One of the livestock products that play a role in supporting food security in Indonesia is beef. Increased income, changes in consumption patterns, and people population growth, and increased public knowledge related to nutrition affect the need for the number of cattle being slaughtered to provide meat products for public consumption fulfill.

Beef consumption by the population in Indonesia is still low when compared to other developing countries. Kementan RI (2016) reports that Indonesian people's beef consumption is only 2.61 kg/capita/year, far below the average consumption of beef in developing countries (5 kg/capita/year) and developed countries (25 kg/capita/year), or a country like Australia (40 kg/capita/year). Riwukore and Habaora (2019^a) and Riwukore et al. (2019) states that the consumption of protein source food in Indonesia is still low because it is influenced directly by household income directly or indirectly. Household income from beef cattle business is not optimal because the type of business carried out by farmers is still traditional and small-scale.

This causes cattle that are kept thin because of limited available food and livestock easily die due to disease (Habaora, 2015^a; Sukada et al., 2016). Riwukore et al. (2020^{abc}) states that the government has sought to increase domestic cattle production, such as: (1) livestock development, (2) improving the quality of breeds in artificial insemination programs, and (3) eradicating diseases. The hope, there is a balance between demand for livestock products, income, and the rate of public consumption. Soedjana (2016) dan Habaora et al. (2020^{ab}) states that the increase in beef cattle production is strongly influenced by production facilities, such as feed, commodity prices and production efficiency.

One of the provinces that produce and source beef cattle (mainly Bali cattle) in Indonesia is East Nusa Tenggara (NTT). The contribution of Bali cattle from NTT as beef cattle to fulfill national beef consumption needs (West Java, Banten, and DKI Jakarta) is 26.9% (Riwukore and Habaora, 2019^{bc}; Habaora, 2020^{ab}; Riwukore et al., 2020^{abc}). The paradox of animal protein nutrient intake from the population in NTT is still low, which is an average of 2.54 grams per day. Riwukore and Habaora (2018^a) state that the ideal consumption of animal protein is 50 grams per person per day. This means that the resident of NTT is still low in fulfilling protein consumption even though it is a source area for beef cattle production in Indonesia.

NTT Province based on the development of beef cattle population is ranked fifth nationally with a number of 17.050.006 tails. The largest beef cattle population is in the province of East Java, followed by the provinces of Central Java, South Sulawesi, and West Nusa Tenggara. Based on the cattle population, resident welfare indicators have not shown any economic growth and per capita income or decreased poverty levels. This indicator can be seen from the Human Development Index (HDI), where NTT has only reached 64.39 HDI or well below the national average of 71.39. That is, the welfare of the population in NTT is lower than the resident in other provinces of Indonesia. Habaora (2015^{ab}) states that regions with a low HDI show areas of lagging categories, low in per capita income, increased poverty, and decreased welfare. HDI display like this affects the level of consumption of beef production.

NTT's strategic role as a beef cattle production area (exporters) so that capable of supplying beef cattle needs to consumer areas (Java and Kalimantan) as many as 55,000-63,000 tails per year in accordance with the Decree of

the Governor of East Nusa Tenggara Number: 207 / Kep / HK / 2012 About Export Quota for Beef Cattle (Riwukore and Habaora, 2019^{abc}; Priyanto *et al.*, 2020).

This factor causes the pattern of consumption of meat protein (beef) in the household is very low because the income earned is also low. Some of the efforts made by the government in spurring domestic livestock production such as: (1) livestock development, (2) improving the quality of breeds through artificial insemination programs, and (3) disease eradication program, so it is hoped that this effort will be able to offset the demand for livestock products which is increasing rapidly or even faster than the rate of consumption income (Soedjana, 2016).

One of the beef cattle producing provinces in Indonesia is the province of Nusa Tenggara Timur (NTT). The contribution of Bali cattle from NTT as beef cattle to fulfill national animal protein needs is 26.92% (Ditjen PKH, 2016). However, the intake of animal protein from meat products by humans in NTT is still low, only reach 2.54 grams a day. The ideal consumption of animal protein for each person is 50 grams per person per day (Riwukore and Habaora, 2019^{ab}). This means that the human of NTT is still low in fulfilling protein consumption even though it is a central area for beef cattle production in Indonesia.

The province of NTT is seen from the cattle population per year being rank fifth nationally as many as 1,041,023 tails after the provinces of East Java, Central Java, South Sulawesi, and West Nusa Tenggara. However, the cattle population is not comparable with human welfare indicators in NTT, namely economic growth, income per capita, poverty level, and level of welfare. Economic growth and per capita income can be seen from the growth of the Gross Regional Domestic Product (GRDP) in the area, the level of poverty can be seen from the number of poor people in the area, and the level of population welfare can be seen from the value of the Human Development Index (HDI). For example, NTT's HDI of new reached 64.39, well below the national average of 71.39. This shows that the level of welfare of the human in NTT is very low compared to the average welfare in other provinces in Indonesia. Regions that have a low HDI indicate that the area is included in the category of disadvantaged areas so that it has an influence on low per capita income, increased poverty, and decreased welfare (Habaora, 2015^b; Heryadi and Zali, 2017). These economic growth indicators affect the level of beef consumption

available in NTT.

Domestic meat needs are mostly concentrated in the provinces of DKI Jakarta, West Java, and Banten, which is 60% of the national meat needs. To fulfill these needs, 750 beef cattle of slaughtered per day are supplied from Australian imports, East Java, Central Java, Bali, West Nusa Tenggara, and NTT. Beef cattle from NTT contribute around 26,92% to the supply of beef cattle it (Kementan RI, 2016). NTT as an exporter of beef cattle for national meat needs should affect income indicators and consumption patterns, but these indicators do not significantly influence so the hypotheses of this research are: (1) NTT's role as a livestock exporter area causes this region to lack sufficient beef supply for consumption; and (2) NTT's role as an exporter area is because this region has fulfilled the needs of domestic beef as a source of animal protein (Habaora *et al.*, 2019^{abc}). Thus the purpose of this study was to determine the adequacy of beef cattle supply and the level of beef consumption in NTT. The benefits of this research as information material to the government in an effort to improve the welfare of the human.

MATERIALS AND METHODS

This research was conducted in the Indonesian province of East Nusa Tenggara for 6 (six) months, namely June-November 2019. This study is classified as a case study research, which is an approach that aims to maintain the wholeness of the object that is useful for providing information on further research related to the explanation of variables and the observation process (Sugiyono, 2001). The subject of research is the livestock population, namely the generalization area which consists of objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and given conclusions. So the population is not only people but also other natural objects with all their characteristics. Beef cattle population data was obtained by the documentation method from the East Nusa Tenggara Statistics Indonesia. In addition, the interview method was also conducted with the Head of the Animal Husbandry Office of East Nusa Tenggara Province and butcher at Oeba Kupang abattoir. The type of data used is primary data and secondary data. Data analysis was carried out descriptively, namely, analysis carried out by way of explanation, writing

and statement which could be in the form of words (qualitative) and numbers (quantitative) to the object/subject of research related to the production capacity and consumption of beef in the province of East Nusa Tenggara through the steps: (1) Calculating the production capacity of beef cattle for a year based on the Animal Husbandry Act No. 18 of 2009, namely slaughtering cattle is only allowed 10% of the total population; (2) calculate beef production by the formula of the number of cattle slaughtered multiplied by 115 kg (one cattle produces 115 kg); and (3) comparing the amount of beef production with the total population of the region to determine the adequacy of domestic beef needs. The operational limits in this study are (1) production capacity, namely the adequacy of beef cattle supply; (2) consumption level, which is the amount of beef consumed per capita; (3) average weight of slaughtered cattle;

and (4) calculation of beef consumption using the instructions of the Ministry of Agriculture.

RESULTS AND DISCUSSION

Overview of Nusa Tenggara Timur

Nusa Tenggara Timur is one of the 34 provinces in Indonesia. The total area of NTT province is 48,718.10 km² divided into 22 regencies/cities. Administratively, NTT is located at 800-1200 South Latitude and 11800-12500 East Longitude. The administrative boundaries of NTT are north of Flores Sea, east of Timor Leste, Maluku, and the Banda Sea. South of the Indian Ocean, and west of the province of West Nusa Tenggara (Disnak NTT, 2019).

In 2017 the human population in NTT showed a figure of 5.287.302 humans with a composition of 2.619.181 people of the male

Tabel 1. Adequacy of beef supply in NTT

No.	Year	Cattle Population (tails)	Cattle Slaughtering			% Cut from population
			Cut in the slaughterhouse (tails)	Cut Outside the RPH (tails)	Total Cut (tails)	
1	2000	485,329	24,565	2,056	26,621	5.5
2	2001	495,051	26,211	2,115	28,326	5.7
3	2002	502,589	29,703	2,970	32,673	6.5
4	2003	512,999	26,078	2,970	29,048	5.7
5	2004	522,929	33,427	6,684	40,111	7.7
6	2005	533,710	40,695	8,834	49,529	9.3
7	2006	544,482	40,156	8,031	48,187	8.9
8	2007	555,383	40,958	8,195	49,153	8.9
9	2008	573,461	41,805	8,361	50,166	8.6
10	2009	577,552	43,215	10,836	54,051	9.4
11	2010	600,923	42,226	8,448	50,674	8.4
12	2011	778,633	58,066	11,855	69,921	9.9
13	2012	814,450	60,583	12,126	72,709	8.9
14	2013	803,450	61,571	12,315	73,886	9.2
15	2014	865,731	64,758	12,952	77,710	9.9
16	2015	902,326	68,326	13,664	81,990	9.1
17	2016	930,997	69,121	13,823	82,944	8.9
18	2017	1,007,608	68,252	13,650	81,902	8.1
19	2018	1,030,523	69,243	13,295	82,538	8.0
20	2019	1,041,023	69,232	13,321	82,553	7.9

Source: processed from the East Nusa Tenggara Provincial Livestock Services Report in 2019

population and 2.668.121 people of the female population. Of this total, when viewed in terms of the number of households, there are 1.144,8 households in NTT with an average household membership of 4,6 people (Disnak NTT, 2019).

Adequacy of Beef Stock in NTT

Sufficient supply of beef cattle for public consumption depends on the production capacity of beef cattle for a year, i.e. the accumulation of the number of slaughtering cows and cattle out of the area is only allowed 10% of the total population (Animal Husbandry Act Number 18 of 2009). Information on beef cattle production capacity in East Nusa Tenggara is presented in Table 1.

Information and data in Table 1 show the percentage of the slaughter of beef cattle in East Nusa Tenggara for a period of 19 years (2000-2019), an average of <10% per year. The highest percentage of cattle slaughter occurred

in 2014 (9.9% of the total cattle population) and the lowest in 2000 (5.4% of the total cattle population). Slaughtering cattle outside the abattoir shows an increase in the number of slaughtering cattle from year to year which allows uncontrolled slaughter of female cattle. One of the butchers in the Kupang City stated that slaughtering of female cattle in Slaughterhouse of Oeba Kota Kupang-NTT could reach 99% per day of the total population of slaughtered cattle. The government's weak supervision of cattle slaughter in RPH has a negative impact on the supervision of the prohibition of productive female slaughter outside the RPH. This is in line with what Riwukore and Habaora (2018b) reported that generally, government oversight of the sustainability of slaughterhouses in regions is weak so that activities and dynamics in slaughterhouses are not feasible. Generally, the availability of cattle in NTT to be slaughtered as a provider of domestic meat needs has

Tabel 2. Production and consumption of beef in NTT, 2000-2019

No.	Year	Cattle Population (head)	Human Population (People)	Beef Production (kg)	Beef Consumption (kg/capita/year)
1	2000	485,329	3,808,477	5,581,284	1.5
2	2001	495,051	3,888,735	5,693,087	1.5
3	2002	502,589	3,888,735	5,779,774	1.5
4	2003	512,999	4,088,058	5,899,489	1.4
5	2004	522,929	4,188,774	6,013,684	1.4
6	2005	533,710	4,260,294	6,137,665	1.4
7	2006	544,482	4,355,121	6,261,543	1.4
8	2007	555,383	4,448,873	6,386,905	1.4
9	2008	573,461	4,534,319	6,594,802	1.5
10	2009	577,552	4,619,655	6,641,848	1.4
11	2010	600,923	4,683,827	6,910,615	1.5
12	2011	778,633	4,788,600	8,954,280	1.9
13	2012	814,450	4,871,200	9,366,175	2.9
14	2013	803,450	4,954,000	9,239,675	2.8
15	2014	865,731	5,036,900	9,955,907	2.9
16	2015	902,326	5,120,100	10,376,749	2.0
17	2016	930,997	5,203,514	10,706,466	2.1
18	2017	1,007,608	5,287,302	11,587,492	2.2
19	2018	1,030,523	5,291,003	9,491,870	2.7
20	2019	1,041,023	5,321,043	9,493,595	2.7

Source: processed from the East Nusa Tenggara Provincial Livestock Services Report in 2019

not overcapacity because it is still below 10% of the total cattle population. The role of the government to monitor and supervise the limitation of slaughtering productive females in the RPH and outside the RPH is very important considering the growth of cattle population per year that is not optimal.

In general, the availability of cattle in NTT to be slaughtered as a provider of meat availability has not yet occurred over cutting, where the development is still below 10%. But the role of the government to limit the slaughter of productive females in the abattoir and outside the abattoir is to be expected considering the development of cattle population that is not optimal. Priyanto et al. (2020) stated that the availability of cattle to be slaughtered to meet beef needs is strongly influenced by the number of cattle population, reproductive status, and production capacity of cattle. This also affects the level of consumption of beef by the community.

Calculation of beef consumption levels in Indonesia there is no standard and there are still differences of opinion among experts. In general, the researchers used the argument of beef consumption based on the consumption of 13 types of food products that use beef as processed products and based on household consumption data from the National Socio-Economic Survey (Susenas) and the level of consumption participation in a commodity (Soedjana, 2013; Heryadi and Zali, 2017). To calculate the level of beef consumption in NTT seen by calculating cattle slaughter and the average weight of cattle converted to total beef production (Heryadi and Zali, 2017). Information and data on cattle slaughtering for beef production and consumption in NTT can be seen in Table 2.

Information and data in Table 2 show the level of beef consumption in NTT is only 2.2 kg/capita/year or well below the national average level of beef consumption of 2.6 kg/capita/year. The results showed the level of welfare and nutritional knowledge of NTT people was still low. The NTT region is a region with the number 3 pre-prosperity level after the provinces of Papua and West Papua. Riwukore and Habaora (2018a) stated that everyone needs a daily protein intake of at least 50 grams per day or 18.25 kg/capita/year. The protein consumption of the people of Indonesia and NTT, in particular, is still very low, reaching only 12% per year of the total protein requirements needed by each person. Riwukore *et al.* (2019) states that a lack

of protein intake which is lacking in NTT causes the prevalence of malnutrition in the population of NTT, especially children, is very high.

CONCLUSION AND SUGGESTION

Conclusion

Cattle slaughtering to fulfill the needs of meat consumption for humans in NTT is increasing from year to year in line with the rate of population growth and people's lifestyle. Slaughtering is still within the limits of legislation, which is under 10% of the total cattle population in NTT. But the slaughter of these animals has not met the standards of nutrition and animal protein needs. This is because the consumption of protein from beef products in NTT only reaches 12% of the total ideal protein requirement for each person.

Suggestion

Suggestion from this research is the role of government in supervising slaughter of cattle outside the slaughterhouse and in slaughter house needs to be improved because slaughtering of a productive female is still very high. Cutting productive females if not prevented will have an impact on the decrease of the cattle population due to the absence of a parent. This research has not included livestock expenditure data from NTT due to limited information, and further research on this information is very important, given the percentage of cattle slaughter increases each year and reach to 10%, and if added to livestock expenditure data there is the potential for cattle population pressure which can have an impact on degradation cattle population. The role of NTT as a livestock export area will change to a domestic production area if it is not prevented from now on.

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REFERENCES

Disnak NTT. 2019. Nusa Tenggara Timur dalam angka 2000-2009. Dinas Peternakan Provinsi Nusa Tenggara Timur, Kupang.

- Habaora, F. 2015^a. Padang penggembalaan daerah tropis. Deepublish Press, Yogyakarta.
- Habaora, F. 2015^b. Populasi opini penyalahgunaan kekuasaan. Deepublish Press, Yogyakarta.
- Habaora, F., A. M. Fuah, L. Abdullah, R. Priyanto, A. Yani, and B. P. Purwanto. 2019^a. Attitude analysis of Bali cattle farmers toward credit program based on agroecosystem in Timor Island. *International Journal of Innovative Science and Research Technology*, 4(9): 767-776.
- Habaora, F., A. M. Fuah, L. Abdullah, R. Priyanto, A. Yani, and B. P. Purwanto. 2019^b. Economic analysis of Bali cattle farm in Timor Island Indonesia. *International Journal of Scientific and Technology Research*, 8(10): 1576-1582.
- Habaora, F., A. M. Fuah, L. Abdullah, R. Priyanto, A. Yani, and B. P. Purwanto. 2019^c. Performans reproduksi sapi Bali berbasis agroekosistem di Pulau Timor. *Ternak Tropika: Journal of Tropical Animal Production*, 20(2): 141-156.
- Habaora, F., A. M. Fuah, L. Abdullah, R. Priyanto, A. Yani, and B. P. Purwanto. 2020^a. Botanical composition and carrying capacity in various agroecosystems on the Timor Island. *Jurnal Ilmu Produksi dan Teknologi Hasil Peternakan*, 8(2): 72-79.
- Habaora, F., A. M. Fuah, L. Abdullah, R. Priyanto, A. Yani, and B. P. Purwanto. 2020^b. Importance-Performance Analysis toward productivity of Bali cattle based on agroecosystem in Timor Island. *Journal of Animal and Veterinary Advances*, 19(5): 57-66.
- Heryadi, A. Y. and M. Zali. 2017. Konsumsi daging sapi di Kabupaten Pamengkasan. Seminar Nasional Peternakan III. Universitas Hasanuddin Makasar, Sulawesi Selatan, 18 September 2017. pp. 275-282.
- Kementan RI. 2016. Perkembangan sapi potong dan dinamika populasi. Musyawarah Nasional Gabungan Pelaku Usaha Sapi Potong Indonesia (GAPUSPINDO). Bandar Lampung, Kementerian Pertanian Republik Indonesia. pp. 1-10.
- Priyanto, R., J. R. Riwukore, A. Yani, B. P. Purwanto, L. Abdullah, A. M. Fuah, and F. Habaora. 2020. Analysis of dynamic system toward Governor policy of Nusa Tenggara Timur about quota of beef cattle export (Case study in plantation agroecosystem of Timor Island). *Annual Research and Review in Biology*, 35(5): 32-41.
- Riwukore, J. R. and F. Habaora. 2018^a. Sistem produksi sapi potong. Deepublish Press, Yogyakarta.
- Riwukore, J. R. and F. Habaora. 2018^b. Falsafah sains titik kritis penyembelihan halal. *Jurnal Weekyline*, 1(1):1-10.
- Riwukore, J. R. and F. Habaora. 2019^b. Beef cattle productivity development strategy at pasture Konetuef. *International Journal of Current Research*, 11(6): 4244-4247.
- Riwukore, J. R. and F. Habaora. 2019^b. Expenditure display of education cost on households in Kota Kupang and the policy of masterplan. *International Journal of Innovative Science and Research Technology*, 4(7): 93-99.
- Riwukore, J. R. and F. Habaora. 2019^c. Perception of farmers on the performance of extensionist in the pasture agroecosystem of Timor Tengah Utara District. *Asian Journal of Agricultural Extension, Economics and Sociology*, 29(2): 1-10.
- Riwukore, J. R. and F. Habaora. 2019^d. Profile of existing population density and supporting capacity of beef cattle in Indonesia. *International Journal of Recent Academic Research*, 1(2): 64-71.
- Riwukore, J. R., H. Manafe, and F. Habaora. 2019. Strategies for handling stunting risk ini Indonesia (Case study in Kupang City, Nusa Tenggara Timur Province, Indonesia). *International Journal of Latest Research in Humanities and Social Science*, 2(6): 17-25.
- Riwukore, J. R., B. P. Purwanto, A. Yani, R. Priyanto, L. Abdullah, A. M. Fuah, Y. Susanto, and F. Habaora. 2020^a. SWOT Analysis developing pasture agroekosistem of Bali cattle in Indonesia (Case study in Fatuana pasture of North Central Timor District). *International Journal of Multidisciplinary Research and Publications*. 2(11): 24-30.
- Riwukore, J. R., A. Yani, R. Priyanto, B. P. Purwanto, L. Abdullah, A. M. Fuah, and F. Habaora. 2020^b. Analysis of development of cattle population in Nusa Tenggara Timur Province of Indonesia (Case study in Timor Island Forest Agroecosystem). *Veterinary Research*, 13(3): 33-39.

- Riwukore, J. R., A. Yani, R. Priyanto, B. P. Purwanto, L. Abdullah, A. M. Fuah, and F. Habaora. 2020^c. Analysis of the development of Bali cattle population in pasture agroecosystem of Timor Island. *Veterinary Research*, 13(3): 25-32.
- Soedjana, T. D. 2013. Partisipasi konsumsi sebagai alat ukur status ketahanan pangan daging. *Wartazoa*, 23(4): 166-175.
- Soedjana, T. D. 2016. Penawaran, permintaan dan konsumsi produk peternakan di Indonesia. *Jurnal Forum Penelitian Agro Ekonomi*, 15(1): 17-34.
- Sugiyono. 2001. *Metode penelitian*. Alfa Beta Press, Bandung.
- Sukada, I. K., I. W. Subrata, and I. G. Suarta. 2016. Potensi ternak sapi potong, sapi perah dan kerbau sebagai penghasil daging di Provinsi Nusa Tenggara Timur. *Majalah Ilmiah Peternakan*, 19(3): 101-104.