



Supply Chain Analysis of Cattle Market Participants in North Central Timor Regency

HILARIUS YOSEF SIKONE^{1*}, BUDI HARTONO², SUYADI², BAMBANG ALI NUGROHO²

¹Program Study of Animal Husbandry, Faculty of Agriculture, University of Timor, Indonesia-85614; ²Faculty of Animal Science, University of Brawijaya, Malang, East Java, Indonesia-65145.

Abstract | This study determined the product flow, financial flow, and information flow in the beef cattle supply chain in each marketing agency of beef cattle in the North Central Timor Regency. The research method used was descriptive quantitative, which was carried out by a survey method. Determination of the sample using two methods: purposive sampling (applied to farmer respondents) and snowball sampling (to collect respondents from traders and butchers). Samples used in the study were 115 respondents consisting of 90 farmers, ten collectors, four inter-island cattle traders, six cattle butchers, and five meat retailers. The data was analyzed quantitatively, the presentation of the data was descriptive, and the added value of marketing was calculated using the Hayami method. The supply chain channel that occurs was quite simple, and there were five supply chain channels where identified. Channels 1 and 2 were the supply chain flow of live cattle to inter-island destinations and channels 3, 4, and 5, the cattle supply chain for the abattoir. In general, The product and financial flows were distributed vertically, while the information flow was vertical and horizontal. The highest added value of farmers was (60,6%), and marketing institutions or butchers was 25,1%.

Keywords | Added value, Supply chain, Market players, Cattle

Received | August 05, 2021; **Accepted** | November 23, 2021; **Published** | March 10, 2022

***Correspondence** | Hilarius Yosef Sikone, Program Study of Animal Husbandry, Faculty of Agriculture, University of Timor, Indonesia-85614; **Email:** yosef-sikone@gmail.com

Citation | Sikone HY, Hartono B, Suyadi, Nugroho BA (2022). Supply chain analysis of cattle market participants in north central timor regency. *Adv. Anim. Vet. Sci.* 10(4): 811-820.

DOI | <http://dx.doi.org/10.17582/journal.aavs/2022/10.4.811.820>

ISSN (Online) | 2307-8316



Copyright: 2022 by the authors. Licensee ResearchersLinks Ltd, England, UK.

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

INTRODUCTION

The livestock sector still plays an essential role in the development process, especially in rural areas (Baih-aqi and Aditia, 2020). The current condition of demand for livestock products (meat, milk, and eggs) increase significantly every year due to increasing population, income levels, changes in lifestyle, especially in consumer tastes, as well as the increasing number of industrial-scale livestock

processing businesses (Cirera and Masset, 2010). The combination of increased income, population growth, and consumption elevate the demand for livestock products rapidly (Delgado et al., 1999). However, domestic beef production is not sufficient for beef consumption. Domestic beef production was reported as only 504.802 tons, while the estimated demand for beef is 700.000 tons. Therefore, Beef import is an alternative to fulfill meat consumption (BPS RI, 2020). Consequently, beef imports will push the price

of livestock production facilities to increase from time to time, while output prices experience high fluctuations (Saptana et al., 2016). This condition impacts the communities' livestock business in livestock production centers.

North Central Timor (TTU) regency is one of the centers for beef cattle production, especially Bali cattle in East Nusa Tenggara (NTT). The total population of Bali cattle was 128,264, approximately 12,73% of the cattle population in East Nusa Tenggara. The activity of inter-island beef cattle in the last 5 (five) years has experienced a fluctuating growth rate. In 2014 there were 14,102 cattle between islands, in 2015-2016, only 7,500 heads. In 2017 it increased to 7,700 and elevated up to 8,000 in 2018. Meanwhile, cattle slaughter activities at abattoirs tend to be high, with a growth rate of 7,34% (BPS. TTU, 2019).

Global economic developments and intensive markets present complex challenges for livestock and service businesses. In addition, there are demands for new products at an affordable time, place, and price (Zaroni, 2015). The supply chain of a commodity is closely related to the price. Therefore, supply chain analysis is urgently needed to identify critical points in the price formation process (Setiadi et al., 2018). This situation affects marketing strategies that maintain competitive and innovative businesses (Imhoff et al., 2001; Swift, 2000).

Nowadays, customers have become connected, informed, and active (Agapitou et al., 2017). The business principles are customer orientation and company success that depend on effective relationship management (Nguyen et al., 2007). Market demands are inversely proportional to beef cattle trading in North Central Timor and an entrepreneur from Java Island and Kalimantan. The marketing supply chain is critical for enhancing cattle consumers in Jakarta and Samarinda. The marketing supply chain started with sub-district level collectors, inter-island traders, and wholesalers in DKI Jakarta and Samarinda. In implementing cattle marketing in the North Central Timor district, the breeders have not been organized in an organization and have not yet achieved sales quality standards. Unmanaged cattle market affected weak bargaining trade position. Furthermore, loss and profitability are essential marketing cattle (Saptana and Ilham, 2017; Ardiansyah et al., 2020).

COVID-19 pandemic proved severe public health and economic aspects in Indonesia, especially in North Central Timor regency. The COVID-19 pandemic has resulted in social restriction policies that have significantly impacted the marketing of livestock products. Social media is an alternative for efficient product marketing and shortens the supply chain of livestock products. This study determined product flow, financial flow, and information flow in the

beef cattle supply chain. The additional value of the beef cattle supply chain in the North Central Timor regency was provided in this research.

MATERIALS AND METHODS

RESEARCH TIME AND PLACE

This research was conducted from September to November 2020 in North Central Timor Regency, East Nusa Tenggara Province, Indonesia. The research location was chosen by purposive sampling, considering that North Central Timor Regency is one of the third largest beef cattle production centers (13.62%) of the total cattle population. The target locations include five sub-districts: West Miomaffo sub-district, Kefamenanu City, Insana, North Insana, and Biboki Anle'u sub-district.

RESEARCH METHODS

The research method used was descriptive quantitative, which determined the state of the beef cattle business and every activity carried out through survey methods (Singarimbun and Effendi, 2006). Purposive and snowball sampling methods were used in this study. The purposive sampling method was used to interview farmers, while the snowball sampling method was used for livestock trader investigation (Nurdiani, 2014). The data was collected from 115 respondents consisting of 90 farmers, 10 collector traders, 4 inter-island cattle traders, 6 cattle butchers, and 5 meat retailers. This study performed primary and secondary data for analysis (Siyoto and Sodik, 2015).

DATA ANALYSIS METHOD

The data analysis process begins by reviewing all available data from various sources such as observations, interviews, and documents related to the supply chain. Descriptive quantitative was presented in this research. Marketing efficiency analysis was used to evaluate the most efficient supply chain, calculating by dividing the total cost with the total value of the product being marketed (Soekartawi, 1993). The concept of marketing efficiency was calculated using the formula approach: $EP = TB/TNP \times 100\% \dots \dots \dots 1$. Where: EP = Marketing efficiency (%); TB = total marketing costs (USD/kg); TNB = total product value (USD/kg). Sudiyono (2002) used the formula approach to calculate the margin of each marketing agency: $MP_i = HJ_i - HB_i \dots \dots \dots 2$. Where: MP_i = Margin of marketing agency the i-th (marketing channels 1, 2, 3, 4 and 5); PJ_i = selling price of marketing agency the i-th (USD/kg); HB_i = Purchase price of marketing agency the i-th (USD/kg). The additional value of marketing was determined by referring Hayami method (Table 1).

Table 1: Stages of Calculation of Value Added Method Hayami (modification)

No	Variable	Value
	Output, Input and Price	
1	Output (kg)	(a)
2	Raw Material Input (kg)	(b)
3	Labor Input (DHW)	(c)
4	Conversion Factor	(d) = (a)/(b)
5	TKL Coeficient (DHW/kg)	(e) = (c)/(b)
6	Output Price (USD /kg)	(f)
7	Average Labor Wages (USD /DHW)	(g)
	Revenues and Profits (IDR/kg Raw Material)	
8	Input Prices (USD /kg)	(h)
9	Contribution of Other Inputs (Transaction Costs)	(i)
10	Output Value (USD /kg)	(j) = (d)x(f)
11	a. Value Added (USD /kg)	(k) = (j)-(i)-(h)
	b. Value added Ratio (%)	(l) = (k)/(j)
12	a. Labor Income (USD /kg)	(m)= (e)x(g)
	b. Labor Benefits (%)	(n)= (m)/(k)
13	a. Profit	(o) = (k)-(m)
	b. Profit Rate (%)	(p) = (o)/(j)
	Production Factor Fee (IDR/kg Raw Material)	
14	Margin (USD /kg)	(q) = (j)-(h)
	a. Labor Income (%)	(r) = (m)/(q)x100
	b. Contribution of Other Inputs (%)	(s) = (i)/(q)x100
	c. Company Profit (%)	(t) = (o)/(q)x100

Source: Hayami et al., (1987).

RESULTS AND DISCUSSION

BEEF CATTLE SUPPLY CHAIN

The supply chain is a series of productive activities starting from upstream to downstream, interconnected and forming a value chain (Zhi et al., 2019). One of the ultimate goals of the supply chain process is to make products that have high selling value and add value to the products produced through product flows, financial flows, and information flows (Emhar et al., 2014). The beef cattle supply chain distribution flow pattern in the North Central Timor regency follows the usual flow pattern with three streams: product flow, financial flow, and information flow. For product flow from upstream to downstream, farmers distributed to the wholesalers in Jakarta/Samarinda and final consumers/ household consumers. Financial flows follow the opposite direction. Big traders in Jakarta or Samarinda and household consumers were distributed to the farmers. Meanwhile, the flow of information flows reciprocally (Syakur et al., 2017; Kadju et al., 2020). The distribution network of beef cattle as described in Figure 1.

FLOW PRODUCT

Figure 1 illustrates five cattle and beef supply chain channels to wholesalers in Jakarta or Samarinda and final consumers/ household consumers. Channels 1 and 2 were chain flows for inter-island livestock supply, while channels 3-5 were for slaughterhouse supply in Kefamenanu (local consumers). In general, the five channels assist in the purchase of cattle by collectors from farmers, then the cattle are sold to inter-island traders and then sold again to wholesalers in Jakarta, Samarinda, and slaughterers. Producers or breeders were collectors and inter-island traders who played roles for sales and purchase facilities, transportation facilities, financing facilities, and market information (Syakur et al., 2017).

Product flow was the flow of beef cattle commodity that flows from upstream to downstream to gather customer satisfaction. Inter-island livestock traders received livestock supplies from collector traders from village and sub-district levels. Our finding revealed that the male beef cattle were kept at the paron for further trading as inter-island beef cattle. The highest percentage of beef cattle sales through traders was 62.2%, and farmers sell their livestock directly

to inter-island traders at approximately 26.7%. Similar to a previous study, Noach and Lalus (2020) reported that 72% of farmers sell their cattle through intermediary traders. Cattle sale was carried out at the farmer's location to observe cattle livestock, estimate cattle weight, and negotiate process (Hadi, 2012). The cash payment transaction was a standard system in the North Central Timor regency after farmer and buyer reached a cattle price agreement. This system is a price taker, and the farmer has no bargaining position. The finance urgency of the farmer triggered cattle-cash payment, not for saving or livestock business (Saptana and Ilham, 2017; Kadju et al., 2020). The Cattle-cash payment system caused breeders as producers losses in marketing beef cattle.

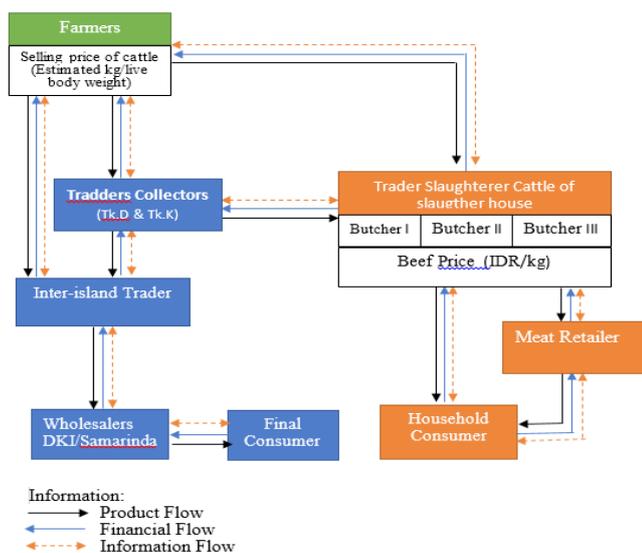


Figure 1: Beef Cattle Supply Chain Flow

The number of beef cattle purchased by collectors varies, depending on the ability of traders to visit the livestock source area. The inter-island livestock transactions from August to October were 1000 livestock with a bodyweight 275kg-318kg (± 295 kg) at the farmer level, while at the inter-island trader level sent 900 livestock with 700 details fish (77.8%) for Kalimantan and 200 birds (22.2%) for Jakarta. For slaughterhouses demand, slaughterers received livestock supplies from collector traders only 18.9% from farmers. Butchers perform the slaughter and then distribute the fresh meat to meat retailers and household consumers. The average demand for ready-to-be slaughtered cattle at the Kefamenanu abattoir is 6-7 heads per day with a bodyweight range of 185kg-215kg (± 196 kg). Meat in slaughterhouses was used for the culinary industry (restaurants) (68%), processed meat products (shredded, beef jerky, and se'i) (20%), and 12% for household consumers.

The final product line in the beef supply chain pattern is household consumers, which belong to the market linkage group (Rahman and Palash, 2016). However, supply chain

actors on channels 3, 4, and 5 provide better services to retailers to maintain their business relationships. These services include free meat transportation from the abattoir to the market, a delayed payment system. Integrated supply chain management has begun to be practiced. However, it is still partial, such as the link between farmers and butchers, butchers with retailers, and retailers with consumers, such as free delivery services to consumers (Saptana and Ilham, 2017; Wu et al., 2010; Febrianto et al., 2021).

FINANCIAL FLOW

The financial flow of each marketing institution aims to smooth the movement of transaction flows. Financial flow was defined as money flow from final consumers and from household consumers to farmers. The structure of financial flows in North Central Timor regency consisted of the financial flow of inter-island livestock sales and The financial flow of livestock sales to the abattoir.

a) Financial flow of inter-island livestock sales

The financial flow pattern structure starts with farmers selling their livestock and getting money from collectors or inter-island traders. The payment system was cash due to the agreement and the livestock's weight at a standard negotiated price. Cattle with 250 kg live weight were priced at IDR 32,000.00/animal body weight and every 25 kg increase in cattle body weight will be followed by a change in price IDR 100.00. Cattle payments were directly at the farmer's house or at the transaction place. In this phase, financial flows flow from collecting traders/inter-island traders to breeders, and then the livestock is transported to the traders holding ground via land transportation.

The price map for live cattle offered by inter-island traders, cattle with 250 kg, was priced at IDR 34,000.00/animal body weight and every 25 kg increase were priced IDR 200.00. Subsequent financial flows flow from inter-island traders to collectors, and payment transactions were made in cash after weighing the cattle. The payment system was in cash at the holding ground location or the houses of inter-island traders. Financial flows then flow from traders outside the island to traders between islands. Livestock to be sent by sea transportation with inspection at the animal quarantine center.

Subsequent financial flows flow from traders outside the island to traders between islands after the cattle arrive at the destination port with a free on board (FOB) pattern. The price offered by inter-island traders, namely a cow weighing 275 kg, was valued at IDR 41,100.00/animal body weight. The payment system was conducted by bank account transfer. The final consumers then channel money to traders outside the island through the purchase and supply process of the fresh beef they produce. This mechanism

occurs continuously and simultaneously.

Empirical studies revealed several pathways to improve supply chain performance for livestock and beef commodities. Those pathways improved local cattle feed management, regulated the production cycle, increased flexibility in meeting feeder and beef cattle demand, and applied quality assurance standards for livestock and beef.

b) The financial flow of livestock sales to the abattoir

The flow pattern in the distribution channel of cattle to the abattoir starts from the farmer who sells his livestock and gets the money flow from the collectors or butchers. The payment system was in cash based on the agreement and the product's suitability (livestock condition) with the price requested by the farmer. Payment is made directly at the farmer's house or wherever there is a transaction on livestock sale. Financial flows move from collecting traders/butchers to farmers in this phase.

Subsequent financial flows from meat retailers to slaughterers occur in abattoirs. The retailers then channel the money to the butchers through the purchase and supply process of the freshly produced beef. Financial flows also flow to the government concerning the cost of cutting levies at abattoirs. However, the financial flows in the abattoir were not related to the product. The abattoir provided the service and supervision of slaughter and ensured cows were a standard condition for slaughter. There are financial flows in the form of abattoir retribution services of IDR 35.000,00 per cattle. The retailers then channel the money to the butchers through the purchase and supply process of the freshly produced beef.

The flow of money from household consumers flows to meat retailers and butchers, collectors, and farmers. Household customers bought beef from retailers in small quantities of meat, and customers were categorized as local retailers. Besides that, some customers also bought beef in large amounts from regular retailers or directly from slaughterer.

INFORMATION FLOW

Information systems in the supply chain were required to build cooperation by creating networks. Ideally, the flow of information that should occur is the reciprocal flow of information from upstream to downstream and vice versa. The flow of information included the cattle supply, the market demand, cattle price, beef price, policies, and regulation of livestock marketing management. Empirical facts showed miss information still occurred in the flow information, such as standard prices for cattle in Jakarta/Samarinda. However, information flows vertically and horizontally (Hadi, 2012; Syakur et al., 2017). The vertical flow was the flow of coordination in different chains between breeders, collectors, inter-island traders, off-island traders,

butchers, retailers, and consumers. While horizontal flow, coordination between chain members included coordination between livestock traders regarding the cattle supply at the farmer level. Integrated information coordination formed agreement and cooperation concerning product availability, quality, and price. In the current condition of the COVID-19 pandemic, the process of swapping information was carried out through social media such as Facebook, WhatsApp, Instagram, and other online sales websites. Each marketing agency involved in the livestock and beef marketing process performed its specific marketing functions and impacted the costs. The amount of margin and level of marketing efficiency obtained by each marketing agency can be seen in Table 2.

The marketing margin value in the marketing channel was varied depending on the length of the marketing agency involved in it. The most considerable margin value in the live cattle marketing channel occurred in channel 1 IDR 15.632,00. In the beef marketing channel, there is a channel 3 marketing pattern with a margin value of IDR 50.950,00 (Table 2). Consumers bore the more prominent the marketing margin, the higher selling price. Sudiyono, (2002) explained the longer or more marketing institutions are involved in the marketing process, the greater the total margin and profit obtained by marketing institutions and vice versa.

The results of the marketing efficiency analysis that have been carried out show that the live cattle marketing channel and beef marketing channel have values ranging from 1.73% to 14.51%, which means they are in the efficient category. According to Rosmawati (2011), decision rules on marketing efficiency were divided into 0-33% (efficient), 34-67% in the less efficient category, and 68-100% in the inefficient category.

VALUE-ADDED CALCULATION

Calculation of value-added analysis is carried out to determine how much-added value is obtained in each beef cattle marketing chain. The value-added estimated the remuneration received by agroindustry business actors and measured the number of job opportunities that created by agroindustry entrepreneurs (Herdiyandi et al., 2017). The supply chain value added calculation in this study is based on the components that make up fixed costs, variable costs, and the selling price of products.

OUTPUT, INPUT, AND PRICE

The output produced by breeders, collectors, and inter-island traders is live cattle, while slaughterers are beef. The average value of the work produced by farmers in the form of live cattle is 809,4 kg, collectors of 2.031 kg, inter-island traders of 53.096 kg, and the output of butchers in the

Table 2: Analysis Marketing Margin and marketing Efficiency of beef cattle in North Central Timor Regency

Marketing Institution	Channel 1	Channel 2	Channel 3	Channel 4	Channel 5
	IDR/kg	IDR/kg	IDR/kg	IDR/kg	IDR/kg
Farmers					
Production cost	13,924	13,921	11,310	11,310	11,310
Selling price	31,093	32,150	34,050	34,850	36,225
Profit	17,169	18,229	22,740	23,540	24,915
Tradders Collectors					
Purchase price	31,095	-	34,050	-	-
Cost	514	-	820	-	-
Selling price	35,000	-	36,885	-	-
Profit	3,391	-	2,015	-	-
Inter-island Trader					
Purchase price	35,000	32,150	-	-	-
Cost	3,079	3,079	-	-	-
Selling price	41,711	40,121	-	-	-
Profit	3,632	4,892	-	-	-
Inter Trader island					
Purchase price	41,711	40,121	-	-	-
Cost	3,185	3,185	-	-	-
Selling price	46,725	46,056	-	-	-
Profit	1,829	2,750	-	-	-
Trader slaughterer cattle					
Purchase price	-	-	36,885	34,850	36,225
Cost	-	-	1,381	1,381	1,381
Selling price	-	-	42,998	41,998	80,000
Profit	-	-	4,732	5,767	42,394
Meat retailer					
Purchase price	-	-	80,000	80,000	-
Cost	-	-	2,546	2,546	-
Selling price	-	-	85,000	85,500	-
Profit	-	-	2,454	2,954	-
Total Cost (USD/kg)	6,778	6,264	4,747	3,927	1,381
Margin (USD/kg)	15,632	13,906	50,950	34,850	43,775
Marketing Efficiency (%)	14.51	13.60	5.58	4.59	1.73

Source: Analyzed based on Primary Data, (2021)

Table 3: Calculation of the average value added of beef cattle supply chain actors in North Central Timor Regency

No	Variable	Unit	Added Value			
			Farmers	Tradders Collectors	Inter island Trader	Butcher
Output, Input, and Price						
1	Output = (a)	Kg	809.4	2031	53096	217.71
2	Input Raw Materials = (b)	Kg	525.6	2051	54180	350.70
3	Input Labor = (c)	DHW	2.72	14.3	75	15
4	Conversion Factor = (d) = (a) / (b)		1.54	0.99	0.98	0.62
5	Coefficient TKL=(e) = (c) / (b)	DHW/kg	0.005	0.007	0.001	0.043

6	Output Price = (f)	USD/kg	2.236	2.400	2.891	5.573
7	Average of Labor Wage = (g)	USD/DHW	5.463	2.222	11.543	3.577

Source: Analyzed based on Primary Data, (2021)

Table 4: Calculation of the average revenue and profit of beef cattle supply chain actors in North Central Timor Regency

No	Variable	Unit	Added Value			
			Farmers	Tradders Collectors	Inter island Tradder	Butcher
Revenue and Profits (IDR/kg of Raw Materials)						
8	Input Price = (h)	USD/kg	1.318	2.228	2.449	2.563
9	Contribution of Other Inputs = (i)	USD/kg	37.380	15.656	60.224	26.724
10	Output Value = (j) = (d) x (f)	USD/kg	3.443	2.376	2.833	3.460
11	a. Added Value = (k) = (j) – (i) – (h)	USD/kg	2.088	0.133	0.324	0.870
	b. Value Added Ratio =(l)=(k)/(j)	%	60,6	5,6	11,4	25,1
12	a. Labor Income = (m) = (e) x (g)	USD/kg	0.028	0.015	0.016	0.153
	b. Labor Rewards = (n) = (m) / (k)	%	1,4	11,7	4,9	17,6
13	a. Profits = (o) = (k) – (m)	USD	2.059	0.117	0.308	0.717
	b. Profit Rate = (p) = (o) / (j)	%	59,8	4,9	10,9	20,7

Source: Analyzed based on Primary Data, (2021)

Table 5: Calculation of the average remuneration for production factors of beef cattle supply chain actors in North Central Timor Regency

No	Variable	Unit	Added Value			
			Farmers	Tradders Collectors	Inter island Tradder	Butcher
Cost of Production Factors (IDR/kg of Raw Materials)						
14	Margin = (q) = (j) – (h)	USD/kg	2.125	0.148	0.385	0.897
	a. Labor Income = (r) = (m) / (q)	%	1,3	10,4	4,2	17,1
	b. Contribution of Other Input =(s)=(i)/(q)	%	1,8	10,5	15,7	3,0
	c. Company Profit = (t) = (o) / (q)	%	96,9	79,0	80,2	80,0

Source: Analyzed based on Primary Data, (2021)

fresh beef was 217,71 kg. The output, input, and price calculation results on the value-added of the supply chain of livestock market players were described in Table 3.

The main raw material inputs were live cattle in kilograms, 525,6 kg (farmers), 2.051 kg (gathering traders), 54.180 kg (inter-island traders), and 350,70 kg (butchers). Based on Table 3, the calculation results show that the conversion factor value at each marketing agency differs with the following details: farmers conversion factor of (1,54), collector’s conversion factor of (0,99), inter-island trader conversion factor of (0,98), and conversion of slaughterers (butchers) of (0,62). The value of the conversion factor above means that every 1 kg of live cattle input produces an output of 1,54 kg of live cattle (farmers), 0,99 kg of live cattle (collectors traders), and 0,98 kg of live cattle (intermediate traders). The decrease in the conversion factor value for traders was due to a reduction of cattle body weight. In this context, livestock traders benefit from the

difference in the selling price of livestock. And the butcher conversion factor value of 0,62 means that every 1 kg of live cattle input produces a meat output of 0,62 kg. Beef carcass production ranged from 50-68% of the total live weight of cattle. The conversion factor affects the output value (USD/kg) produced, where the greater the conversion value, the greater the output value. The output value was obtained from the product of the conversion factor and the output price.

The labor coefficient is the division between the use of labor (DHW) and the input of raw materials (kg) used in the production process. The average wage for supply chain actors in various marketing institutions varies from USD 2,222 (collectors), USD 3,577 (butchers), USD 5,463 (farmers) to USD 11,543 (traders). Inter-island). In the provision of wages, each worker is not distinguished by job specifications but rather on the outpouring of working time. The wages of the above workers are relatively low-

er than some regions in Indonesia and even neighboring countries, so they should be used as a source of excellence. Low input costs can be maximized by the costs used to pay for lower labor costs. Research by [Serra et al. \(2005\)](#) states that increasing the competitiveness of the beef cattle business in Uruguay is related to the availability of high and cheap labor, while in New Zealand, it is related to the availability of educated breeders and sufficient labor productivity. Thus, it is necessary to increase the knowledge and skills of farmers about beef cattle cultivation for increasing labor productivity.

REVENUE AND PROFITS

The price of feeder cattle raw materials obtained from livestock breeders and traders is 54 livestock with an average price of USD 1,318 per kg body weight. The feeder cattle were selected and bought freely from a livestock market, production center areas, or livestock collectors. Other input contributions to farmers included feed costs, health costs (vitamins, drugs/vaccines), depreciation of cages, and other equipment with a total USD 37,380 for each kilogram of input used. The Revenue and profit added value of the supply chain of beef cattle market participants described in [Table 4](#).

The output obtained by farmers is USD 3,443/kg body weight, with an added value of USD 2,088 and an added value ratio of 60.6% of the total output. The value-added ratio was defined as a beef cattle cultivation business managed by breeders who created added-value through daily body weight gain of livestock. Total labor income is USD 0,028 per kg of output with a percentage of employee compensation of 1.4%. Profit was obtained from the difference between output and input, with a profit of USD 2,059/kg body weight. The profit margin was 59.8%, and other inputs were 1.8%.

The input price for beef cattle purchased from farmers is USD 2,228/kg body weight. Other input contributions to collecting traders are in the form of feed costs, transportation costs, user fees, animal health certificate fees, cellphone credit, and ropes with a total of USD 15,656. The output value obtained by the collectors is USD 2,376/kg body weight with the added value of USD 0,133, and the value-added ratio is 5.6% of the total output. The amount of income received by workers for each kilogram of output is USD 0,015 with a percentage of employee compensation of 11.7%. The profit value is obtained from the difference between the output value and the input price, USD 0,117/kg body weight. Of this value, 4.9% of the margin is profit, and 10.5% is the contribution of other inputs issued by collecting traders.

In inter-island traders, the input of raw materials is the

purchase price of live cattle from the level of breeders with a certain standard of body weight in rupiah per kilogram. The cost of cattle offered tends to be low in front of traders, and farmers sell their livestock when the need is urgent. The average beef cattle price purchased from collectors was USD 2,449/kg body weight.

A total contribution input was USD 60,224 per kilogram of intake used. The other contribution input involved transportation costs, district livestock technical and health inspection fees, livestock transportation, quarantined feed, quarantine services, animal feed while on board and mobile phone credit. The retrieved output was USD 2,833/kg body weight. The added value of inter-island traders was USD 0,324 with 11.4% of the total output. The workforce received the relative income was USD 0,016 per kg with 4.9% of labor compensation of the profit obtained by inter-island traders is USD 0,308/kg body weight. The margin value of 10.9% for profit value, and 15.7% was the contribution of other inputs that was issued by inter-island traders.

The price of raw material input to butchers was the purchase price of live cattle ready to be slaughtered from farmers or collectors in rupiah per kilogram. The average live weight of cattle ready to be slaughtered at the abattoir was 194kg for USD 2,563/kg bodyweight. The input contributions to slaughterers were feed costs, transportation costs, abattoir fees, ropes, and cellphone credit with a total value of USD 26,724 for each kilogram of input used. The output value obtained by the butcher is USD 3,460/kg body weight. The added value of butchers is USD 0,870 with a value-added ratio of 25.1% of the total output. The amount of income received by the workforce for each kilogram in production is USD 0,153 with a percentage of labor benefits of 17.6%. The profit earned by the cattle butcher is USD 0,717/kg, with 20.7% of the margin being profit and 3.0% being the contribution of other inputs issued by the butcher.

Value-added analysis shows that the highest value-added ratio is 60.6% for farmers, while for the other three marketing institutions, 6.5%, inter-island traders 11.4%, and cutting traders 25.1%. The added value differentiation was based on the function of each institution. [Marimin and Maghfiroh, \(2010\)](#) reported that the added value in each supply chain depends on the input and treatment of each member in the supply chain. The cutting trader shows the highest added value due to its function. The functions of the cutter traders include the exchange function, transportation function, packaging function, financing function, and market information ([Fatahilah et al., 2010](#); [Liputra et al., 2018](#)).

COST OF PRODUCTION FACTORS

The value-added analysis margin was calculated by the difference between the output value and the price of raw materials. The added value margin details for each marketing agency are farmers at USD 2,125/kg, collecting traders at USD 0,148, inter-island traders at USD 0,385 and butchers at USD 0,897. The amount of margin in various supply chains was distributed as labor income, other input contributions, and business profits. The results of the calculation of the value-added margin of the supply chain of beef cattle market players were shown in Table 5.

In Table 5 the distribution of business profits in the analysis of the most enormous added value was obtained by farmers, namely 96,9%, for traders of 79,0%, inter-island livestock traders by 80,2% and for butchers by 80,0%. The results of this study differ slightly from the research of Kadju et al., (2020b) that the profits obtained by farmers reach 99.44% of the total output value. The profit percentage balance in this study illustrates that profit-sharing in each marketing agency with labor income is smaller, and this activity contributed to the region's economy. Lau et al. (2021) reported that the agroindustry has a high profit level and increased regional economic growth. However, the increased contribution of agroindustry workers was suitable for equal distribution of job opportunities.

CONCLUSION

This study summarized that five supply chain channels in Nort Central Timor regency were divided into channels 1-2 for inter-island cattle supply chain and channels 3-5 for the slaughterhouse. Beef cattle supply chain performed specific flow patterns, including product and financial flows were vertical, and information market flow was vertical and horizontal. Cattle farmers performed the highest added value with 60.6%, while the highest added value of butchers was 25.1%.

ACKNOWLEDGEMENTS

The authors thank to the Postgraduate Program of the University of Brawijaya. This research was financially supported by the Ministry of Education and Culture of the Republic of Indonesia through BPPDN Affirmation 2018 with contract number 1420/D3/PG/2018.

CONFLICT OF INTEREST

All authors have no conflict of interest.

AUTHORS CONTRIBUTION

HYS Analyzed data, designed research, and wrote the manuscript. BH, S, and BAN designed research and prepared the manuscript.

REFERENCES

- Agapitou C, Bersimis S, Georgakellos D (2017). Appraisal of CRM implementation as business strategy option in times of recession: The role of perceived value and benefits. *Int. J. Bus. Sci. Appl. Manag.* 12: 18–31.
- Ardiansyah R, Utami HD, Nugroho BA (2020). The Value Chain Strategy of Agribusiness of Etawah Crossbred Goat Milk toward the Industrial Revolution 4.0 Era in Sumberdem Village, Malang Regency. *J. Eng. Sci.* 5: 222–224.
- Baihaqi M, dan Aditia EL (2020). Efisiensi dan Nilai Ekonomi Daging Sapi untuk Potongan Pasar Tradisional Berdasarkan Potongan Komersial yang Berbeda. *J. Ilmu Produksi Dan Teknol. Has. Peternak.* 8: 86–90. <https://doi.org/10.29244/jipthp.8.2.86-90>
- BPS RI (2020). Statistik Indonesia. Badan Pusat Statistik Republik Indonesia, Jakarta.
- BPS TTU (2019). Timor Tengah Utara Dalam Angka 2019. Badan Pusat Statistik Kabupaten TTU, Kefamenanu.
- Cirera X, Masset E (2010). Income distribution trends and future food demand. *Philos. Trans. R. Soc. B Biol. Sci.* 365: 2821–2834. <https://doi.org/10.1098/rstb.2010.0164>
- Delgado C, Rosegrant MW, Steinfeld H, Ehui S (1999). Live Stock to 2020. The Next Food Revolution. In *ter na tional Food Pol icy Re search In sti tute*, Washington DC (US).
- Emhar A, Aji JMM, dan Agustin T (2014). Analisis Rantai Pasokan (Supply Chain) Daging Sapi Di Kabupaten Jember. *Berk. Ilm. Pertan.* 1: 53–61.
- Fatahilah YH, Marimin dan Harianto (2010). Analisis Kinerja Rantai Pasok Agribisnis Sapi Potong: Studi Kasus Pada PT. Kariyana Gita Utama, Jakarta. *J. Teknol. Ind. Pertan.* 20: 194–206.
- Febrianto N, Hartono B, Yulinarsari AP (2021). Value-Added Analysis of Duck Meat Supply Chain in Malang, Indonesia. *Am. J. Anim. Vet. Sci.* 16: 112–120. <https://doi.org/10.3844/ajavsp.2021.112.120>
- Hadi PU (2012). Manajemen Rantai Pasok Komoditas Ternak dan Daging Sapi di Nusa Tenggara Timur. (Bunga Rampai Rantai Pasok Komoditas Pertanian Indonesia). IPB Press, Bogor.
- Hayami Y, Kawagoe T, Morooka Y, Siregar M (1987). *Agricultural Marketing and Processing in Upland Java: A Perspective from a Sunda Village*. CGPRT Centre, Bogor.
- Herdiyandi Rusman Y, dan Yusuf MN (2017). Analisis Nilai Tambah Agroindustri Tepung Tapioka Di Desa Negaratengah Kecamatan Cineam Kabupaten Tasikmalaya (Studi Kasus Pada Seorang Pengusaha Agroindustri Tepung Tapioka di Desa Negaratengah Kecamatan Cineam Kabupaten Tasikmalaya). *J. Ilm. Mhs. Agroinfo Galuh* 2, 81–86.
- Imhoff C, Loftis L, Geiger JG (2001). *Building the Customer-Centric Enterprise: Data Warehousing Techniques for Supporting Customer Relationship Management*, 1st ed. Wiley.
- Kadju FYD., Hartono B, Nugroho BA (2020a). Analisis Value

- Added on Entrepreneurship of Beef Shredded and Jerky in Kupang Town East Nusa Tenggara Province - Penelusuran Google. *Int. Res. J. Adv. Eng. Sci.* 5: 222–225.
- Kadju FYD, Hartono B, Nugroho BA (2020b). Analysis of Beef Supply Chain in Kupang Town East Nusa Tenggara Province. *Int. Res. J. Adv. Eng. Sci.* 5: 69–73.
- Lau VS, Sio S, Purwatiningsih TI, Sikone HY (2021). Performance Analysis and Added Value of Industry Processing Beef into Processed Meat Jengken and Shredded in the Kota Kefamenanu District. *J. Trop. Anim. Sci. Technol.* 3: 91–107. <https://doi.org/10.32938/jtast.v3i2.1170>
- Liputra DT, Santoso S, dan Susanto NA (2018). Pengukuran Kinerja Rantai Pasok Dengan Model Supply Chain Operations Reference (SCOR) dan Metode Perbandingan Berpasangan. *J. Rekayasa Sist. Ind.* 7: 119. <https://doi.org/10.26593/jrsi.v7i2.3033.119-125>
- Marimin M, dan Maghfiroh N (2010). Aplikasi Teknik Pengambilan Keputusan dalam Manajemen Rantai Pasok. IPB Press, Bogor.
- Nguyen TH, Sherif JS, Newby M (2007). Strategies for successful CRM implementation. *Inf. Manag. Comput. Secur.* 15: 102–115. <https://doi.org/10.1108/09685220710748001>
- Noach YR, dan Lulus MF (2020). Analisis Indeks Koneksi Pasar dan Distribusi Margin Pada Lembaga-Lembaga Pemasaran Ternak Sapi Potong di Kabupaten Kupang Nusa Tenggara Timur Indonesia. *J. Agrimor.* 5: 13–16. <https://doi.org/10.32938/ag.v5i1.939>
- Nurdiani N (2014). Teknik Sampling Snowball dalam Penelitian Lapangan. *Binus J. Publ.* 5. <https://doi.org/10.21512/comtech.v5i2.2427>
- Rahman KT, Palash MS (2016). Fed Cattle Market Integration in Mandatory Price Reporting Era. *Open Agric.* 3: 348–355. <https://doi.org/10.1515/opag-2018-0038>
- Rosmawati H (2011). Analisis Efisiensi Pemasaran Pisang Produksi Petani di Kecamatan Lengkiti Kabupaten Ogan Komering Ulu. *J. Agronobi S.* 3: 1–9.
- Saptana, dan Ilham N (2017). Manajemen Rantai Pasok Komoditas Ternak dan Daging Sapi. *Anal. Kebijak. Pertan.* 15: 83–98. <https://doi.org/10.21082/akp.v15n1.2017.83-98>
- Saptana, Umboh SJK, Kalangi L, dan Ilham N (2016). Kajian Kebijakan Tataniaga Daging Sapi Mendukung Stabilisasi Harga. Presented at the Semnas Persepsi III Manado, Manado. pp. 154–165.
- Serra V, Woodford K, Martin S (2005). Sources of Competitive Advantage in the Uruguayan and New Zealand Beef Industries (15th Congress, Campinas SP, Brazil, August 14–19, 2005 No. 24292). International Farm Management Association.
- Setiadi, Nurmalina R, dan Suharno (2018). Analisis Kinerja Rantai Pasok Ikan Nila Pada Bandar Sriandoyo Di Kecamatan Tugumulyo Kabupaten Musi Rawas. *MIX J. Ilm. Manaj.* 8. <https://doi.org/10.22441/mix.2018.v8i1.010>
- Singarimbun M, dan Effend S (2006). Metode Penelitian Survei. LP3ES, Jakarta.
- Siyoto S, dan Sodik MA (2015). Dasar Metodologi Penelitian. Literasi Media Publishing, Yogyakarta.
- Soekartawi (1993). Prinsip Dasar Ekonomi Pertanian Teori dan Aplikasi, Cet. 3. ed. Raja Grafindo Persada, Jakarta.
- Sudiyono A (2002). Pemasaran Pertanian. Universitas Muhammadiyah, Malang.
- Swift R (2000). Accelerating customer relationships: using crm and relationship technologies. Prentice Hall Press One Lake Street Upper Saddle River, NJ, United States.
- Syakur MA, Purnomo SH, dan Hertanto BS (2017). Analisis Rantai Pasokan (Supply Chain) Daging Sapi dari Rumah Pemotongan Hewan sampai Konsumen di Kota Surakarta. *Sains Peternak. J. Penelit. Ilmu Peternak.* 15: 52–58. <https://doi.org/10.20961/sainspet.v15i2.11444>
- Wu Z, Choi TY, Rungtusanatham MJ (2010). Supplier–supplier relationships in buyer–supplier–supplier triads: Implications for supplier performance. *J. Oper. Manag.* 28: 115–123. <https://doi.org/10.1016/J.JOM.2009.09.002>
- Zaroni AN (2015). Globalisasi Ekonomi Dan Implikasinya Bagi Negara-Negara Berkembang : Telaah Pendekatan Ekonomi Islam. *Al-Tijary* 1: 1 – 22. <https://doi.org/10.21093/at.v1i1.418>
- Zhi Y, Yueying J, En X (2019). Buyer-supplier relational strength and buying firm's marketing capability: An outside-in perspective. *J. Ind. Mark. Manag.* 82: 27–37. <https://doi.org/10.1016/j.indmarman.2019.03.009>