

Analysis of Slaughtering Characteristics and Beef Marketing in East Timor



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Abstract

The bovine cattle sector in East Timor is rudimentary in its production and marketing. It is dominated by small-scale units and extensive production systems which are based on exclusively natural food. The cattle are sold at the local markets by appearance rather than weight. The animals are generally sold when the appropriate weight is met, and the families are in need of monetary resources. The purpose of this study was to analyze the cost of slaughtering and beef marketing in East-Timor. To this end, two stages of information collection were applied. The first one consisted of secondary research, through a broad literary review which involved theoretical components and empirical studies, hoping to frame the topics covered. The second stage consisted of primary research through a questionnaire given to the heads of different slaughter units in East-Timor. The results allowed for an analysis of the slaughtering and marketing conditions and their respective costs, as well as the identification of the factors that condition them, both positively and negatively. Despite the difficulties and limitations of research - due to the quality of statistical and documentary information or the obstacles to conducting the interviews- the results found still permit relevant conclusions. They also support the suggestion of policy measurements that improve the sector and provide guidelines/clues for future research. Among the barriers to the expansion of the beef production are the low level of technological implementation at the levels of production, slaughter and sale; the precarious road network and the consequent long transportation; the absence of technical assistance; the precarious slaughter system and industrialization of meat; the lack of improved genetic resources. All these barriers require for policy measures to be taken. There is also an utter need for government and veterinary regulations in the districts that can carry out the indispensable pre-slaughter animal inspection and post-slaughter meat inspection. Thus, guaranteeing the health quality of the meat consumed.

Keywords: Cost; Slaughter; Marketing; Cow Meat; East Timor

Introduction

The bovine sector in East Timor is rudimentary, both in terms of production and trade. The herds are dispersed throughout the national territory, with greater concentration on the district of Bobonaro. The animals are raised freely on the fields, usually without the use of animal feeds, sown pastures or nutritional supplements. The cattle is sold for its appearance and not by weight or taking into consideration the quality of the meat. Consequently, productivity is low and the time it takes for an animal to reach adult weight can reach up to four years. There are no agricultural policy guidelines for beef production. Likewise,

there are no centers for production, reproduction, research and experimentation, as such are understood to be sociocultural activities of the local population.

Despite the goals set by the government (staff increase, approved legislations and regulations on veterinary public health, quarantine and diseases) and the governmental vaccination campaigns, much remains to be done. According to MAP [1] and AIP-FCE [2], there is a need for the development of dissemination campaigns that instill basic animal health care and improved nutrition. Moreover, animal identification must be carried out

so to oversee the following: disease control, animal movement, prevention of public health, improvement of animal genetic quality, reproduction and other production parameters (mortality rates, fertility and interval between births, average daily gains and conversion index). Additionally, the lack of animal identification, licensed slaughter units and the paucity of health statuses, restrict marketing possibilities, especially those with Indonesia [1].

Animal raising in East-Timor has the potential to improve the local levels of nutrition and the population's access to meat. It also aids to the country's ability to self-supply and decrease beef imports, whilst supporting overall development through the creation of jobs, the exportation of earnings and increase of social well-being [3,4]. Be that as it may, there aren't studies on bovine costs and marketing, nor relevant information to support measurements that enhance this sector and improve its performance. The objective of this study is to analyze the costs of the slaughter and commercialization of beef in East Timor. Meaning: to characterize the slaughter locations and conditions; to compare the cost of slaughter and commercialization in different units and slaughter locations; to identify the factors that affect slaughter and marketing costs; to seek the means and alternatives to minimize these costs without decreasing meat quality; to characterize the sales and marketing processes whilst proposing improvements for these operations and guarantee quality and price to consumers; to propose policy measures that improve the performance of the slaughter system and the marketing of beef in East Timor.

Economic Theory, the Market, Costs and Commercialization

The economic theory provides a wide range of concepts and criteria that make it possible to understand and explain the economic behavior of individuals and markets [5]. The prices and quantities of goods vary over time depending on the supply, demand, and their reaction to other economic variables [6]. The demand refers specifically to the consumer and the supply is directly associated with the producer, namely, the factors that influence production. The factors that most significantly affect the market supply are called Supply Determinants. They are the following: prices of the products and raw materials, technology and expectations [7].

In general, the higher the price of a good, the greater is the number of companies that are able and willing to produce, offer and sell it. However, some companies face high costs due to lack of experience or market orientation. Consequently, their products may have lower prices, making the companies economically unfit to enter the markets. However, if the costs of the production factors decrease, production becomes more viable and companies tend to expand production, allowing for the appearance of new companies on the market, with expectations of profit. Thus, if the costs of raw materials increase, we will have the opposite result. Undoubtedly, other situations may occur, such as the non-

expansion of production leading to a technological innovations and adjustments or a drop in prices [7].

Demand is another essential tool for analyzing the functioning of the markets and it can differ from one market to another. Marshal [6] associates demand with the consumer, defining it as the quantity of a product that buyers are willing to buy to satisfy their needs at an accepted price at a given moment in time. For Mankiw [7], demand represents the desired quantity of a product that buyers can buy, influenced by the following factors: price, income, prices of similar products, tastes and expectations. Consequently, the lower the price, the more willing consumers are to buy larger quantities. Conversely, consumers are more less likely to buy a product the higher its price is. Changes in income, consumer preferences/tastes and the price of substitute or complementary goods can also influence demand [8].

Market equilibrium occurs if the quantity demanded and offered for a product is precisely the same [8]. That is, when assuming that the price of demand is equal to that of supply which consequently means that nothing induces an increase or decrease in the quantity produced [6]. The equilibrium is called stable when the price of demand is higher than that of the supply, which implies slightly lower quantities than the equilibrium quantity and, vice versa. Decreases in production costs can affect market prices and increase production, subsequently enlarging the supply, which may change the market balance. In turn, increased consumer income can induce greater availability to consume, which leads to an increment in price and eventually a new market balance [8].

A market includes buyers and sellers who carry out transactions by leveling the prices of products based on the cross-check between supply and demand [6]. When on the market, producers look for clues to plan and decide what, how much and how to produce [9]. The markets ensue transactional exchanges which provide knowledge about the consumers' preferences and information which allows for prices to be determined [10]. There are diverse particularities in the agri-food markets, namely:

- i. The fragmentation of the agricultural and livestock production and its based on biological cycles
- ii. They have seasonal and annual variability
- iii. They be dependent on random factors such as climate and others
- iv. They have a perishable nature and storage difficulties, which makes transportation more expensive
- v. The products need to be processed, controlled, standardized, preserved, packaged and differentiated to suit consumer preferences.

These particularities influence prices, hinder long-term planning and cause producers to take risks in the face of competition. These producers are price takers, with no capacity to influence the prices individually [9]. These exchanges provide

knowledge on preferences. This information is transmitted and determines the correlation between the quantity traded and its price.

Commercialization regards all the activities necessary to meet the needs and desires of the consumers on the markets, such as: planning the availability of the offer, effecting the product ownership transfer, promoting the means for physical distribution and facilitating all the informational operations and market access [9]. Some factors can influence fundamental marketing decisions and efficiency, which have, in the past, led to slow market developments. These factors are the following: the production location (not the market's), undifferentiated products and the distance between producers (which complicates the strategic decisions). However, some trends represent both difficulties and opportunities in terms of commercialization, such as: the increase in consumer demand and power, the industrialization

of agribusiness, the increase in the size of agricultural holdings the greater differentiation of products, the increasing regulation of agricultural production and the progressive globalization of agriculture [11].

The Characteristics of Bovine Production

Livestock production represents about 4,5% of the total production in East-Timor. A significant part of the livestock corresponds to the production of buffalo and Balinese cattle (Figure 1). Approximately 23% of the families in East-Timor have bovine cattle and about 10% of the families have buffaloes. The average number of heads per family differs, being an average of 3.8 heads for cattle and 5.0 heads for buffaloes. The districts with the highest number of bovine heads are Bobonaro, Viqueque, Covalima and Lautem. The districts with the greatest number of buffaloes are Viqueque, Baucau and Lautem.

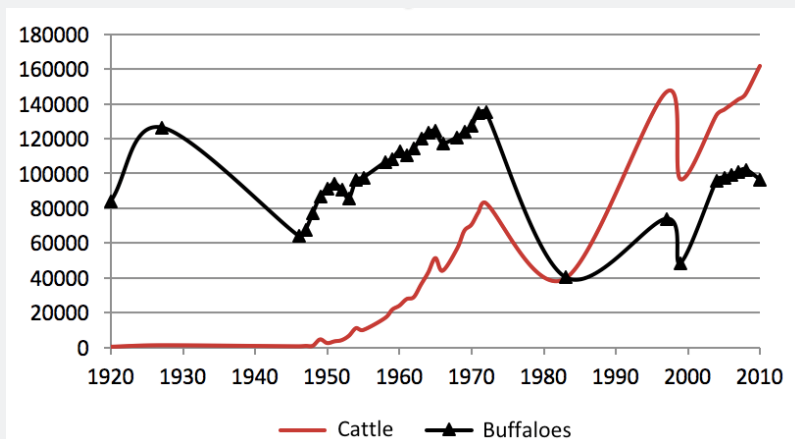


Figure 1: The evolution of Cattle and Buffaloes between 1920 and 2010.

Source: Bettencourt et al, 2013

In East Timor, the dominant production system is extensive although the semi-intensive system accounts for 20 to 30% [12] of the totality. These have reduced or null production costs (Dahlan et al., 2010) as its animals are left to graze freely, without manufactured shade or stables and no technological intervention. These systems face limitations related to the difficulty in achieving the animals' desired live weight, the low rates of average daily gain, low fertility rates and also the high animal mortality rate (which mainly affects young and female specimens). The two main causes of animal deaths are diseases (84.1%) (mainly caused by septicemia induced by *Pasteurella multocida*) and nutritional deficiencies (6.9%) [13]. The Ministry of Agriculture and Fisheries' vaccination plan includes cattle and buffaloes vaccination for this infectious agent [5,14] which, in collaboration with protozoa and brucellosis, has an impact on public health [15].

Cattle grazing quotas differ by district. Ailéu, Ermera and Díli have very high densities, greater than 4 heads per ha of natural pasture. The districts of Manufahi, Lautem and Covalima have

very low quotas, less than one head per ha of natural pasture. The larger districts (Viqueque, Lautem, Oecussi, Bobonaro and Covalima) that produce both buffaloes and cattle have volumes lower than 2 heads per hectare of natural pasture.

The slaughter of cattle was only recently recognized as important, mainly because of its influence on the quality of meat, consumer safety and the opening of the National Slaughterhouse of Tibar. The slaughtering is carried out mainly at the meat selling points which, in the Díli District, are: the market Halilaran, the ex Comoro Market, Raikotu, Comoro, New market in Manleuana, Ailelhun and Bidau mota claran. The sale process can be executed through wholesalers, retailers, butchers and directly to the final consumer. Data from the East Java Province Livestock Services annual report, Indonesia, (2005) shows a total of 370,893 cattle specimens slaughtered in 2004, with an annual growth of 0.92% and a beef production of 71,203.804 kg. The annual report of West Timor Province Livestock Services, Mataram, Indonesia, (2005), presents, for its slaughterhouse alone, a periodicity of 100

bovine heads per day. There is no information on the slaughter costs in East Timor or the value of transporting live animals from the districts into Dili. There are also no regulations on animal transport nor administrative payments. However, the Government, through the Ministry of Agriculture and Fisheries, has already created a License form model (booklet) for the circulation and transportation of live animals from the National Directorate for Livestock and Veterinary of East Timor [16,17].

The values of meat consumption in East-Timor are still far from those observed in more developed countries. FAO data indicates a decrease in per capita consumption from 45.6 kg in 1992 to 32.1 kg in 2007. According to this data, the consumption of about 32 kg was distributed among the different types of meat as follows: 5.1% beef, 29.2% pork, 16.5% chicken, 1.3% goat / sheep and 47.9% other meats. The latter include buffalo, horse, dog and wild animal (FAO) meats. The MAF [18] study on the families located in the different districts showed an average meat consumption of 14.4 kg/ capita/year. The urban and coastal areas/districts generally showed a higher consumption than the more rural areas, with the exception of Oecussi. In regards to the meats consumed, chicken stood out with 8.22 kg / capita / year, followed by pork with 2.224 kg / capita / year, buffalo with 1.310 kg / capita / year, and beef with 0.963 kg / capita / year and ewe with 0.470 Kg / capita / year.

Applied Methodology

The basic method used in the present investigation is that of descriptive analysis, which, according to Nasir [19], permits the analysis of a situation or event at a given moment, whilst removing implications of the analyzed problems and proposing clues for their solution. The methodological procedure included two stages of information collection consisting of primary research and secondary research. The latter was supported by a broad literary review on the theoretical components and empirical studies on the costs of bovine slaughter and marketing as well as the factors that affect them. In the primary survey, a questionnaire was applied to a convenience sample composed of the individuals responsible for slaughter units in 13 different districts (Aileu, Ainaro, Bobonaro, Baucau, Covalima, Dili, Ermera, Lautém, Liquica, Manatuto, Manufahi, Viqueque, Oecusse), including the Tibar National Slaughterhouse. The main disadvantage of sampling

is the impossibility of generalization, as conclusions only apply to the surveyed units, although this process is less costly and of simpler application [20].

The data obtained was treated using descriptive statistical measures, adopting the SPSS statistical program, which is conducive to a concise, synthetic and understandable representation of the collected data. The analysis was carried out through the elaboration of tables and graphs and the calculation of measures and/or indicators considered adequate for the analysis of the information gathered [21].

Results and Discussion

Sample Characteristics

35 questionnaires were carried out and distributed among the 13 Districts of the country as follows: Liquiça (4 including the National Slaughterhouse), Dili (11), Aileu (3), Oecussi (3), Ainaro (2), Covalima (2), Manatuto (2), Lautem (2), Viqueque (2), Baucau (1), Bobonaro (1), Ermera (1) and Manufahi (1).

Typology of the Slaughter Units

Of the 35 slaughterhouses, 20 (57.1%) slaughter every day and the remaining 15 (42.9%) slaughter solely once a week. Almost all slaughterers in Dili (90.9%) work daily while in rural areas they work mostly once a week (66.7%). These differences between Dili and rural areas are statistically significant ($F = 13.218$ and $p\text{-value} = 0.001$).

In regards to the maximum and minimum number of animals slaughtered per day, 5% of the slaughterers have a minimum of 5 animals and 10% have a maximum of 5 animals slaughtered. Most slaughter at least 1 animal (60%) daily, although 35% of the slaughterers only slaughter 1 animal at most. From the 35 slaughterers, on a weekly basis, 7 (46.7%) always slaughter only 1 animal, 1 (6.7%) always slaughters 6 animals, and the rest (46.6%) slaughter between 1, 2 and 3 animals. When comparing the number of cattle slaughtered per day versus the weekly quota, it can be seen that the values observed in Dili are higher than of the other districts. The differences are significant between Dili and rural slaughterers (Table 1: $p\text{value} < 0.05$).

Table 1: Comparison between the daily and weekly number of slaughtered animals.

Slaughters	Number of Animals			F	p-value
	Dili	Rural	Total		
Minimum Slaughters per day	2,4	1,3	1,9	4,445	0,049
Maximum Slaughters per day	3,4	1,4	2,4	21,429	0,000
Average of Slaughters per day	2,9	1,4	2,1	11,735	0,003
Minimum Slaughters per Week	6,0	1,1	1,5	166,978	0,000
Maximum Slaughters per Week	6,0	1,6	1,9	31,929	0,000
Average of Slaughters per Week	6,0	1,4	1,7	99,463	0,000

Nearly all of the slaughtering takes place at night (75%) and only a small minority (25%) takes place during the day. This reflects that most slaughterers prefer to slaughter at night in order to avoid potential tensions. Moreover, animals tend to be calmer at night. In Dili all slaughtering takes place at night while in rural areas they have the following distribution: night (58.8%) and day (41.2%). The differences between Dili and the rural areas are statistically significant ($F = 7.159$, $p\text{-value} = 0.013$). Furthermore, rural slaughtering is illegal and it has poorer conditions when compared to the National Slaughterhouse in Dili, that fulfills the required conditions.

Concerning the slaughter age of the animals, the majority (82.9%) of the slaughtered animals are aged between 3 and 4 years old, 77.1% are aged over 5 years old and only 37.1% are slaughtered at 1 or 2 years old. In Dili we tend to witness the slaughter of animals over 3 years old whereas animals aged 1 to 2 years old are more common in rural areas. These differences are significant for animals 5 years and over: $p\text{-value} = 0.29$. The older

age (3 and 4 years old) can be justified by two reasons. On one hand, the animals originate from local breeds and are exploited in an extensive system, which provides slower growth than that of an intensive breeding system and other types of breed. On the other hand, the farmers are not yet aware of the importance that animal weighing has on slaughtering. Such means that in order to negotiate and decide the sale price of a specimen, the animals are assessed only visually, through their body condition and estimated age.

According to the answers given, the districts with larger animal sales are Viqueque, Manufahi, Lautém, Manatuto and Covalima. The vast majority of slaughterers in the districts buy the animals from the district itself, although there are some exceptions. Those from Baucau purchase in Lautem, those from Ermera buy from Covalima and Manufahi and lastly Ainaro and Liquiçá buy from Covalima. Virtually all of the Dili slaughterers buy in more than one district (Table 2).

Table 2: Importance of Districts in Animal Supply.

Districts	Number of times mentioned by the slaughterers	%	Districts	Number of times mentioned by the slaughterers	%
Aileu	1	2,9	Liquica	4	11,4
Ainaro	3	8,6	Lautem	10	28,6
Baucau	3	8,6	Manatuto	6	17,1
Bobonaro	4	11,4	Manufahi	10	28,6
Covalima	6	17,1	Oecussi	4	11,4
Dili	1	2,9	Viqueque	12	34,3
Ermera	1	2,9	Total	64	100,0

Most of the slaughtered animals have identification (88.2%), mostly iron markings (96.4%), and are transported by bus (88.2%), although, in rural areas walking is considered. The transport time until the animal arrives at the slaughter place has an average duration of 4.1 hours, with 54.3% of the animals taking less than 3 hours and 16.7% more than 10 hours. In Dili, animal transport takes an average of 7.8 hours, while in rural areas it takes 2.8 hours, this difference is statistically significant ($F = 18.793$ $p\text{-value} = 0.000$).

Among the 35 slaughterers, 42.9% fast the animals before the slaughter takes place, although they are not subject to veterinary inspection (90.95%) and are often immobilized by leg-tying (48.7% of cases). The average number of fasting hours is 10.3 hours, with 4 slaughterers fasting for 24 hours (26.7%) and 53.3% of the slaughterers fasting for less than 7 hours. There are no differences in the realization and duration of the fasting time between Dili and the rural areas. The knife (57.1%) followed by the machete (48.6%) and dima (28.6%), are the instruments used to slaughter.

The cutting of slaughtered animal carcasses is performed on the ground. The animals are mostly cut into 4 pieces (34.6%) or 5

(30.8%). In Dili, the carcasses are cut into 5 parts (45.5%) while in rural areas they are cut in 4 parts (53.3%). The carcasses are also not inspected by a veterinarian nor are there any official control regulations.

The number of workers is variable, and it can be between 2 and 13 people. In Dili, the amount of workers is higher than that of rural areas. The hiring regime can be done on a daily, weekly or monthly basis. The average daily wage is 6 USD, the weekly wage is 30 USD and finally the month wage is 135 USD. The wages are always higher in Dili than in rural areas. The vast majority of slaughterers started their activity after 1999 and the slaughterers in Dili are older.

Prices

The prices practiced by the slaughterers aim to remunerate all the costs involved in the production and sale of the livestock. Slaughterers usually buy animals at different prices, depending on the specimen's age and gender. Distinct prices are applied to different ages (1 to 2 years, 3 to 4 years and above 5 years old). Body condition does not influence the prices. When comparing the gender distribution of prices, Figure 2 revealed a repeatedly lower

price for female specimens. The prices of males vary between 579 (minimum average) and 727 USD (maximum average) and

for females between 415 (average of the minimum) and 487 USD (maximum average).

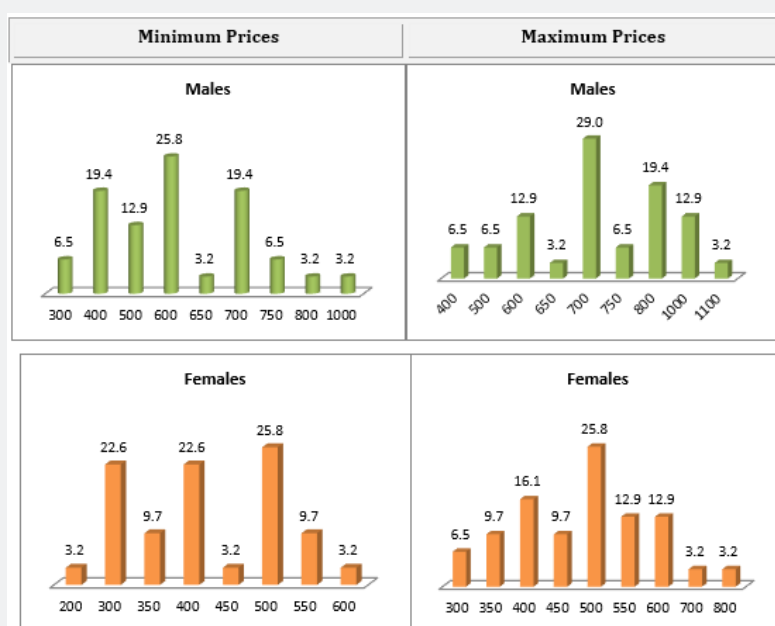


Figure 2: Minimum and Maximum Prices for Males and Females.

The comparison between the minimum and maximum prices for females and males shows that the minimum prices and the maximum prices are significantly different for both genders. The average price for males (653 USD) is higher and significantly different from the average price for females (451 USD) (Table 3). The minimum prices for females and males in Dili are lower than

in rural areas, although they are not significantly different. The maximum prices for males and females are higher in Dili than in rural areas and are significantly different. Prices for both genders are higher in Dili than in rural areas, although this result is not significantly different (Table 4).

Table 3: Comparison between the Maximum and Minimum Prices between males and females.

Comparison	t	p-value
Males - Minimum Price*Maximum Price	-4,831	0,000
Females - Minimum Price*Maximum Price	-4,390	0,000
Average Price of Females*Average Price of Males	9,315	0,000

Table 4: Comparison of Minimum and Maximum Prices for Females and Males in Dili and Rural Districts.

Comparison	Dili	Rural	Total	F	p-value
Minimum Price for Males	564	588	579	0,156	0,695
Maximum Price for Males	818	678	727	5,628	0,025
Minimum Price for Females	405	420	415	0,164	0,688
Maximum Price for Females	541	458	487	4,333	0,046
Male Price	691	633	653	1,242	0,274
Female Price	473	439	451	0,884	0,355

Most buyers use differences in the animal's age in order to estimate and decide the prices of the live animal, and it includes a level of negotiation between the buyer and the seller. Meaning that traders are not yet used to buying animals for their live weight.

Also, the prices for each age are different. Between the ages of 1 to 2 years old the average minimum price is 330 USD, and the average maximum price is 352 USD. Figure 3 shows the distribution of these prices, referred by the slaughterers. In both

cases, the most reported values are 200 and 300 USD. For animals aged from 3 to 4 years old, the average minimum price is 516 USD, and the average maximum price is 540 USD. Figure 4 shows the

distribution of these prices, reported by the slaughterers. In both cases the most reported values are 400 and 600 USD.



Figure 3: Maximum and Minimum Prices for the Ages 1-2.



Figure 4: Maximum and Minimum Prices for the Ages 3-4.

For animals aged 5 years and over the average minimum price is 673 USD and the average maximum price is 778 USD. Figure 5 shows the distribution of the prices referred by the slaughterers, being that for the minimum price the most observed frequency

is 600 and 800 USD and for the maximum price 700, 800 and 1000 USD. It should be noted that although more expensive, older animals (over 5 years old) are the ones with the worst quality of meat.



Figure 5: Maximum and Minimum Prices for Ages Superior to 5 years old.

The comparison between the minimum and maximum prices for each of the three age groups shows that the minimum and maximum prices are significantly different for each of them (Table 5). All minimum, maximum and average prices for the three age

groups are higher in Dili than in the rural areas. The prices in Dili are significantly different from the prices in rural areas for the age class 1 to 2 years old and the age class 5 years old and older, but for a p-value of 10% (Table 6).

Table 5: Comparison of Maximum and Minimum Prices by Age Classes.

Comparison	t	p-value
Age 1 to 2 - Minimum price * Maximum price	-2,309	0,031
Age 3 to 4 - Minimum price * Maximum price	-3,395	0,002
Age 5 above - Minimum price * Maximum price	-5,284	0,000

Table 6: Comparison of Minimum and Maximum Age Class Prices in Dili and Rural Districts.

Comparison	Dili	Rural	Total	F	p-value
Minimum price 1 to 2 years	394	293	330	3,382	0,081
Maximum price 1 to 2 years	413	320	352	3,046	0,096
Average price 1 to 2 years	403	300	338	3,809	0,065
Minimum price 3 to 4 years	545	500	516	1,190	0,284
Maximum price 3 to 4 years	568	524	540	0,958	0,336
Average price 3 to 4 years	557	509	527	1,223	0,278
Minimum price 5 years and older	736	634	673	3,265	0,082
Maximum price 5 years and older	841	740	778	3,135	0,088
Average price 5 years and older	789	687	726	3,702	0,065

The average quantities sold by slaughterers in Dili and in rural areas are shown in Table 7. Table 8 shows the comparison of the average selling prices of the different animal parts in Dili and in the rural areas. The price of bones, lungs, intestines and stomachs

is higher in rural areas than in Dili. The differences for lungs, intestines and stomachs are significant at 10%. All other prices are higher in Dili than in rural areas and the differences are not significant, except for feet.

Table 7: Average Quantity Sold of Different Beef Parts in Dili and Rural Areas.

Animal Parts	Unit	Dili	Rural	Total
Bones	Kg	32,1	35,6	34,1
Meat	Kg	118,2	79,8	93,4
Heart	Kg	2,0	1,3	1,5
Liver	Kg	4,3	3,5	3,8
Lung	Kg	3,2	3,0	3,0
Intestine	Kg	7,8	6,8	7,2
Stomach	Kg	5,0	4,5	4,7
Head	unit	1,3	4,0	2,9
Feet	unit	4,3	5,2	4,9
Skin	Kg	14,5	13,5	13,7

Channels of Commercialization

With regard to live animals, most slaughterers buy the animals directly and only from the producers (48.6%), or from producers and traders (45.7%) an only 5.7% buy from traders only. In the urban circuit (Dili) traders predominate although there are producers as well. In the rural areas the purchase of animals is

mainly done directly from the producers. The importance given to traders in Dili is probably justified by distance and/or difficulty in transport between producers and slaughterhouses. Long, difficult and painful transportation, animal fatigue and stressful situations have a major negative influence on the meat quality and food safety.

Table 8: Comparison of Average Selling Prices of Different Bovine Parts in Dili and Rural Areas.

Animal Parts	Unit	Dili	Rural	Total	F	p-value
		USD	USD	USD		
Bones	Kg	2,59	2,96	2,84	2,474	0,126
Meat	Kg	6,55	6,31	6,39	0,706	0,407
Heart	Kg	6,09	5,69	5,81	0,560	0,459
Liver	Kg	6,05	5,92	5,96	0,106	0,747
Lung	Kg	2,55	4,10	3,61	4,849	0,035
Intestine	Kg	3,57	4,39	4,11	3,172	0,085
Stomach	Kg	2,32	3,71	3,20	5,882	0,022
Head	unit	18,63	14,07	15,24	1,113	0,300
Feet	unit	7,00	2,89	3,88	4,631	0,041
Skin	Kg	5,89	2,80	3,75	0,752	0,395

Meat marketing channels are also essential in order to preserve food value. The results obtained point out that, after the slaughter of the animals, all the meat is purchased from slaughterers and destined for the final consumer (100%), to retailers (51.5%), restaurants (74.2%), supermarkets (23, 3%) and butchers (3.8%). The figure shows some differences between Dili and the rural areas when concerning retailers and supermarkets because retailers and supermarkets are more important in Dili. The types of parts purchased by retailers are mainly parts of the carcass (66.7%), only 26.7% purchase the entire carcass and 100% of the buyers acquire parts of the carcass at the butcher shop. In the supermarket, 25.0% buys carcass parts and 75% purchase the entire carcass, while in the restaurant 85% buys carcass parts and only 15% buys the entire carcass.

International consumers (6.1%) buy less meat when compared to the national consumers (93.9%). This fact that can be explained by the lack of confidence of the international consumer, in part, justified by the constant lack of veterinary inspection, but it can also be explained by the lack of knowledge that is made available on the slaughter and marketing conditions of the meat. Organizations, whether governmental or private, acquire their meat from slaughterers, with decreasing percentage importance for institutions linked to education (61.5%), hospitals and other institutions linked to health (38.5%), prison and police affairs (23.1%).

Most of the transportation of the meat for sale is done by car (48.6%), followed by hand (37.1%) and motorcycle (14.3%). Manual transport through hand care (45.8%) predominates in rural areas, while in urban areas transportation by car (72.7%) is dominant. The differences in meat transport between rural and urban areas are significant at 10% (F = 3.705; p-value = 0.063). Cold (75.9%) is the prevailing form of conservation.

As for general conditions, the importance of having drinking water in most slaughterhouses is important to maintain minimum public health conditions. The existence of cement flooring also

facilitates good cleaning practices and reduces health risks. Regarding the existence of a wall and roof, it is difficult to assess the advantages of their existence, which is more frequent in rural areas. Although the roof and wall protect from insects and exposure to the sun, they must always be associated with good ventilation and cooling conditions that preserve the quality of the meat.

Conclusion

This study and the information collected allowed for the drawing of some interesting conclusions, especially given that there are no academic and scientific studies on the subject. The first conclusion to be drawn is that the process of slaughtering animals in most East-Timorese slaughter units is still not desirable. First the animal arrives at the slaughterer fatigued by the transport, being placed in a waiting area for variable time. It is then lined up, stunned, slaughtered and cut to the ground. Since all the pieces are not sold fresh, the meat is kept cold. Even so, the Timorese beef sector has undergone several changes in recent years, due to operations that started at the National Slaughterhouse in Tibar, the increase in national and international normative sanitary requirements, the market demands and the increased requirements from many of the agents involved in the production chain.

The sale of the beef slaughtered in Dili is purchased in more than one district, mainly the following: Bobonaro, Viqueque, Covalima, Lauten and Oecussi. Animals fast but they are generally not subject to any veterinary inspection either before or after the slaughter. The animals are immobilized by lashing the legs and they are slaughtered with different utensils, the most common being a knife, followed by machete and dima. The pistol is only used at the Tibar National Slaughterhouse.

Although it was not possible to compare the cost of bovine slaughter and marketing in different units and slaughter places, due to the lack of reliable records and data, the prices practiced

by the slaughterers allow us to draw some conclusions. It should be noted that the majority of slaughterers purchase based on the condition of the animal, although such does not influence the pricing. The purchase price varies widely between genders and age classes, with males being more expensive than females and older animals being pricier than younger, in absolute terms. All minimum, maximum and average prices by age class are still higher in Dili than in rural areas. As to the different parts of the carcass, prices are higher in Dili when compared to those practiced in rural areas, with the exception of bones, lungs, intestines and stomach, which cheaper in Dili when compared to rural areas.

The marketing channels include all the activities necessary to make meat available from producers to consumers, including the determination of product value, for both live animals and for the meat. In the rural areas, the purchase of live animals is done directly from the producers and concerns two parties: traders and producers. In urban slaughterers, particularly in Dili, the role of traders is more important due to the distance between producers and slaughterhouses. The meat marketing circuits, which are entirely intended for the end consumer, include retailers, intermediaries in the restaurant sector, supermarkets and butchers. The means of transport used are mostly a truck or car, wheelbarrow and motorcycle, the former predominating in urban areas while the other dominate the rural settings.

The factors that condition slaughter and beef sales were as follows: a) Transport of animals, which must not be carried out under conditions unfavorable to the animal; b) Rest after transport required to ensure adequate meat conservation; c) Need for health inspection of the animal before and after slaughter to check the health status of the animal and the meat intended for human consumption; d) Reduce the possibilities of contamination of meat in different stages (slaughter, bleeding, skinning, evisceration, cutting, washing and removal of the extremities) for hygienic-sanitary and commercial reasons; e) Need for a cold chain that guarantees the maintenance of meat quality; f) Transport of the carcass and meat pieces free from contamination; g) Definition of packaging and labeling conditions whenever justified and at the option or imposition of the buyer; and, h) Assess Animal Welfare practices and environmental impacts.

Finally, this study proposes policy measures that aim to improve the performance of the bovine slaughter and marketing systems in East-Timor. The low level of technological implementation at the production level, slaughter and commercialization, the precarious road network and the consequent long transportation time, the absence of technical assistance, the precarious slaughter system and industrialization of meat and the lack of improved genetic resources, are barriers to the expansion of cattle production on which policy measures must be taken. There must also be governmental and veterinary regulations within the districts that are able to provide the necessary pre-slaughter animal inspection

and post-slaughter meat inspection and thus guarantee the health quality of the meat consumed. The creation of another slaughterhouse and a cutting unit is also suggested, one similar to the National Slaughterhouse so to ensure the slaughter, cutting, packaging and storage of meat with guaranteed quality, both for the domestic and foreign markets.

It is also important to develop further research in the area of cattle production, to implement a long-term disease control management system and to expand the animal vaccination program. It will be necessary to train veterinary clinicians, to help with animal care, and to train local farmers: this can occur, through reforms on education and training systems. Eventually leading to the creation of an Association of Cattle Breeders that will watch over production, promotion, strategies and will be able to suggest appropriate policy and legislation measures.

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