UNIVERSITY OF SOUTHERN QUEENSLAND

OFFAL AND BEEF DEMAND IN INDONESIA AND AUSTRALIA'S TRADE PROSPECTS (A CASE STUDY FOR MAKASSAR CITY)

A dissertation submitted by

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ABSTRACT

Understanding meat demand and its characteristics are important in giving a more accurate evaluation of the factors that govern consumers' willingness to pay for meat products, and in understanding the relationship and responsiveness between variables. Demand for meat, including beef and beef offal is continuously increasing in Indonesia, and studies in meat demand have been conducted extensively. However, most of those studies did not consider offal products. This study focuses only on the consumption of offal and beef, considering that domestic production has not met the domestic demand. In addition, some problems still appear as the beef self-sufficiency program has not yielded the maximum desired results.

This study has five main purposes. Firstly, it provides up to date information about the determinants of social-demographic factors for offal and beef expenditures with probit model analysis. Secondly, it estimates the demand elasticities for offal and beef (local and imported) by using the linear approximate of almost ideal demand system (LA/AIDS) model with the inclusion of Inverse Mill Ratio (IMR). Thirdly, this study estimates the potential impact of socioeconomic and demographic factors, product attributes (quality and affordability) and market factor (availability) on the willingness to pay (WTP) for imported offal with the hedonic price model approach. Fourthly, this study examines the actual WTP for imported offal and calculates the marginal implicit price (marginal willingness to pay) by using the hedonic price model approach. Finally, this study explores Australia's trade prospects for imported offal in Indonesia based on the LA/AIDS, WTP and descriptive analyses.

Research findings show that several important factors such as age, income, ethnicity, occupation, family size and level of education significantly affect the expenditure for local and imported offal, and local and imported beef. Offal and beef are classified as necessity goods in Makassar, and consumers rely heavily on offal and beef products. This result is supported by the positive expenditure elasticity of the study, where consumer income increases the demand for local and imported offal and beef. The WTP analysis reveals that if the price of imported offal on the market increases, the willingness to pay for the product will decrease. Therefore, the availability of the products in the market should be a large focus of the Indonesian Government, including local and international firms. Maintaining the sustainability of meat products in the country, including with efficient trade policies of imported offal and beef is crucial. Australia as a major exporter of live cattle and beef products in Indonesia could gain more insight from this perspective.

The research contributes to the literature of the demand and practice studies, especially in assisting producers, marketers and policy makers in developing effective supply, including the market share of offal and beef in Makassar City. The results of this study will have important implications and better understanding of beef and offal industries in Indonesia.

CERTIFICATION OF DISSERTATION

I certify that the ideas, experimental work, results, analyses, software and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

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02/12/2015

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ENDORSEMENT

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LIST OF RESEARCH OUTPUTS FROM THE THESIS

The following seminar/conference and journal papers were completed during the period of candidature:

Tenrisanna, V, Rahman, MM & Khanam, R 2013, 'Socioeconomic and demographic factors of beef offal demand in Indonesia: a case study for Makassar City, Indonesia', in Proceedings of the 23rd International Business Research Conference. World Business Institute, Melbourne, Australia.

Tenrisanna, V, Rahman, MM & Khanam, R 2014, 'Consumers' willingness to pay for imported offal in Indonesia - A case study for Makassar City', Postgraduate and Early Career Research (PGECR) Group 13th Research Symposium University of Southern Queensland, Australia.

Tenrisanna, V, Rahman, MM & Khanam, R 2015, 'Estimation of consumer demand for offal and beef: The case of Makassar City, Indonesia'. This paper is under consideration for publication in the Asian Journal of Business Research.

Tenrisanna, V, Rahman, MM & Khanam, R 2015, 'Beef and offal market in Indonesia - evaluation of import trade policy'. This paper is under consideration for publication in the Asian Profile.

Tenrisanna, V, Rahman, MM & Khanam, R 2015, 'Factors affecting consumers' willingness to pay for imported offal in Indonesia: A case study for Makassar City'. This paper is under consideration for publication in Economic Issues.

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1. CHAPTER 1. INTRODUCTION

1.1 Preview

This chapter provides an introduction to the research work presented in this thesis. It describes the research background and motivation of the study, research problem, objectives and hypotheses, and outlines the remaining structure of the thesis. This chapter also highlights the possible outcomes that this study could reveal.

The organisation of the chapter is as follows: section 1.2 explores the background and motivation of the study, section 1.3 states the statement of the problem, section 1.4 draws the study objectives, section 1.5 describes the study area, section 1.6 gives details about study ethics approval, section 1.7 outlines the organisation of the thesis, and finally section 1.8 is the chapter summary.

1.2 Background and motivation of the study

Studies on meat supply and demand have been conducted thoroughly in Indonesia, but most of those studies did not consider offal products (See for example: Fabiosa 2005; Hutasuhut et al. 2001; Ilham 2001; Jensen & Manrique 1998; Menkhaus et al. 1992; Olivia & Gibson 2005; Yusri 2012). The reason can probably be explained by the difficulty in obtaining accurate statistics for offal consumption and production. With low-income levels, the demand for beef offal in Indonesia continues to increase. The price of beef offal is lower than that of beef cuts; many people use beef offal as the main ingredient for traditional foods and many small and medium food businesses still depend on offal products for their trading activities. According to Marti, Johnson and Mathews (2011), varieties of meat such as livers, hearts, brains, kidneys and tongues in some countries are considered delicacies and are the basis for many traditional dishes; in other countries, their consumption is associated with a low- income population. These products are used as an inexpensive way to get high-quality protein and nutrition (Kamenski 2006). Therefore, it is important to include offal products in a meat demand study, so that government policy can support all segments of society in Indonesia.

The main goal of this study is to model households' expenditure patterns in a meat group which includes offal and beef in order to obtain estimates of price and income elasticities and to estimate consumer willingness to pay for imported offal. To model the household expenditure patterns, first, a probit model is used to determine the socioeconomic and demographic factors affecting offal and beef expenditures. Next, the linear approximate of almost ideal demand system (LA/AIDS) introduced by Deaton and Muellbauer (1980) is employed. Many studies suggest that LA/AIDS model is a more viable system for analysing the demand for food commodities (Deaton & Muellbauer 1980; Green & Alston 1990; Hayes, Wahl & Williams 1990; Jabarin 2005). Moreover, the LA/AIDS model with homogeneity imposed, presents convincingly well with respect to estimate of elasticities. In conclusion, this study estimates consumers' willingness to pay (WTP) for imported

offal in Makassar City, South Sulawesi Province, Indonesia with a hedonic price approach, and discusses the trade prospects of beef offal for Australia, in Indonesia.

In this study, we assume weak separability between the demand for beef and offal, and the demand for other food or meat commodities. Accordingly, the demand model includes information on both domestic and imported products of offal and beef. In studies of food demand it is customary to consider consumer maximising their utility under the assumption of weak separability (See for example: Baltzer 2004; Cheng & Capps 1988; Dey 2000; Nzaku, Houston & Greg Fonsah 2010; Smed 2005). According to Edgerton (1997), weak separability approach implies that commodities can be partitioned into a number of "separate groups" (e.g. housing, food, transportation, etc.), and subsequently determining lower level consumption conditional on the budget assigned to the particular groups. In this study, a multi-stage (four-stage) budgeting framework has been used for modelling the demand of beef and offal. The separability structure is illustrated in Figure 1.

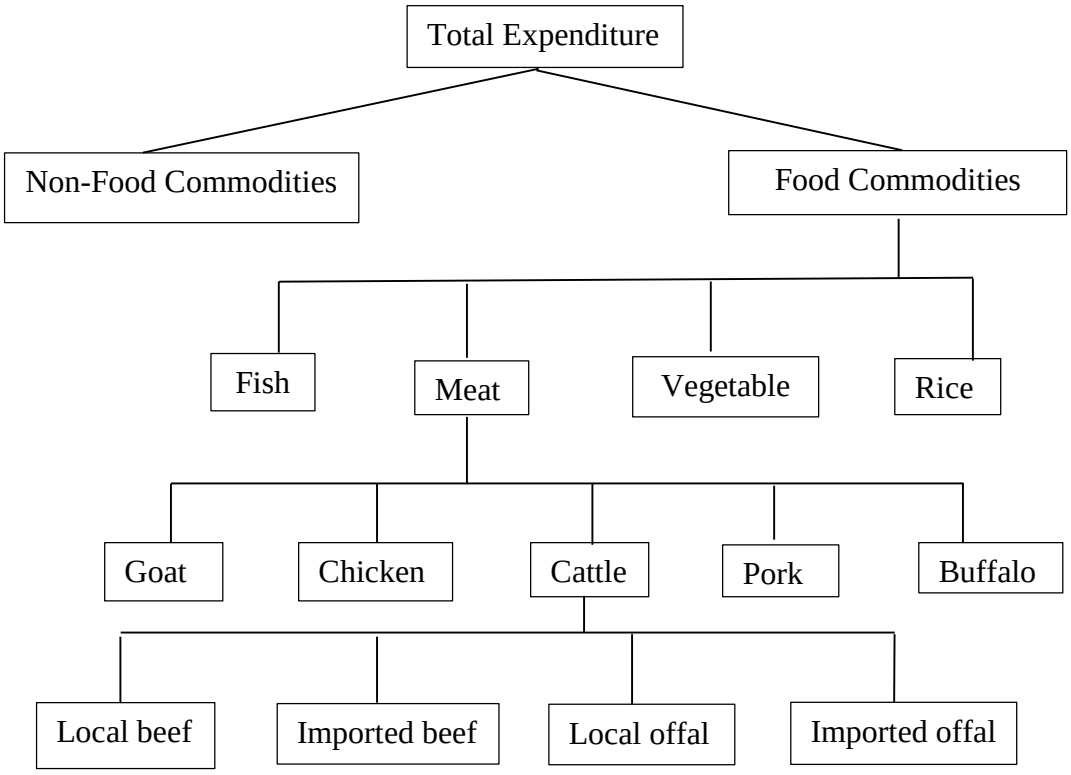


Figure 1: Separability structure of beef and offal expenditures

In the first stage, the household makes decisions on how much of their total income (expenditure) for food consumption and non-food consumption. In the second stage, the household allocates a portion of food expenditure for meat consumption. In the third stage, the household allocates the meat expenditure between different types of animal meat such as cattle, goat, pork, chicken, and buffalo. Finally, in the fourth stage, the household chooses between different types of cattle products for instance local beef, imported beef, local offal and imported offal.

Indonesia as a developing country with a population size of approximately 254.5 million in 2014 (World Bank 2015), has caused the demand for food products, including meat and beef products to increase significantly. Livestock products are an important source of animal protein in Indonesia. According to Sinergi (2014) protein deficiency is one of the reasons for the presence of severe malnutrition of the Indonesian population. In the long run this will have an impact on the increasingly poor quality of human resources. Malnutrition is a significant issue for Indonesians to this day. In 2012, Indonesia was ranked as the fifth most malnourished country in the world. This is considering that Indonesian population is ranked fourth in the world. The total number of undernourished children in Indonesia is around one million. The malnourished amount represents 4.5 per cent of the number of Indonesian children, which is around 23 million. The malnourished areas have not only included regions in eastern Indonesia but also throughout the whole of Indonesia (Sinergi 2014).

Food consumption of Indonesia's population is still largely dominated by plant carbohydrates, especially from rice. The average rice consumption by the Indonesian population in 2013 was 20.4 gram per capita per day (Indonesian Bureau of Statistics 2014a). According to the World Bank, income levels in Indonesia are categorised in the lower middle income. Furthermore, the poverty headcount ratio at the national poverty line was 11.3 per cent of the population in 2014 (World Bank 2015). According to Pingali (1997, p. 31), at low levels of income, rice is considered a luxury commodity, but at high levels of income, rice becomes an inferior good, as consumers substitute rice for high-cost quality food, such as beef, fish, bread, and vegetables.

Generally, the Indonesian communities only consume beef at religious events and proceedings like wedding ceremonies and other traditional events. The reason for this is that beef is quite expensive in Indonesia compared with chicken, fish, and goat meat. It is very rare for Indonesians to consume beef daily. Offal is essential in Indonesia because generally traditional cookery uses offal as the main ingredient. As the offal is cheaper than beef, consumers sometimes substitute beef cuts with offal. A lot of traditional food businesses and processed meat industries, such as sausage, burger, and meatball producers depend on the availability of imported beef and offal in the local market because its prices are cheaper than local beef and offal. This allows a greater profit for their businesses. Nowadays, the price of beef and offal in Indonesia could reach US$10/kg and US$4/kg, respectively. Remarkably, retail beef price in Indonesia was AUD 13/kg in 2013, which was the most expensive beef price in the world (Lamb 2013). Thus, the Indonesian Government has imported live cattle and beef products including offal to fill the shortage of local production in Indonesia.

In Indonesia, edible offal other than poultry includes: livers, hearts, intestines, spleens, tongues, kidneys, tails, lungs and brains. Beef offal is one of the highly demanded products in Makassar City, South Sulawesi Province, Indonesia. The community of South Sulawesi has several traditional dishes that use beef offal as the main ingredient. With the rapid growth of population, the demand for beef offal is increasing and will continue to increase. In Makassar, beef offal is obtained from local cattle producers and imported beef offal. The local government has decided to import offal at an average of 15 tonnes per day (Republika 2012). The study of Saleh (2011) found that consumers in Makassar are gradually shifting away from local offal to imported offal from cattle because of the higher price of local offal and limited local production. In addition, factors that cause friction between demand for local offal and imported Australian beef offal are: product quality, affordability and accessibility and consumer willingness to try different products.

Since domestic demand is greater than supply, imported offal has become an integral part of Indonesia's supply chain. However, the Indonesian Government has decreased export permits for cattle, boxed beef and offal from Australia over the last two years, therefore the prices for meat have increased significantly (Aikman 2013). In addition, record numbers of breeder cattle being slaughtered has increased due to a shortage of beef and high prices. Indeed, offal products that enter the market cannot be evaluated in terms of food quality and safety. Due to the Indonesian Government's self-sufficiency programs for beef production by 2014 (Food and Agricultural Directorate 2010), the Indonesian Government import permits allowed between 90,000 tonnes and 100,000 tonnes of beef and offal, and the Australian share of the market was 41,000 tonnes of boxed beef and 14,200 tonnes of offal in 2011. From this perspective, it is of vital importance to get a better understanding of consumer perception about imported offal, particularly in Makassar City, South Sulawesi Province, Indonesia.

The purpose of this research is threefold. Firstly, to provide empirical evidence of socioeconomic and demographic factors responsible for beef and offal (local and imported) demand by using the probit model; secondly, to estimate the demand elasticities for offal and beef (local and imported) by using linear approximate almost ideal demand system (LA/AIDS) model and finally, to provide consumers' willingness to pay analysis for imported offal and explore Australia's trade prospects on imported offal. This study investigates the opportunities that Australia may have in adding the quantity of exported offal to Indonesia based on consumer willingness to pay for imported offal in Makassar City, and in Indonesia as a whole.

Overall, this study will be an important contribution to the existing literature for food demand studies. It will give a clear understanding about consumer expenditure patterns and the determinants of expenditure. Major socioeconomic and demographic factors responsible for the changing market shares between local and imported offal will be identified; budget shares for beef and offal expenditures will also be examined. Finally, the results of the study will provide policy makers, producers, retailers, importers and exporters with information, analysis and recommendations that are expected to contribute to the availability and sustainability of the offal and the beef market.

1.3 Statement of the problem

There has been enormous empirical studies done on the demand for beef in Indonesia since local production could not meet the increasing demand for beef (see for example:Fabiosa 2005; Hadi et al. 2002; Hutasuhut et al. 2001; Olivia & Gibson 2005; Saleh 2011). Unfortunately, the research to date, while useful, has left a gap in terms of meat demand by not looking for consumer demand for offal products. This might be that this particular area has not been studied previously because of a hole in the Indonesian Government's policy in terms of food security; whereas the changes in the political and economic environment and lifestyle of Makassar consumers in the last ten years have affected offal consumption and expenditure. In this study, offal products will be included in the beef demand analysis.

The Indonesian Government has a policy objective of achieving self-sufficiency in beef production. Under this policy, self-sufficiency is defined as 90 per cent of domestic beef consumption produced from cattle raised in Indonesia. The Indonesian beef self-sufficiency policy aims to reduce live cattle and beef imports to approximately 42 per cent of 2010 levels, by 2014. Additionally, the volume of offal exported to Indonesia halved to about 6000 tonnes in 2011 (Department of Agricultural 2010).

Indonesia's population is growing fast and demand for food continues to increase. Indonesia's beef consumption rose 2.2 kg per capita in 2013, from 1.9 kg per capita in 2012, and it will keep rising in line with increases in per capita income, according to Thomas Sembiring, Executive Director of Indonesian Meat Importers Association (Aspidi) (The Jakarta Globe 2013). He stated that, 'the Indonesian Government self-sufficiency target should only apply to those commodities which consumption levels are stabilising, such as rice' (The Jakarta Globe 2013).

Trade restrictions imposed by the Indonesian Government in the name of self-sufficiency was an effort to boost domestic beef production; however, the program has made life difficult for exporters, retailers and buyers. After having released this regulation, the shortage of offal supplies in South Sulawesi Province, especially in Makassar city occurred each day. Indeed, the price of offal has risen by 30 per cent. According to Republika (2012), there are approximately 300 traditional stalls that need 16 tonnes of offal per day in Makassar while only one ton could be supplied by local slaughterhouses. In general, the need for edible offal will continue to increase while local production tends to stay static and the growth rate of the population increases in Makassar. Furthermore, some offal products are found to be illegal in traditional markets, and hence the quality of the product is not maintained because of the high demand for offal. Absence of commensurate increases in the offal supply will create pressure to raise offal prices.

Study of offal demand has been very rarely done in Indonesia, yet the demand of the product has increased significantly. Therefore, this study will give a broad picture about factors influencing the offal and beef demand in Makassar and consumers' willingness to pay for imported offal. A detailed offal and beef demand system specification with LA/AIDS model to generate consistent parameter estimates is important based on the recent condition after the Indonesian Government policy proposed a reduction in the

imported quota for beef and offal products. Limited products in the market has induced the price of beef which has rocketed since then. The retail beef price in Indonesia was AUD 13/kg in 2013, which was the most expensive meat price in the world (Lamb 2013). Overall, this study provides a structural framework and reference for studying the market performance of beef and offal in Makassar City, Indonesia.

1.4 Research objectives

The study aims to achieve the following objectives:

1. To analyse determinants of socioeconomic and demographic factors responsible for changing market shares for local and imported offal, and local and imported beef simultaneously using a probit model. Household economic and demographic effects such as age, income, ethnicity, family size, and years of education are expected to have significant influences on offal and beef expenditures.

2. To estimate the demand elasticity for offal and beef (local and imported) using the linear approximate almost ideal demand system (LA/AIDS) model by including Inverse Mills Ratios which generate from the probit model. The expenditure parameter for all meat observed is expected to be positive. The estimated Marshallian own-price elasticities for local and imported offal and beef are expected to be negative. This will show that the local and imported beef and offal have become increasingly important in the consumers' diet. The cross-price elasticities are expected to be positive which indicates that the local and imported offal are substitute products.

3. To estimate the potential impact of socioeconomic and demographic factors, product attributes (product quality and affordability) and market factors (product availability) on the WTP for imported offal. Consumers' WTP for imported offal are expected to be affected by socioeconomic and demographic factors such as age, occupation, level of education, ethnicity, income and family size; also product attributes such as product quality and price; market factor such as the availability of imported offal in the market simultaneously.

4. To examine the actual WTP for imported offal and calculate the marginal implicit price (marginal willingness to pay) by using the hedonic price model approach.

5. To explore Australia's trade prospects for imported offal in Indonesia.

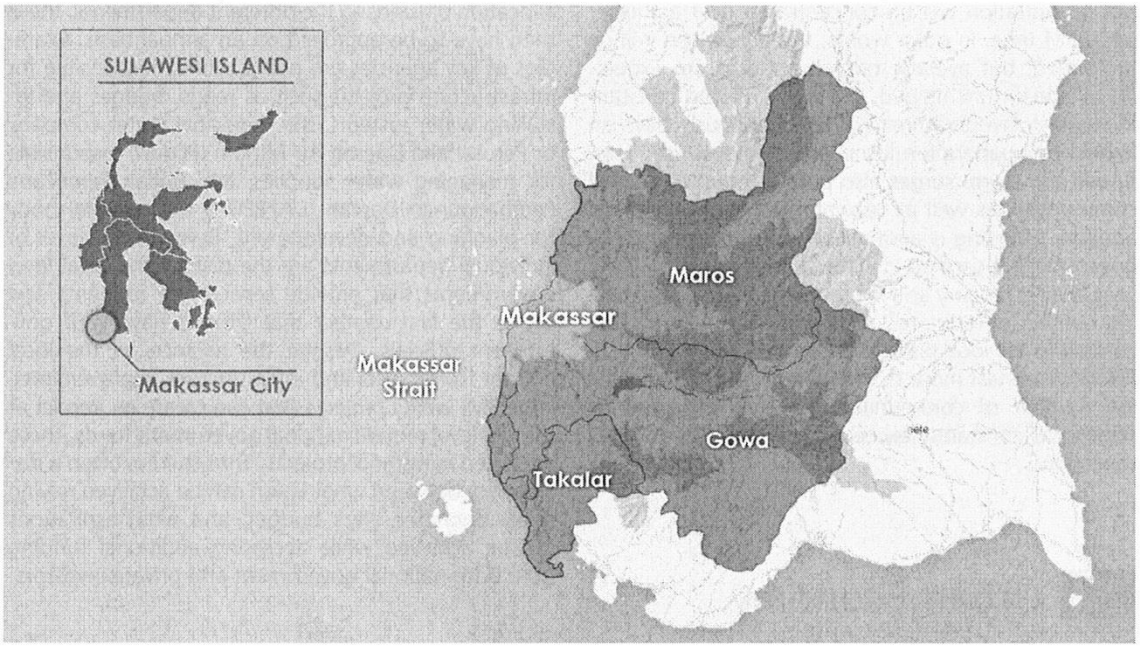
1.5 Study area

Makassar has been purposively selected as the study area for this research. This selection is based on local food traditions, the size of the population and the importance of the city as the centre of trading activities in the South Sulawesi Province. Makassar is considered one of the largest cities in Indonesia and is the central offal market in South Sulawesi Province. Makassar is a coastal city, sitting on the far south western tip of the island of Sulawesi, in eastern Indonesia (Taylor 2014).

Geographically Makassar lies between 119°24′17′38’ East Longitude and 5°8′6′19’ South Latitude. Makassar’s boundaries are Maros Regency on the North side and East side, Gowa Regency at the South side, and Makassar Strait on the West side (Figure 2). The area of Makassar is 175.77² km which includes 14 districts and 143 wards. The land use in Makassar consists of construction and surrounding fields, dry fields, lands/garden, grassland, dykes, fish ponds, temporarily unutilised wood plantations and small holder forests, estates and wetlands. Climate trends in Makassar, according to the data from the meteorological station of Maritime Paotere, the average relative humidity is around 79 %, temperature between 25.1 ºc – 29.1 ºc with an average wind velocity of around 4.2 knots (Central Board of Statistic of Makasar 2014).

The total population of Makassar in 2013 was 1,408,072 people; 696,086 males and 711,986 females (Central Board of Statistic of Makasar 2014). There are four dominant ethnic groups in Makassar City; Bugis, Makassar, Mandar and Toraja.

The economic structure of Makassar includes agriculture, mining and quarrying, manufacturing industries, electricity, gas and water, construction, trade, transportation and communication, banking and financial institutions and other services. Makassar’s gross domestic product (GDP) increased from 11,341,848 million Rupiah in 2006 (USD 1,104,905,647) to 16,252,451 million Rupiah in 2010 (USD 1,583,289,151). However, the economic growth of Makassar decreased from 9.83 per cent in 2010 to 8.91 per cent in 2013 (Central Board of Statistic of Makasar 2014). Meanwhile, as a result of rapid urbanisation trends in Makassar, the demand for food and agricultural products will continue to increase.



Source: Taylor (2014)

Figure 2: Location of Makassar on the island of Sulawesi

1.6 Study ethics approval

According to Sekaran (2010, pp. 15, 221), ethics in business research refers to conduct or expected societal norm of behaviour while conducting research. Ethical conduct should reflect the behaviour of the researcher who conducts the investigation, the participants who provide the data, and the analyst who provides the results. It should include the entire research team that presents the interpretation of the results and suggests alternative solutions. Another ethical guideline that needs to be addressed while collecting data, is confidentiality and the assurance that there be absolutely no distortion in reporting the data collected during the study.

One of the most important ethical principles is that coercion should not be used to encourage people to take part in the research. In academic research, it is also advisable to avoid offering financial or other material rewards to induce people to take part, as this could lead to biased results (Collis 2009, p. 45). According to Saunders, Lewis and Thornhill (2012, p. 226), ethical concerns are essential when research involves human participants. In the context of research, ethics refers to standards of behaviour that guide researchers conduct in relation to the rights of those who are subjects in particular work, or are affected by it. Accordingly, the appropriateness or acceptability of a researcher's conduct will be influenced by broader social norms of behaviour.

This study received ethics approval from the Ethics Chair of the University of Southern Queensland on 26th of February 2013, with approval number H12REA186 (See Appendix F).

1.7 Organisation of the thesis

This study is organised into six chapters (Figure 3). The methodologies of the three empirical chapters (chapters 3-5) are narrated separately in the respective chapters.

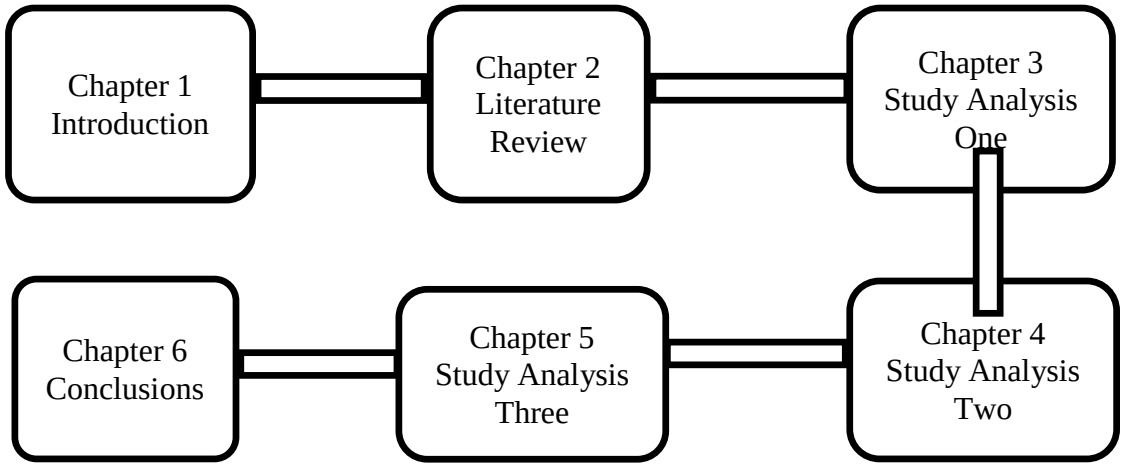


Figure 3: The structure of thesis

Chapter 1 introduces the research project. It provides background and motivation of the study, research problems and objectives, hypotheses, study area description, study ethics approval and a preview of the dissertation.

Chapter 2 reviews the existing literature and theoretical foundations of the study. Initially, the chapter discusses the literature on edible offal studies, such as the definition of edible offal, the types of edible offal people can eat and the nutrition of bovine offal. The next part reviews meat consumption, and supply and demand in Indonesia. This part highlights the total meat consumption per capita in Indonesia, the beef and offal market in Indonesia, in Makassar specifically. Following, the theory of consumer demand is reviewed and also revised are the concepts of demand and properties, such as theoretical demand restrictions in terms of adding up, homogeneity in prices and income, and the symmetry of cross effects of demand functions. The next section explores the Almost Ideal Demand System model analysis and then previous studies of meat demand are explored as is the theory of consumer behaviour. Discussed also in the literature review are studies on the exploration of consumer WTP. Several topics are discussed here, such as the concept of WTP, approaches to measure consumers' WTP, previous studies on consumers' WTP for food and meat products and the hedonic price method and empirical studies. Finally, based on the literature reviews, several research gaps are described.

Chapter 3 discusses the study results on the effects of socioeconomic and demographic factors on offal and beef demand in Makassar by using probit analysis. Results from this model are used to model the beef and offal demand system with the LA/AIDS analysis.

Chapter 4 provides the study results on the offal and beef demand systems in Makassar by applying the LA/AIDS demand system.

Chapter 5 provides the study results of consumer WTP for imported offal in Makassar and Australia's trade prospects for offal and other beef products.

Chapter 6 offers the conclusions of this dissertation, which includes a summary of the study results, policy recommendations, limitations and contributions of the study, and recommendations for further study.

1.8 Chapter summary

This chapter has provided a brief introduction to the research project and is divided into sections that includes the background and motivation of the study, a statement of the problem, research objectives, research hypotheses, and organisation of the thesis.

The next chapter will deliberate on literature reviews and theoretical foundations of the study.

2. CHAPTER 2. LITERATURE REVIEW

2.1 Preview

Chapter 1 has provided a brief introduction to the research project by elaborating on the background and motivation of the study, addressed a statement of the problem, included; research objectives, research hypotheses, and the organisation of the thesis.

Chapter 2 discusses and reviews significant literature and theoretical foundations of the study. This segment also aims to gain some understanding of the differences and similarities from previous studies undertaken. The chapter discusses the literatures on edible offal, beef and offal consumption in Indonesia, consumer demand and consumer behaviour, the Almost Ideal Demand System (AIDS), previous meat demand studies and consumer willingness to pay. In the last section, several research gaps will be advised based on the literatures have been reviewed, and the summary of the study will be presented.

2.2 Edible offal

The definition of Edible Co-Products is animal product other than white or red meat muscles. Edible Co-Products are known in several countries with different terms, such as fancy meat, offal, variety items and edible by products (United Nations 2008). Some offal products that are considered inedible in a country can be considered as edible in other countries (Toldrá et al. 2012). Hayes (1989) stated that, "Offal derived from "off-fall" the portion that falls off during dressing-constitute approximately 45% of the live weight of typical steer and heifer carcasses". Goldstrand (1988) clarified that offal or organ meats are the "off fall" or by-product of a manufacturing operation. Offal or meat by-products contain primary food components which have a high potential in human nutrition. Many have important technological properties due to their high protein content and can therefore be recommended as a good low cost nutritious product (Kurt & Zorba 2007; Van Heerden & Morey 2014).

Similarly, Bowater and Costafson (1988) stated that, 'Offal can be generally defined as those parts of the carcass which are disassembled on the dressing floor'. Van Heerden and Morey (2014) described offal as the internal organs and entrails of a butchered animal, which have a considerable amount of an animal's meat weight. Offal products include the heart, liver, lungs, tails, feet, and head including brains and tongue.

Animal by-products may be broadly classified into edible and non-edible, depending on the purchasing power of the customer, an individual's food habits, customs and religious meaning (Scaria 1989, p. 1). The use and value of edible and inedible meat by-products depends entirely on the culture and the country. For instance, Americans eat very little edible red offal, but the French, British and Irish in particular consume large amounts of edible red offal (Hayes 1989). Goodwin and Koudele (1990) acknowledged that, 'Variety meats are often considered to be *ethnic foods.* In this light, an individual's ethnic heritage

may be an important factor in influencing his or her decision about whether to purchase variety meats'.

Van Heerden and Morey (2014) examined the nutrients of bovine offal. The authors ascertained that liver, spleen, lung, heart and kidney are good sources of protein, zinc and iron, and very important for their nutrition. Meat and meat products are recognised as good sources of high biological-value proteins, group B vitamins, minerals and trace elements and other bioactive compounds (Toldrá & Reig 2011). However, according to Weiss et al. (2010), the high fat content of such products results in a consumption obstacle for these products by people who are prone to cardiovascular diseases and/or are overweight. Micha, Wallace and Mozaffarian (2010) advised that, 'meat consumption is inconsistently associated with the development of coronary heart disease (CHD), stroke, and diabetes mellitus, limiting quantitative recommendations for consumption levels'. According to Toldrá and Reig (2011), recent innovation in the meat industry have been made in order to produce healthier meats and processed meats. These innovations for instance, include reducing the content of unhealthy substances (i.e. less added sodium chloride, less nitrates and nitrite) or improving the content of substances with healthy benefits (i.e. natural antioxidants, omega-3 fatty acids, probiotics and bioactive peptides).

In Toldrá et al. (2012), the meat industry uses a degree of improvement to add value to animal by-products by making them edible food items. Such added value can be obtained in terms of shelf stability, flavouring compounds, water bonding agents, emulsifiers, and better sensory quality (colour, texture, flavour). According to Decker and Park (2010), the nutritional composition of meat products can be altered by direct addition of bioactive food ingredients or by the inclusion of bioactive compounds into animal diets. Advances in ingredient and processing systems for meat and meat products, like fat replacers, fat profile variations and cholesterol reduction techniques, and new texture modifiers can satisfy consumer demand for healthier meat products (Weiss et al. 2010).

2.3 Beef and offal consumption in Indonesia

This part will discuss beef and offal consumption in Indonesia. The section is divided into three parts. The first part discusses meat consumption in Indonesia. The second discusses the beef and offal market in Indonesia, and the third part is specifically about the beef and offal market in Makassar, South Sulawesi Province, Indonesia.

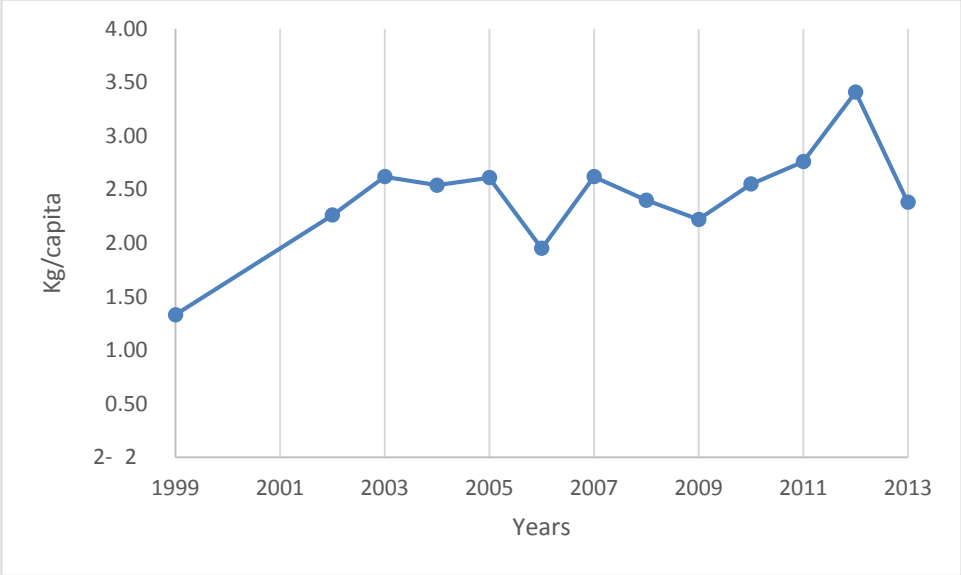
2.3.1 Meat consumption in Indonesia

The Indonesian economy suffered a dramatic reduction from the economic crisis in 1997. According to Veeman, Veeman and Adilu (2002), the economic crisis in 1997 caused serious shortfalls in agricultural production, devaluation of Indonesian currency, a financial crisis which increased poverty, putting about 30 million people below the poverty line. Since then, the average growth of beef consumption has decreased by 2.53 per cent from 2009 to 2013 (Indonesian Bureau of Statistics 2014a). Veeman, Veeman and Adilu (2002) implied that the growth of cattle production in Indonesia has lagged behind poultry and pork because of slower demand. Per capita consumption of beef had been estimated at 2 kg a year. Beef consumption in Indonesia was lower than both

Malaysia and the Philippines which were at 15 kg per capita and 7 kg per capita respectively. Similarly, Fabiosa (2005) reported that Indonesia's per capita meat consumption, ranks low compared with its Asian neighbours, including countries with comparable incomes and countries with similar Islamic traditions. Based on the National Survey of Social Economics of Indonesian Bureau of Statistics in 1996, 1999 and 2002, Japan and South Korea had the highest per capita beef consumption in Asia. Conversely, Indonesia ranks at the bottom (1.41 kg), higher only than India (1.48 kg) and but lower than the Philippines (7.61 kg).

Indonesian Bureau of Statistics (2014a) reported that from 2011 to 2012, meat consumption in Indonesia increased from 2.76 kilograms per capita to 3.41 kilograms per capita. However, meat consumption decreased from 3.41 kg per capita in 2012 to 2.38 kilograms per capita in 2013 which may have been due to higher prices and limited products in the market (Figure 4).

Permani (2013a) implied that the Indonesian Government program wanted to achieve beef self-sufficiency by year 2014 through protectionist trade that would decrease beef consumption in the long run and increase domestic beef prices.



Source: Indonesian Bureau of Statistics (2014a)

Figure 4: Meat consumption in Indonesia from 1999 to 2013

According to the Directorate General of Livestock and Animal Health Services Republic of Indonesia (2013), Indonesia as a developing country has shown significant increase in meat consumption, including fresh meat, processed meat and other meat during 2007-2011 (Table 1).

Table 1: Meat consumption by type of meat and processed meat per capita from 2007 to 2011

Commodities	Year (Kg/capita/year)					Growth 2011 over 2010 (%)
	2007	2008	2009	2010	2011	
Fresh meat						
1. Beef cattle	0.42	0.37	0.31	0.37	0.42	14.29
2. Buffalo	-	-	-	-	-	-
3. Goat	0.05	0.05	-	-	0.05	-
4. Pork	0.26	0.21	0.21	0.21	0.26	25.00
5. Broiler	3.44	3.23	3.08	3.55	3.65	2.94
6. Local chicken	0.68	0.57	0.52	0.63	0.63	0.00
7. Other poultry	0.05	0.05	0.05	0.05	0.05	0.00
8. Other meat	0.05	0.05	0.05	0.05	0.05	0.00
Processed meat						
1. Spicy shredded meat	0.02	0.02	0.01	0.01	0.02	50.00
2. Others	0.05	0.00	0.05	0.05	0.10	100.00
Others						
1. Liver	0.10	0.05	0.05	0.05	0.10	100.00
2. Offal exclude liver	0.05	0.05	0.05	0.05	0.05	0.00
3. Bones with a bit of adhering meat	0.10	0.05	0.05	0.05	0.05	0.00
4. Bones	0.05	0.05	0.05	0.05	0.05	0.00
5. Others	0.05	0.05	0.05	0.05	0.05	0.00

Source: (Directorate General of Livestock and Animal Health Services Republic of Indonesia 2013).

As can be seen from Table 1, the growth of consumption per capita in commodities such as beef, pork, processed meat and offal liver increased significantly from 2010 to 2011. Meat consumption derived from beef grew 14.29 per cent and the consumption of liver increased 100 percent from 2010 and 2011. Though income levels are low, the demand for offal cattle in Indonesia continued to increase. The reasons: the price of cattle offal

was lower than that of beef meat; Indonesians used beef offal as their main ingredient for traditional foods; and many small and medium food businesses still depended on offal products for their trading activities. Accordingly, beef consumption tended to increase over time, but the growth of domestic beef production was lower than the growth of consumption. This situation led to the increase in imports (Kusriatmi et al. 2014).

On average, meat consumption derived from livestock had been the lowest consumed by Indonesian society. As can be seen from Table 2, daily animal protein consumption derived from the fishery group increased from 7.28 grams/capita in 2009 to 7.85 grams/capita in 2012. But, fish consumption reduced from 7.85 grams/capita to 7.56 grams/capita in 2013. Meat consumption from livestock increased from 2.22 grams/capita in 2009 to 2.38 grams/capita in 2013. Eggs and milk consumption also increased from 2.96 grams/capita in 2009 to 3.07 grams/capita in 2013.

Table 2: Average daily per capita consumption of animal protein (gram) by commodity group, 2009-2013

Commodity	2009	2010	2011	2012	2013
Fishery	7.28	7.63	7.66	7.85	7.56
Meat livestock	2.22	2.55	2.76	3.41	2.38
Eggs and milk	2.96	3.27	3.06	3.01	3.07

Source: Indonesian Bureau of Statistics (2014a)

2.3.2 Beef and offal market in Indonesia

The gap between the consumption need and local beef production has happened each year in Indonesia, which might be caused by the increasing number of middle and high income communities. Eighty per cent of beef consumers reside in the city, and those living in rural communities consume beef at very small portions per individual. This can be reflected by the increasing amount of beef consumption per capita from 1.95 kilograms in 2007 to 2.24 kilograms in 2009. As a result, the demand for beef and offal increased from 455.755 tonnes in 2008 to 516.603 tonnes in 2009 (Food and Agricultural Directorate 2010). In order to meet the demand, imported beef and offal increased by 110.246 tonnes and live cattle by head at 768.133 in 2009. This was because local cattle production could only supply 49 per cent of national beef demand in 2009 (Food and Agricultural Directorate 2010).

Beef production in Indonesia has shown a significant increase from 339,480 tonnes in 2007 to 539,965 tonnes in 2014 (See Table 3). However, the growth of domestic beef production is lower than the growth of consumption (Kusriatmi et al. 2014). Therefore, Indonesia continues to import beef products, offal and live cattle.

Table 3: Beef production in Indonesia, 2007-2014

Year	Production (tonnes)
2007	339,480
2008	392,511
2009	409,308
2010	436,450
2011	485,335
2012	508,905
2013	504,819
2014	539,965

Source: Indonesian Bureau of Statistics (2014f)

Directorate General of Livestock and Animal Health reported that the volume of imported cattle ready for slaughter during January to July 21, 2014 reached 381,212 head or equivalent to 76 thousand tonnes of meat. Accordingly, the total of imported beef entering Indonesia reached 133, 139 tonnes or 23.16 per cent of the national meat needs in 2014 at 757,088 tonnes. So by the end of the year, it is hypothesised imports of beef will continue to grow.

Kusriatmi et al. (2014) projected the national beef demand and production from 2012 to 2021. The study utilised time series data from 1990 to 2011, and implemented the simultaneous equation model. The projection was based on simulation, whereas imported feeder cattle decreased by 25% and imported beef decreased by 35%. This study suggested that domestic beef production would not be able to meet the national demand from 2012 to 2021. In addition, in 2014, domestic beef production can only meet about 77.35 per cent of total beef demand, so around 22.65 per cent would be met from imports. According to the blue print 2014 for beef self-sufficiency (Food and Agricultural Directorate 2010), Indonesia requires only 10 per cent beef imports to fulfil domestic consumption. In this case, the shortage of beef will continue to increase.

Australia, is one of the world's most proficient cattle producers and also one of the world's largest exporters of beef at about 14 per cent of the total world beef exports (Kidane 2007). Indonesia has also imported live cattle and frozen beef products including offal, mostly from Australia. Indonesia remained the largest market for Australian live cattle exports in 2013, taking 454,152 head, up 63 per cent valued at AUS$308 million. Indonesia accounted for 53 per cent of total Australian live cattle exports in 2013 (Meat & Livestock Australia 2014).

In 2007, Indonesia's imported offal products were 972,706 kg from Australia and 591,690 kg from New Zealand (Director of Community Veterinary 2009). Types of offal that was permitted to be exported to Indonesia were liver and heart, oxtail, tongue, lips and feet (Australian Meat Industry Council 2007; Director of Community Veterinary 2009). Since 2011, the Indonesian Government has only permitted liver and heart to be exported to Indonesia (Minister of Agriculture 2011). Australia is known as a beef exporting country,

and it has exported up to more than 100 countries. The slaughter of livestock for meat production results in a large number of by-products consisting of hides, skins, edible offal, tallow, meat meal and inedible offal. According to Porter and Weeks (1983), the value of by-product export was almost $ 722m in 1979-1980. That was around 20 per cent of the overall value of exports of livestock slaughtered. This shows us that Australia can gain more by continuing to export both edible and inedible offal.

Australian exporters should consider some items in their trading arrangement including the restricted offal list, non-commercial labelling requirements, storage temperatures (to be stored -18°C), expiry dates and halal requirements. Indonesian regulation on banning some types of offal such as lungs, tripe, and spleen gives an impact on the shortage of local supply. Similarly, the regulation has limited Australian exports to trade. Therefore, there should be some reasons for restricting some types of offal, since basic requirements are met by exporters.

New Zealand has also been one of the exporting countries of beef offal in Indonesia. Weir (2012) stated that by volume, Indonesia was New Zealand's second-largest beef and offal market in 2010. However, Indonesia has dropped back to become New Zealand's fifth-largest export market in 2011. Beef and offal exports to Indonesia have decreased since quotas were introduced to limit overseas supplies, in order to encourage local meat production. As a result of deep cuts to quotas, domestic beef offal prices in Indonesia jumped as much as 25 per cent. New Zealand's Meat Industry Association (2011) mentioned, 'given Indonesia's economic growth and the resulting growth in income and demand for animal protein, it appears there will still be a need for imported meat.'

2.3.3 Indonesia's beef self-sufficiency program

The beef self-sufficiency program by 2014 aimed to improve animal food security based on local resources (Food and Agricultural Directorate 2010). With this program the Indonesian Government sought to increase local production of beef by reducing the volume of import. The initial target of the beef self-sufficiency program was to be achieved by 2000, 2005 and 2010; however the program was unsuccessful in reducing the amount of meat and offal imports, because of continued limited local production. The restrictions on imports of beef products was re-enacted in 2011 as part of actions to achieve self-sufficiency in beef products for 2014.

Nixon and Whiehead (2013) stated that the beef self-sufficiency program in Indonesia includes three phases. In 2000, the government launched credit programs to assist small holders with fattening and breeding cattle, and the breeder import program. The first beef self-sufficiency program with a target date of 2005 was unsuccessful due to a limited supply chain, shortage of land required to allow breeding and fragmented production. The 2005 target moved to 2010 by introducing a seven step policy around improving production capacity. The plan was unsuccessful due to low productivity levels and high calf mortality rate. The 2010 target moved to 2014.

According to The Australian Financial Review (2012), 'Indonesian Government policy in reducing beef quota will push up Indonesia's cost base, and may increase food prices to the point of causing serious unrest with the bulk of Indonesia's still comparatively poor

population'. In line with the launch of the beef self-sufficiency program, several steps were added to the original seven step policy, including the development of commercial cattle farming, improving supply chain and the import quota program. However, there are no improvements in current Indonesian cattle breeding (Calving rate: 57 per cent/21 months) and mortality (Calf mortality: 18 per cent) (Nixon & Whiehead 2013). Thus, the price of local beef has continued to increase and there is a limited supply of beef products.

Due to the Indonesian Government self-sufficiency program with regards to beef production in 2014, the Indonesian Government import permits, allowed between 90,000 tonnes and 100,000 tonnes of beef and offal, and the Australian share of the market was 41,000 tonnes of boxed beef and 14,200 tonnes of offal in 2011. Therefore, the recent announcements by the Indonesian Government regarding the allocation of imports for beef and offal in 2012 limited Australian shipments to the market. The Indonesian Government allocated 20,000 tonnes of boxed beef in 2012, which was down around 50 per cent compared to the 2011 volumes (Condon 2012).

Firdausy et al. (2005) found that Indonesia's comparative advantage (RCA index) for animal production, which took priority in 1999 was 0.39 and decreased significantly into 0.29 in 2003. The RCA index below one, means that the country does not have specialisation in that particular animal production. The competitiveness of livestock production, especially for cattle products has been very low, therefore, Indonesia needs to continue to import products over the next years.

The study of Tenrisanna, Rahman and Khanam (2013) has shown that both local and imported offal is a necessity good, while both local and import beef is a luxury good based on the expenditure elasticity estimates. From the WTP analysis study of Tenrisanna, Rahman and Khanam (2014), it is clear that offal imports were quite expensive and was very difficult to find in the market. Moreover, some consumers who bought offal imports in the traditional markets found the quality of offal imports low in terms of freshness and packaging. Therefore, it is important to maintain the new regulation for beef and offal imports, in order to provide more products in the market, and make the product more affordable.

Indonesia is a key market for Australian offal with trade valued at $22.7 million in 2010 to 2011 (Department of Agriculture Fisheries and Forestry 2012). However, the volume of offal exported to Indonesia halved to about 6000 tonnes in 2011. The Indonesian Government policy to reduce the amount and type of imported offal in 2011 led to a shortage of offal supply in Indonesia. After this regulation had been released, the shortage of offal supply in South Sulawesi Province, especially in Makassar City occurs each day because local production tends to remain stagnant. Indeed, the price of offal has risen by 30 per cent. There are around 300 traditional stalls that require 16 tonnes of offal per day in Makassar while only 1,000 kg could be supplied by slaughter houses in Makassar. In addition, the wide spread availability of unsafe offal in terms of quality is not new to many people in the Indonesia Republic (Republika 2012).

Today, by constraining imports, the price of beef and offal will rise and encourage local farmers to sell breeding female cattle to earn more money. As a result, breeding capacity will decrease. The expensive beef prices will be a result of the protection policy imposed

by the government, whereas importers are not allowed to sell beef directly to the public (Izzaty 2013). Importers are allowed to sell beef only to beef industry, hotel, restaurant or catering. According to Vanzetti et al. (2010), to be self-sufficient in the current market circumstances would require enough additional stock of cattle to sustain enough slaughter cattle, and relatively-mature cattle for short-term fattening and slaughtering, since breeding cycles need to be taken into account.

2.3.4 Beef and offal market in Makassar

This study focuses on offal and beef demand and consumer behaviour in Makassar City, Indonesia. Makassar city as the capital city of South Sulawesi Province is chosen as a sample city because of its cultural background of people who eat offal regularly and sees it as a highly demanded item. Makassar is the provincial capital of South Sulawesi, Indonesia, and the largest city on Sulawesi Island. The city is southern Sulawesi's primary port, with regular domestic and international shipping connections and is one of the trade centres in Indonesia. The total population of South Sulawesi Province is 8,032,551 and of that, Makassar city is 1,339,374 (South Sulawesi Bureau of Statistic 2010). As a service in eastern Indonesia, Makassar serves as a centre for trade and services, industry, and the centre for education and health services.

Beef demand in Makassar can be fulfilled from local production, however offal products must be supplied from other islands in Indonesia and imported offal from other countries. The local government has decided to import beef offal on an average of 15 tonnes/day since high demand could not be met from local production (Saleh 2011). As can be seen from Table 4, beef production in South Sulawesi Province increased significantly from 2008 to 2012 from 9,503,867 kg to 12,724,748 kg, respectively (Department of Animal Husbandry and Animal Health 2014). Accordingly, beef supply in Makassar City can be fulfilled from local production, but the price is still expensive because it follows the national beef prices.

The price of beef in the domestic market in December 2013 amounted to Rp. 94,210/kg, up 2.02% higher compared to the previous month. The price disparity between regions in Indonesia during December 2013 was relatively large, because the distribution of the supply of local meat and derived from imported cattle had not been evenly distributed nationally. Cities with the highest beef price were Palangkaraya and Tanjung Pinang, amounted to Rp.120,000/kg, and the city with the relatively low price was Kupang, Rp 73,350/kg. (Nuryati & Astrid 2013).

Table 4: Beef production in South Sulawesi, 2008-2012

Year	Beef production (kg)
2008	9,503,867
2009	8,215,598
2010	9,055,961
2011	11,025,604
2012	12,724,748

Source: Department of Animal Husbandry and Animal Health (2014)

Offal demand is a schedule of the quantities of offal consumers are willing and able to consume at various price levels. There are a limited number of earlier attempts that looked into beef offal demand in Indonesia. Saleh (2011) examined consumer demand on beef offal (local and import) in traditional markets in Makassar City. The study revealed several factors that shifted consumer demand from local to imported offal; product quality, affordability, accessibility and consumers who simply opted for imported offal. Furthermore, local offal consumption decreased from 47 per cent to 42 per cent, while types of imported offal from Australia increased from 53 per cent to 57 per cent. These findings indicate that imported offal from Australia tends to dominate market share in the traditional markets of Makassar.

Makassar people regularly include offal in their diet because most local foods use offal as main ingredients. It is easy to find local food stalls or restaurants who sell offal cuisines such as *coto Makassar* and *sop saudara* in most areas in Makassar City. *Coto Makassar* is a very famous dish in Makassar. People could eat this food for breakfast, lunch or dinner. It is a soup made from the mixture of nuts, spices and a selection of offal which may include beef liver, hearts, brain, tongue, intestine and beef meat.

2.4 Consumer demand and consumer behaviour

The main objective of consumption theory is to describe the factors that determine the amounts purchased by the consumer of the goods and services which are available in the market place, and to assess the influence of these factors (Theil 1975). It underlies all individual purchase decisions with the assumptions that consumers enter the market place with well-defined preferences (Frank 2006). This model is known as the theory of rational consumer choice. Budgetary information can be used to make certain inferences about how a rational consumer will behave. Therefore, a consumer helps marketers design better marketing programs, aids in the development of laws and public policy decisions regarding product safety, and promotes general understanding of how consumers behave and why (Hoyer 2010, p. 40). So, researchers conduct basic and applied research to identify important variables relevant to consumer behaviour.

Berkman (1986, pp. 6-20) defines consumer behaviour as the activities of people engaged in actual or potential use of market items such as products, services, retail, environments, or ideas. The field of consumer behaviour explores why people make certain purchasing decisions, what products and services they buy, where they buy them, how they use them, the frequency with which they purchase them and the consumer decision process in action. As early as Adam Smith, economists were constructing theories of buyer behaviour. The classical position holds that a consumer makes choices and purchasing decisions solely on the basis of rational self-interest and carefully considered economic motivations. Thus, all consumer behaviour involves an element of choice. Furthermore, according to Solomon (2012), consumer behaviour is the study of the process involved when individuals or groups select, purchase, use or dispose of products, services, ideas, or experiences to satisfy needs and desires.

Chisnall (1995, p. 107) implies that to understand the behaviour of people, some knowledge of the influence of cultural norms and values is necessary. Study of

environmental factors such as cultural and social influences will help to construct what may be termed the mosaic of behaviour; from these many variables, personal and environmental, the intricate pattern of human behaviour will become apparent. According to Quester (2007, p. 548), culture is a complex concept that includes knowledge, beliefs, art, law, morals, customs and any other capabilities acquired by humans as members of society. Culture includes almost everything that influences an individual's thought process and behaviour.

Demographic factors can have a large effect on the way marketers identify, target and communicate with their customers. When developing effective marketing strategies, marketers need to consider changes in population size, age structure, workforce participation, and education and income levels (Quester 2007, p. 389). As such, demographics clearly influence consumption behaviours both directly and by affecting other attributes of individuals. Consumer characteristics such as demographics, lifestyle and personality can play an important part in marketing strategy (Assael 1987, p. 31).

Carpenter and Moore (2006) imply that demographic characteristics are one of the important elements of every marketing strategy, especially in understanding national or local markets. Accordingly, individual characteristics of consumers, influence their consumption behaviour. McFadden (1986) noted that demographic, economic and social variables can modify preferences. According to Kardes (2011, p. 37), market segmentation is often based on a customer's vital population statistics, called demographic characteristics. Popular demographic characteristics include age, gender, income, education, occupation, social class, marital status, household size, family life cycle, and culture or ethnicity.

Chisnall (1995, p. 129) remarked that culture derives from a group of people sharing and transmitting beliefs, values, attitudes, and behaviour patterns which are held in common and regarded as important to a specific society. Cultural orientations are affected by many variables, such as age, sex, social group, education, aspirations, professional interest, ethnic origin, religious observance and so on. The author stressed that culture gives people an identity and social cohesion. It may also profoundly affect consumption behaviour.

Solomon (2012, p. 538) defines culture as the accumulation of shared meanings, rituals, norms, and traditions among the members of an organisation or society. Assael (1987) sees culture as the norm, beliefs and customs that underlie and govern conduct in society. The effects of culture on consumer behaviour is so powerful that it determines the overall priorities he or she attaches to different activities and products.

There have been a number of studies conducted on household meat demand in Indonesia that have examined the effects of demographic and socioeconomic characteristics, such as age, occupation, household size and culture in affecting the demand or expenditure of a product or service (see for example:Fabiosa 2005; Guenther et al. 2005; Hadi et al. 2002; Hutasuhut et al. 2001; Jensen & Manrique 1998; Olivia & Gibson 2005; Saleh 2011). However, these studies did not attempt to look into beef offal demand, nor the consumer behaviours for offal expenditure.

Jensen and Manrique (1998) use a bivariate probit model to construct estimates of the correction terms for self-selectivity bias and to better understand the meat and dairy product consumption decisions among household income groups in Indonesia. The study found that the demand structure and corresponding elasticity varied for different income groups. Demands for higher income households were very responsive to prices, income and demographic variables, whereas demands for the medium-low income households were responsive mainly to income and price. However, this study did not include offal products in their estimation, since offal is a favourite meat product especially for medium-low income households. According to Goodwin and Koudele (1990), consumer preferences for edible offal has been given very limited attention in the empirical literature. A variety of socioeconomic, demographic, and sociological factors may be responsible for consumer behaviours toward offal consumption.

Price

It is important to analyse determinants of socioeconomic and demographic factors responsible for the changing market shares for local and imported offal, and local and imported beef expenditures, especially in a developing country. This analysis would assist producers, marketers and policy makers in establishing effective marketing programs including market share in Makassar City and for future trade cooperation.

2.4.1 Concepts of demand

Consumer demand is heavily influenced by marketing environment factors such as the interest rate level, social trends and marketing communications. Webb (2005, p. 100) offered, 'The demand for business goods is based on the underlying demand for consumer goods, so business markets are said to have derived demand'.

Demand represents the choice-making behaviour of consumers, while supply represents the decisions of producers. The law of demand states that there is an inverse relationship between the price of a good or service and the quantity buyers are willing to purchase in a defined time period, (Layton 2005, p. 59) (See Figure 5).

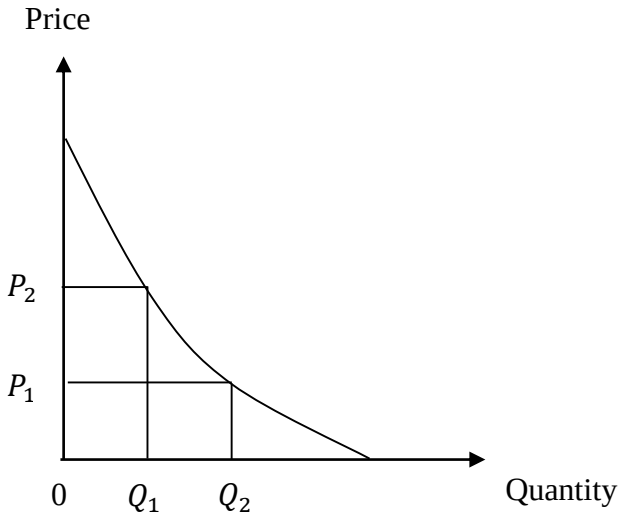


Figure 5: Demand curve

The concept of the demand curve as a functional relation between the quantity and the price of a particular commodity is explained in the Principles of Economics by Alfred Marshall (Marshall 2003). Marshall underlined that the demand curve is derived from a formulation based on maximisation of a consumer's utility function, subject to a budget constraint. Marshall specified that part of the process, where someone is only just tempted to purchase something might be called his or her marginal purchase and the utility of his or her marginal purchase may be called the marginal utility of the object to him or her. The utility function measures the satisfaction that the consumer gets from consuming goods, and the budget constraint is an expression of the financial limitations of the consumer. The marginal utility of an object to anyone reduces with every increase in the amount that someone already has.
Marshall discussed in his Principles of Economics, consumer surplus and downward-sloping demand on the assumption that 'the marginal utility of money to the individual purchaser is the same throughout; which underlies our whole reasoning, that his expenditure on any one thing for instance, tea is only a small part of his whole expenditure'.

Vives (1987) formalised the Marshallian idea that when the proportion of income spent on any good is small then the income effects are small. If *n* is the number of goods, under certain assumptions on preferences and prices, the order of magnitude of the norm of the income derivative of demand is$1/\sqrt{\mathrm{n}}$. As a consequence, we understand in the case of a single price change, the percentage error in approximating the Hicksian Deadweight Loss by its Marshallian counterpart, reverts to zero at least at the rate $1/\sqrt{\mathrm{n}}$ and that demand is downward sloping for *n* is large enough.

Zaratiegui (2002) explained that Marshall developed the demand theory based on two assumptions: (1) the individual allocates a different utility function to each good consumed; (2) the marginal utility of money is constant. Marshall assigns utility to a certain commodity along time, and its utility function has to be modified when one parameter changes. Therefore, to build a curve reflecting the individual marginal valuations, we should remove the income effects (the prices of other goods and the individual income) as the price goes down, in such a way that consumer utility remains constant, which would be similar to the Marshallian demand function.

The utility function is the inverse of the indirect utility function, which uses expenditure and price as arguments. The demand curves derived from minimising costs subject to a given level of utility (in practice total expenditures) are called 'Hicksian demand curves,' after J.R. Hicks. The demand curves derived from maximising utility (in practice the consumption of goods) subject to a budget constraint are called 'Marshallian demand curves,' after Alfred Marshall. The Hicksian approach is based on maximising utility by considering the utility fixed; while the Marshallian approach is based on maximising utility by considering total cost fixed. The occurrence of optimising consumer behaviour is the underlying assumption that allows the duality between the two approaches (Deaton & Muellbauer 1980).

The primary principle of the flexible, functional form in demand analysis is the neoclassical postulate that consumers optimise their choices (Deaton & Muellbauer 1980).

To specify the demand model, data on actual demand decisions (quantity demanded) in response to observed commodity prices, income and other demographic effects are needed. Based on certain assumptions about the structure of consumer preferences, important hypotheses about demand behaviour are obtained (Engel 2008).

2.4.2 Demand properties

The theory of consumer behaviour leads to a number of predictions about behaviour in the marketplace. To statistically estimate consumer demand systems, characteristics of demand behaviour predicted by the theory, can be used to provide restrictions on the values that estimated parameters are allowed to take (Jehle 2001). The system of budget share equations is required to satisfy the properties of adding-up, linear homogeneity and Slutsky symmetry, which can be introduced by restrictions on the parameters (Smed 2005). Nicholson (2001) stated homogeneity is a direct result of the utility-maximisation assumption which suggests in terms of normal goods, a fall in price of a good lead to an increase in quantity purchased because of the substitution effect and the income effect.

Adding up or additivity ensures that the income effects add up. The budget constraint is satisfied for the given prices and income for both Marshallian and Hicksian demand functions. In terms of homogeneity, Marshallian demand functions are homogenous of degree zero in both prices and income, while Hicksian demand functions are homogenous of degree zero in prices only. Symmetry property is only imposed on the Hicksian demand function. In this function, the cross substitution effect between Y and X must be the same as the cross substitution effect between X and Y (Deaton & Muellbauer 1980).

The law of demand states that there is an inverse relationship between the price and the quantity demanded; ceteris paribus. A market demand curve is the horizontal summation of individual demand curves. An increase in demand or a decrease in demand is caused by a change in one of the non-price determinants such as the number of buyers, tastes or preferences, income, expectations and price of related goods (substitutes and complements) (Layton 2005, pp. 59-61). Thus, to measure the degree of consumer responsiveness, or sensitivity to a change in price, we use a price elasticity of demand. Price elasticity of demand is the ratio of the percentage in the quantity demanded of a product to a percentage change in its price.

The responsiveness of quantity demanded to changes in some other variables such as price elasticity, income elasticity or elasticity of related goods are the parameters used in economic studies. The elasticities are used in order to examine how sensitive the demand for a good is to changes in the price of good itself, to changes in the price of related goods, and to changes in income (Layton 2005; Schotter 2001, p. 93).

Schotter (2001, p. 94) explained that,' When a 1% change in the price of a good leads to more than 1% change in the quantity demanded, the demand is called elastic. When a 1% change in the price leads to a less than 1% change in the quantity demanded, the demand is called inelastic. When a 1% change in the price leads to exactly a 1% change in the quantity demanded, the demand is called unitary elasticity'.

Pindyck (2013, pp. 33-5) described demand as price elastic when the price elasticity is greater than 1 in magnitude. In general, the percentage decline in quantity demanded is greater than the percentage increase in price. Demand is price inelastic when the price elasticity is less than 1 in magnitude. In this case, the demand for a good depends on the availability of other goods that can be substituted for it.

Ramskov and Munksgaard (2001) explored five types of demand elasticities; (1) own price elasticity illustrates the percentage rise in the demand at a percentage rise in the price of the good itself, (2) income elasticity shows the percentage increase in the demand for a given good as a result of a percentage increase in income, (3) cross-price elasticity explains the percentage increase in demand for good *i* as a result of a percentage increase in the price of good *j*, (4) elasticity of substitution measures the percentage in the relative consumption of two goods as a consequence of a change in the relative prices of the goods, and (5) compensated (Hicksian) or non-compensated (Marshallian) elasticities. Ramskov and Munksgaard (2001) suggested that the Marshallian utility function is calculated as a function of prices and income while Hicksian demand that function depends on prices and utility level or expenditure approach.

Estimated income elasticities can be used to assess how increments household income will be spent. Thus, expenditure can be used as a proxy for income (Browne, Ortmann & Hendriks 2007). If the expenditure elasticity is positive, it means as income increases, the expenditure for a good or product will increase. If the expenditure elasticity is negative, it means as income increases the expenditure for a good or a product will decrease (Browne, Ortmann & Hendriks 2007; Hutasuhut et al. 2001).

Schotter (2001, pp. 115-6) implied that error in measuring consumer surplus with uncompensated demand functions instead of compensated demand functions is small. With the uncompensated demand function, we can observe by looking at data on prices and quantities, while compensated demand functions exist only in the minds of consumers. Similarly, in this study, only uncompensated demand function or the Marshallian elasticities will be considered.

There are two possible categories for the relationship between changes in income and changes in demand; normal goods and inferior goods. A normal good is any good or service for which there is a direct relationship between changes in income and its demand. In this case, a fall in the price of a good causes substitution; income effect means more of the good will be purchased. An inferior good is any good or service for which there is an inverse relationship between changes in income and its demand (Nicholson 2001).

2.5 The Almost Ideal Demand System (AIDS)

Huang and Haidacher (1983) discussed that the demand system is an effective instrument for conducting outlook and policy analysis on the program effects of retail price changes on quantities of food purchased. Cross-price and income elasticities are estimated in a simultaneous framework which provides information about the complete interdependent nature of the demand for food, which is not explored by traditional partial demand analysis.

In order to estimate a responsiveness of quantity demanded, most studies used the Almost Ideal Demand System (AIDS) model. The AIDS model was originally proposed by Deaton and Muellbauer (Deaton & Muellbauer 1980). Deaton and Muellbauer (1980) first estimated around eight commodities; food, clothing, house services, fuel, drink and tobacco, transport and communication services, and other goods and services. The AIDS model includes theoretical assumptions about the aggregation, homogeneity, and symmetry of the demand system. In addition, commodity consumption conforms to the principle of two-stage budgeting. The AIDS model has proven to be more popular, because it permits exact aggregation over households and is easier to estimate (Poi 2002). Many researchers have applied the complete demand system in their studies (see for example:Cai et al. 1998; Heien & Pompelli 1988; Henneberry & Hwang 2007; Huang & Show 2011; Hutasuhut et al. 2001; Muzayyanah & Maharjan 2011; Tshikala & Fonsah 2012).

The linearised version of AIDS (LA/AIDS) is widely used to simplify the estimation process. Green and Alston (1990) developed calculations of income and price elasticities specifically designed for the LA/AIDS model, and found there were advantages over conventionally used formulae (Buse 1994). Because of its simplicity, the Linear Approximate Almost Ideal Demand System (LA/AIDS) is popular for empirical studies amongst agricultural economists by using household expenditure data (Buse 1994).

Hutasuhut et al. (2001) added that socio-demographic variables exist such as a range of personal, household and spatial effects in their LA/AIDS model. This study found that the demand for beef is both income and own-price inelastic, while the demand for chicken is income and own-price elastic. The study suggested that Australian agribusiness may have a good prospect for the cattle and meat trading sector. However, the findings of this study needs to be explored further with regards to whether beef demand in Indonesia would have impacts on Australian agribusiness.

There have been a number of studies conducted on household food demand. This section will highlight studies on meat demand worldwide. Growth in meat demand is largely driven by income and population growth (Fletcher, Buetre & Morey 2009). Based on demand theory, meat demand determinants are meat product prices, consumer income, demography, consumer taste and preferences.

The study of Henneberry and Hwang (2007) focused on imported meats that differentiated by supply source using the first difference version of the restricted source-differentiated Almost Ideal Demand System (AIDS). In the South Korean beef market, the United States has a competitive advantage compared with Australia, which is determined by the United States relatively low own-price elasticity and high expenditure elasticity compared with Australia. On the other hand, the United States does not have much to gain in terms of its pork exports rather than beef because South Korea has significant expenditure elasticity for fresh domestically produced pork.

Flake and Patterson's (1999) study focused on food-safety issues related to beef demand and other meats in the United States market by using linear approximation almost ideal demand system model (LA/AIDS) estimation. Health information variables and beef safety variables were introduced in a square root form. It was found that all own-price

elasticities are significantly different from zero and negative. Indeed, beef safety information was found to have a significant impact on beef demand and dominated by health information. Thus, health information on beef safety concerns is needed not only from articles but also from consumers.

Taljaard et al. (2004) analysed meat demand determinants in South Africa by estimating a meat demand system. Their study used annual time-series data from the National Department of Agriculture. The framework employed the LA/AIDS model and a Restricted Seemingly Unrelated Regression (RSUR) to estimate the model. Results indicated that the compensated and uncompensated own and cross price elasticities in the LA/AIDS estimates are significantly lower (more inelastic) compared to previous estimates for meat in South Africa, for two reasons; the estimate was for different time periods and the estimation technique.

The complete demand system is estimated using the Seemingly Unrelated Regression (SUR) method (Zellner & Ando 2010). A symmetry and homogeneity restriction from demand theory is imposed on flexible forms through equality restrictions on the parameters. In order to avoid the singularity problem, one of the share equations was dropped from the system which was the imported beef share equation. Excluding one equation automatically implies the adding-up restrictions and the omitted share equation can be recovered from the adding-up conditions (Jabarin 2005).

Heien and Wesseils (1990) stated that Heckman's procedure in dealing with the inclusion of zero consumption in the analysis avoids a biased parameter estimate. In the first stage, the results of a probit model of commodity expenditures are used to compute the inverse mills ratio (IMR). The IMR for each commodity is included to correct selectivity bias. The IMR is estimated due to when the collected data contains many zero expenditures. A probit model has been used in several studies to distribute with the inclusion of households that reported zero consumption or expenditure in the analysis (Guenther et al. 2005; Morgan et al. 2004). In the second stage, the estimated variables which represent the unobservable influence on the participation decision or the IMR variables are then included in the LA/AIDS system (see for example: Abdelmagid, Wohlgenant & Safley 1996; Jabarin & Al-Karablieh 2011; Jabarin 2005; Liu et al. 2009).

2.6 Previous meat demand studies in Indonesia

The study of Priyanti (1998) identified factors that influence the demand and supply of beef, and measure the degree of consumer responsiveness to change in price. The determinants observed were production and consumption of beef, retail price, population, per capita income and input price of beef production. The Two-Stage Least Squares (2-SLS) estimation method was used to estimate beef demand function. The results showed that the coefficient of determination (R^2) was a relatively high 93.80. The results indicated that the retail price of beef is determined simultaneously by demand and supply linkages. However, in this study there has not been a statistical analysis of consumer attitude variables in purchasing beef such as taste or preference, the decision whether to buy and how much to buy.

Statistical measurement techniques have been applied in order to analyse or estimate the relationship between variables. The responsiveness from quantity demanded to a change in variable, such as price elasticity, income elasticity or expenditure elasticity; cross price elasticity of related goods is where parameters are used mostly in economic studies. Muzayyanah and Maharjan (2011) studied the socioeconomic determinant of livestock product consumption in urban and rural Java in Indonesia. The study found that the expenditure elasticity for meat and milk products were positive, meaning they are luxury foods. But, eggs were classified as a necessity good since its expenditure elasticity has a negative sign. Size of the household, age of the head of the household, the education of the wife, and the occupation of the head of the household had an impact on the consumption of meat, eggs and milk in urban homes; while only the occupation of the household head had significant impact for rural homes.

Olivia and Gibson (2005) found that the own-price elasticities of both beef (-0.46) and chicken (-0.42) in Indonesia were smaller than previous studies. To estimate the demand system, Olivia and Gibson corrected the biases caused by unit values. The own-price elasticities for beef are much more sensitive than the estimates for chicken. In this study, unit values calculated as the ratio of household expenditure on a particular food is in relation to the quantity consumed.

Hayami (1979) analysed beef import design liberalisation in Japan and how the study would benefit all. Estimation results of the Marshallian partial equilibrium analysis, suggested that the decline in beef prices relates to increasing imports that then affect the demand for other livestock products and reduces the income for domestic pork and chicken producers. Since severe restrictions have been imposed on the imports of agricultural commodities in Japan, it should be possible to design a policy which could benefit consumers and suppliers. Therefore, research on consumer demand should be conducted more deeply.

Ilham (2001) analysed the supply and demand of beef in Indonesia. The study had five main results. First, supply of beef cattle smallholder is influenced by the margin of beef price and cattle price, and supply of beef cattle industry. Secondly, beef cattle industry is influenced by beef price, the price of cattle feeder and interest rates. Third, beef imports were influenced by a tariff. Fourth, beef demand in Indonesia was influenced by beef and fish prices. Finally, domestic beef prices were influenced by imported beef prices, cattle prices and domestic beef supply.

Trade restrictions are imposed through self-sufficiency in an effort to boost local beef production. Several policies have been implemented in Indonesia in order to achieve self-sufficiency in beef production, such as the credit subsidy policy, imposing quota and tariff for imported beef products and live cattle, and funding on research and development to improve beef cattle productivity. Vanzetti et al. (2010) studied the revival of interest in self-sufficiency in Indonesia and its likely consequences. The study implied that a self-sufficiency policy with minimal exposure to international market prices imposes high costs to maintain self-sufficiency. The revised, lower, estimate significantly influences the results, advising that, virtually removing cattle and beef imports is still attainable, but at an even more significant cost to consumers and taxpayers.

2.7 Consumer Willingness to Pay (WTP)

2.7.1 The concept of willingness to pay

The WTP or reservation price is defined as the maximum price a given consumer accepts to pay for a product or service for a given quantity. It is a ratio-scaled measure of the subjective value the buyer assigns to that quantity(Le Gall-Ely 2009; Wertenbroch & Skiera 2002). Additionally, WTP is a measure of the value that a person assigns to a consumption or usage experience in monetary units (Homburg, Koschate & Hoyer 2005). As part of the price perception process, WTP is closer to price judgement and is linked to other variables that influence decision making (satisfaction, loyalty and culture).

According to McTaggart (2007, p. 62), the willingness and the ability to pay is a measure of marginal benefit. If a small quantity is available, the highest price that someone is willing to pay for one unit is high. As the quantity available increases, the marginal benefit falls and the highest price that someone is willing to pay falls along the demand curve. Thus the demand curve, reflects buyers' WTP. The downward sloping demand curve reflects the fact that as price increases, consumers are willing to buy less of the good or service (See Figure 6).

Harapap and Hartono (2007) argued that the concept of WTP is strongly related to the concepts of Compensating Variation and Equivalent Variation in the theory of demand. In other words, WTP can be interpreted as the maximum amount that a person is willing to pay to prevent the deterioration of something. Homburg, Koschate and Hoyer (2005) suggested that when customers experience elevated states of satisfaction, they perceive a high outcome of an exchange and therefore are willing to pay more. Furthermore Krystallis and Chryssohoidis (2005) asserted that another reason consumers give for their WTP is to ensure food safety and overall quality.

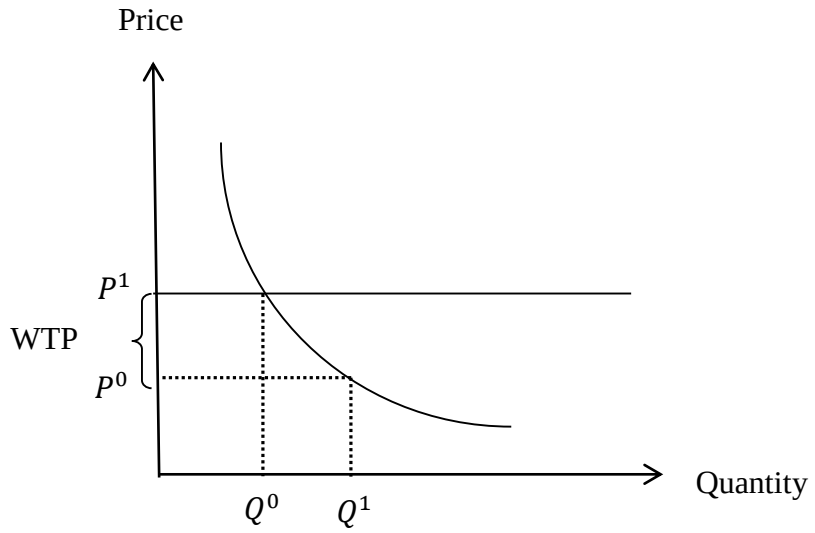


Figure 6: WTP in a demand curve

2.7.2 Approaches to measure consumer WTP

A number of theoretical approaches to measuring consumers' WTP have been implemented in the relevant literature with different conceptual foundations and methodologies. Breidert, Hahsler and Reutterer (2006) classified the approach based on data collection methods. Methods are divided into two; revealed preference and stated preference. Revealed preference can be achieved by using market data and experiments, while stated preference can be achieved with direct survey and indirect survey (conjoint analysis and discrete choice analysis).

The study of Sichtmann and Stingel (2007) advised that two of the most widely discussed methods for eliciting WTP on an individual level are use of the Vickrey auction method (Alfnes & Rickertsen 2003; Menkhaus et al. 1992; Vickrey 1961) and conjoint analysis (Cranfield & Magnusson 2003; Misra, Huang & Ott 1991; Sichtmann & Stingel 2007). Ratcliffe (2000) implied that conjoint analysis involves the presentation to individuals of hypothetical scenarios. This method uses ranking, rating, or discrete choice to represent consumer preference. The respondent's respective utility functions can be estimated from the results obtained. Louviere (1988) stated that discrete choice or resource allocation responses have a number of important advantages. Specifically, one can design choice or allocation experiments to mimic real choice environments closely. Furthermore, conjoint analysis allows respondents to make trade-offs among multiple purchase options; it yields more realistic predictions of purchase behaviour than do traditional methodologies (Krystallis, Fotopoulos & Zotos 2006).

Conjoint analysis has become one of the most widely used quantitative tools in marketing research (Green & Srinivasan 1990; Orme 2010, p. 7). Conjoint analysis, is also called 'trade-off analysis'. The technique is based on the assumption that complex decisions, including purchase decisions, are based not on a single factor or criterion, but on several factors 'considered jointly' (American Marketing Association 1992, p. 1). As indicated by Orme (2010, p. 51), in conjoint experiments, respondents express their preferences for products described by varying levels of attributes. Thus, we can estimate utilities associated with attribute level. Statistical techniques are then used to establish a relationship between attribute level and preference.

Wertenbroch and Skiera (2002) used conjoint analysis and contingent valuation-based techniques that directly ask consumers about their WTP, as well as the simulated test market. Conjoint analysis is designed to determine trade-offs between product features or attributes (including prices), and differences in WTP are inferred from subjects' rankings or ratings of alternatives.

The contingent valuation (CV) method is a method using surveys to value goods and services. The CV method uses survey questions to elicit people's preferences for public goods by finding out what they would be willing to pay for specified improvements in them (Mitchell 1988, p. 2). The choices made by survey respondents are then analysed in a similar manner as the choices made by consumers in actual markets (Carson 2000). Carson (2000) stated that the respondents were offered a binary choice between two alternatives. Accordingly, random assignment of cost and a number of respondents, allows the researcher to trace out the distribution willingness to pay for the good. Hanemann

(1994) explained that surveys offered a way to trace the demand curve for a public good that could not otherwise be gleaned from market data.

Kyung Hee and Hatcher (2001) differentiated between four major methods that are used to measure consumer WTP. These are; contingent valuation, experimental auction, the conjoint analysis method and the hedonic price method. In the hedonic approach, the hedonic price equation shows the relationship between the price of a good as a dependent variable and the characteristics as independent variables. The hedonic function is estimated using the market price, consumption/expenditure data, and objective characteristics in the point of decision making. Several studies have implemented a hedonic price approach to estimate consumer WTP (See for example: Monty & Skidmore 2003; Stanley & Tschirhart 1991; Wahl, Shi & Mittelhammer 1995).

Common elicitation approaches, such as conjoint analysis and the contingent valuation method based on the survey approach (directly or indirectly) are very flexible, as questionnaires can be designed to provide answers to questions of specific interest to the researcher. However, the main weakness is the hypothetical nature of consumer responses in that, what consumers say is not necessarily what they do (Baltzer 2004). Stated willingness to pay is often presumed to be overestimated compared to real willingness to pay (Millock & Hansen 2002). Furthermore, stated willingness to pay may not reflect revealed behaviour (Dhar & Foltz 2005; Kramer 1990).

Conjoint analysis and contingent valuation methods can suffer from hypothetical bias. Le Gall-Ely (2009) argued that respondents do not take into consideration all the constraints that would affect his or her choice in a real situation, such as budget available, financial consequences, availability of the product or competitor product. Therefore, there is a difference between what the respondent says and what s/he would accept to pay in a real situation; respondents tend to overestimate WTP. Study by Neill et al. (1994) found that hypothetical WTP is consistent and significantly higher than the WTP that reflects real economic commitments. It is attributable to differences between hypothetical and real payment.

Botelho and Pinto (2002) study found that hypothetical WTP overstates real WTP by a substantial margin, and that difference is statistically significant. However, Johannesson, Liljas and O'Conor (1997) in their study, did not find a statistically significant difference between hypothetical and real willingness to pay. However, the variance differs between groups, indicating that the hypothetical question introduces additional random error.

2.7.3 Previous studies on consumer WTP for food and meat products

Studies on consumer willingness to pay (WTP) for food products, including behaviour, attitudes and perceptions toward food products have been conducted recently in many countries (see for example: Cranfield & Magnusson 2003; Misra, Huang & Ott 1991; Şentürk 2009; Umberger et al. 2002). Willingness to pay is a function of the product attributes, characteristic of the consumer, and other factors thought to influence the choice. The probability of WTP falling within a range of values also depends on these factors (Cranfield & Magnusson 2003). The main objective of these studies was to build

competitive advantage of products in the market and to help sellers develop their marketing strategies.

Consumer satisfaction with a product is also another objective in analysing their behaviour and attitudes toward the product. Westbrook and Oliver (1991) implied that it is generally agreed that satisfaction originates in a comparison of the level of a product or service performance, quality, or other outcome perceived by the consumer with an evaluative standard. Homburg, Koschate and Hoyer (2005) examined how consumer satisfaction affects the consumers' willingness to pay. The study findings suggest that cumulative satisfaction is more relevant because it is the strongest driver of customer behaviour, or in this case, willingness to pay.

There are a number of studies in the literature about WTP for food and meat products that used the contingent valuation approach (Lusk & Schroeder 2004; McCluskey et al. 2005; Misra, Huang & Ott 1991; Radam et al. 2010; Şentürk 2009; Umberger et al. 2002). Misra, Huang and Ott (1991) stated that the contingent valuation method provides a direct approach for obtaining consumer willingness to pay for certain benefits. The contingent valuation approach is less costly than actual market experiments. Logit or probit models have mostly been used in contingent valuation studies (Whitehead, Hoban & Clifford 2001). With dichotomous choice, contingent valuation respondents are asked whether they would be willing to pay a single price for the public good.

The study of Misra, Huang and Ott (1991) implemented the contingent valuation approach by conducting a mail survey among households to assess and determine consumer perception of food safety and their attitudes toward the use of pesticides in the production of fresh produce in Georgia, United States. Information was collected, relating to respondent socio-economic and demographic characteristics such as ethnic background, age, income, marital status, family size and employment status. An ordered probit model was employed to estimate the probabilities of consumer WTP for certified pesticide residue-free produce. The study results indicate that most consumers recommend testing and certification, but they oppose large price mark-ups for certification that produce is pesticide residue-free.

Menkhaus et al. (1992) used a laboratory experimental auction to determine factors that influence the relative value customers place on alternative retail beef packaging. The Vickrey auction was chosen to elicit how much respondents were willing to pay for one unit of the test in each bidding session. In Vickrey auctions, sealed bids from all bidders are simultaneously collected and the person with the highest bid can purchase the product at a price equal to the second highest bid (Voelckner 2006). The study of (Menkhaus et al. 1992) revealed that the physical appearance of the beef played a major role in purchasing decisions by customers. In addition, information is very important for the successful introduction and marketing of the vacuum skin package.

Umberger et al. (2002) utilised the experimental auction procedure to measure Chicago and San Francisco consumer willingness to pay for beef flavour from domestic, corn-fed beef versus Argentine, grass-fed beef. Multinomial logit model and regression analyses were used to identify consumers who prefer a particular flavour of beef. The multinomial logit model was used to identify consumers with their demographic traits and to predict

which flavour they would prefer. The regression analysis was used to predict the premium that consumers would pay for their preferences. The study found that consumers, on average, strongly preferred the domestic steak on all sensory traits (flavour desirability, juiciness, tenderness, and overall acceptability) over the imported product.

Radam et al. (2010) analysed the Malay consumers' WTP for food safety with reference to beef consumption by using the contingent valuation approach. A logit and probit model was used to estimate the premium that consumers were willing to pay for beef. The study found that household income and price levels were the important factors that influence consumer WTP for beef. The WTP analysis indicated that the consumers were willing to pay an extra 13 per cent for safer beef. The study by McCluskey et al. (2005) on consumer food safety perceptions and willingness to pay for tested beef in Japan, found that attitudes to food safety, reduction in beef consumption following the bovine spongiform encephalopathy (BSE) outbreak, and being female all have a statistically significant positive effect on the WTP for BSE-tested beef. Similar results were found by Latouche, Rainelli and Vermersch (1998) in regards to their study about BSE and food safety issues where consumers required a greater transparency or 'traceability' in the food chain from the farmer to the retailer before they would accept and pay for the product.

In many empirical analyses, WTP takes the form of a multiple response variable that has intrinsic order. Therefore, ordered qualitative response models must be used (Cranfield & Magnusson 2003). In studies by Cranfield and Magnusson (2003) an ordered probit model was implemented to estimate Canadian consumer WTP for pesticide free food products. The results of this study suggested that health and environmental concerns are important factors in consumer preference for reduced input food products. Şentürk (2009) study also implemented an ordered probit model to estimate consumer WTP for genetically modified (GM) food in Turkey. In Cranfield and Magnusson (2003), socio-demographic factors proved to be relatively unimportant in consumer WTP as compared to shopping behaviour. Conversely, Şentürk (2009) study found that socioeconomic and demographic factors did effect consumer WTP in GM foods.

Henson (1996) argued that a number of demographic factors may have a significant influence on the WTP for reductions in the risk of food poisoning including gender, income and level of education. Consumers with higher income are more likely to purchase safer food products. Furthermore, Govindasamy and Italia (1999) indicated that females, with higher annual incomes, younger individuals, and those who usually or always purchase organic produce are all more likely to pay a premium for organic produce.

Roosen, Lusk and Fox (2003) included questions on demographic characteristics, meat consumption habits, beef attributes considered in purchasing decisions, food safety issues and production technologies in their survey instrument. They utilised a mail survey in France, Germany, and the United Kingdom to study consumer preferences for alternative beef labelling strategies. An ordered probit model was used to determine the influence of several consumer characteristics in explaining the level of importance consumers place on brands or country of origin labelling. The study found that consumers place a higher level of importance on government authorised labels than on private brands.

2.7.4 Hedonic price method and previous empirical studies

Lancaster (1966) developed a consumer theory that goods are valued by consumers for their utility obtaining characteristics. Lancaster explored utility which is not directly taken from the goods but from characteristics of the goods. The hedonic price method was motivated at least in part by the work of Lancaster (Sheppard 1999).

Rosen (1974) defined hedonic prices as implicit prices of product attributes that are revealed to consumers from observed prices of differentiated products and the specific amount of characteristics associated with them. Empirically, implicit prices are estimated by first step regression analysis of hedonic price indexes.

In the hedonic approach, price is considered a dependent variable and specific characteristics are considered explanatory variables. The price function represents an equilibrium resulting from the interaction of buyers and sellers in each market. Subsequently, the hedonic price equation is a reduced form equation reflecting both supply and demand conditions (Parker & Zilberman 1993).

Hedonic price analysis has been implemented in many studies to identify characteristics of food and agricultural products which significantly influence price. Most of the studies use a categorical dummy variable to evaluate the effect of characteristics on price (Huang & Lin 2007; Maguire, Owens & Simon 2004; Oczkowski 1994; Salayo, Voon & Selvanathan 1999; Satimanon & Weatherspoon 2010; Unnevehr & Bard 1993). According to Oczkowski (1994), the use of a series of dummy independent variables rather than a single continuous variable has some advantages in the hedonic price analysis. First, large measurement errors in the variable will have less of a misspecification impact if dummy variables are employed. Second, a series of dummy variables represents a more general specification (permitting non-linear impacts) of which a single continuous variable represents a special case.

The study conducted by Maguire, Owens and Simon (2004) aimed to estimate the price premium for organic baby food by applying a hedonic model. The study found that the estimated organic price premium reflects consumer WTP to reduce pesticide exposure.

Salayo, Voon and Selvanathan (1999) used a log-linear hedonic price model to determine the characteristics of prawn and shrimp in the Philippine domestic market. The study showed significant implicit prices of attributes, such as: tail, length, freshness, product form, species, colour, and size, ease of preparation, discolouration, protein, and carbohydrate content.

Huang and Lin (2007) study estimated a hedonic price model using panel data to identify important socioeconomic and demographic factors, product and market attributes that affect price consumers paid for fresh tomatoes in the New York-Philadelphia market. The study found an increasing portion of consumers were willing to pay higher prices for organic and packaged tomatoes. Wang, Mao and Gale (2008) analysed consumer WTP and price premiums for milk products manufactured using the hedonic price model. Based on the survey, the demand for food safety is emerging as an attribute demanded by Chinese consumers.

Awono, Laroche-Dupraz and Vermersch (2011) estimated the marginal WTP for chicken attributes in Cameroon using data from a survey in the field. This study included socioeconomic and demographic independent variables such as age, household size, occupation and education in the analysis. Product attributes such as price, taste and quality were also included in the hedonic model. It was found that consumer's substituted local flesh chicken by importing frozen chicken due to the practice in culinary usage and availability in the local market.

Satimanon and Weatherspoon (2010) study objective is to determine price premiums of sustainable attributes for fresh eggs. The authors used survey data of fresh egg prices and their attributes.

Griffith and Nesheim (2007) used hedonic prices to estimate consumer WTP for organic products using panel data. Information on prices, quantities, demographic and a range of consumer attitudes towards health, quality, the environment and organic produce was collected by telephone survey. The main reason, households are willing to pay for organic foods is the quality, health and environmental concerns.

2.8 Research gaps

Studies on livestock and meat demand are available; however, the study of offal demand is virtually absent. Because of the cultural background in Indonesia, particularly Makassar city, South Sulawesi Province, people consume offal as the main ingredient in their dishes and it is a favourite food. For policy implementation, it is very important to estimate how responsive Indonesia's offal demand is, to make changes around its own price, income, and prices of related goods. This study will supplement the existing knowledge and literature and will benefit Indonesian consumers, and foreign exporters (Australian exporters in particular).

In this empirical study, we assume weak separability between the demand for beef and offal, and the demand for other food or meat commodities. Accordingly, the demand model includes information on both domestic and imported products of offal and beef. In studies of food demand it is customary to consider consumer maximising their utility under the assumption of weak separability (Baltzer 2004). According to Edgerton (1997), weak separability approach implies that commodities can be partitioned into a number of "separate groups" (e.g. housing, food, transportation, etc.), and subsequently determining lower level consumption conditional on the budget assigned to the particular groups. In Makassar, beef and offal products are important ingredients in the community. The demand for local and imported products are also continues to increase. However, none of the empirical studies have performed the structures of substitution among different types of local and imported products for beef and offal.

Analysis of factors affecting offal demand needs to be estimated by considering the socioeconomic and demographic variables, such as price of local and imported offal, income, education, age, and household size. As a whole, the demand estimates would assist in policy formation and for offal marketers; the project would assist them to segment their markets to help them sell their products.

A hedonic pricing method has been rarely used in the empirical studies for beef and offal commodities. The main purpose of the study is to collect data on the actual or real individual willingness to pay for imported offal in Makassar. This study will be a preliminary study for WTP of imported offal in Indonesia.

The hedonic price analysis will provide new evidence of consumer willingness to pay for imported offal in Makassar City, Indonesia. The analysis tests the structural change in consumer WTP for Australian offal in term of the quality. Following this, consumer perception of the import trade policy will depict the effect of free trade (no import quotas) on consumer expenditure for offal. Both analyses will provide policy makers and retailers in the offal supply chain with information, analysis and recommendations that are expected to contribute to the sustainability of the offal industry.

2.9 Chapter summary

This chapter has reviewed the literature and theoretical foundations of this study. It has discussed meat consumption in Indonesia in terms of beef and offal and its supply and demand processes with reference to beef offal consumption in Makassar in particular.

The next chapter will discuss study results on the socioeconomic and demographic factors for offal and beef demand in Makassar.

3. CHAPTER 3. SOCIOECONOMIC AND DEMOGRAPHIC FACTORS FOR OFFAL AND BEEF DEMAND IN MAKASSAR

3.1 Preview

Chapter 2 has provided the literature and theoretical concepts that frames this study.

Chapter 3 provides the results and discussion of research study one, on socioeconomic and demographic factors on beef and offal demand in Makassar City. The organisation of this chapter is as follows. Section 3.2 provides the introduction of the study. Section 3.3 outlines the methodology of the study, Section 3.4 explores the descriptive analysis of this study, and Section 3.5 is the study results and discussion. Finally, section 3.6 is the chapter summary.

3.2 Introduction

The main objective of the consumption theory is to describe the factors that determine the amount of goods and services purchased by the consumer which are available in the market place and to assess the influence of these factors (Theil 1975). It underlies all individual purchase decisions with the assumption that consumers enter the market place with well-defined preferences (Frank 2006). Underlying these theories, are many empirical studies of consumer behaviour and the demand for meat products in Indonesia (see for example:Fabiosa 2005; Hadi et al. 2002; Hutasuhut et al. 2001; Jensen & Manrique 1998; Olivia & Gibson 2005; Saleh 2011). Unfortunately, the research to date, while useful, has left a gap in meat demand by not looking at the area of demand for offal products.

Meat demand, including beef, beef offal and chicken is continuously increasing in Indonesia. Indonesia, with a population of 237,641,320 has shown an increase in meat consumption from 1.95 kilograms per capita in 2007 to 2.75 kilograms per capita in 2011 (Indonesian Bureau of Statistic 2011). Based on consumption data from 2005 to 2007, the consumption of chicken, beef and offal was 4.23 kg/capita/year, 2.33 kg/capita/year and 2.53 kg/capita/year, respectively (Tawaf & Lengkey 2013). These figures show a significant demand for edible offal in Indonesia. Therefore, understanding consumer behaviour in offal expenditure is essential.

In Makassar, South Sulawesi Province, offal is a highly demanded meat product. The community of South Sulawesi has a traditional dish called *Coto Makassar* that uses beef offal as its main ingredient. The local government has decided to import offal at an average of 15 tonnes/day (Saleh 2011). Makassar requires around 16 tonnes of offal per day to meet demand. However, only one ton can be supplied by local slaughterhouses in Makassar Republika (Republika 2012). Accordingly, the demand for edible offal will continue to increase while local production remains static and the growth rate of the

population increases in Makassar. Moreover, some offal products are found in traditional markets, whereas the qualities of the products are not maintained because of the high demand for offal.

Understanding the emerging market of beef products, including the socio-demographic factors that influence demand of beef products are important for producers, marketers and policy makers in developing effective marketing programs including market share in Indonesia and for future trade negotiations. This study, attempts to provide recent information about determinants of socioeconomic and demographic factors for offal and beef expenditure in Makassar City, South Sulawesi Province, and explains the difference among consumers with probit model analysis. The probit model is used to handle the inclusion of households that reported zero consumption or expenditure in the analysis.

3.3 Methodology

The first study objective of this thesis is to analyse socioeconomic and demographic factors on beef and offal demand in Makassar. The source of data and variables, including theoretical approach and probit model analysis are explored in this section.

3.3.1 Data sources

Makassar is purposively selected as the study area for this research. This selection is based on local food traditions, the number of the population and importance of the city as the centre of trading activities in South Sulawesi Province. Makassar is considered as one of the largest cities in Indonesia and the central offal market in South Sulawesi Province.

This study uses two types of data: primary data and secondary data. Primary data were collected based on structured and semi structured interviews, and direct observation. In the absence of reliable household census data, a questionnaire was designed and used for this purpose and was generated from a survey with offal and beef consumers. In this study, primary data are used to analyse research problems or questions, and the secondary data are used as supporting information in the study discussions.

The primary data were collected from market surveys by using questionnaires (see Appendix I), and secondary data is collected from the Indonesian Bureau of Statistics report, the Department of Agriculture in Indonesia and relevant websites such as the Australian Bureau of Statistics and Meat Livestock Australia. A survey questionnaire is used because it has the advantage of obtaining data more efficiently in terms of researcher time, energy and cost (Sekaran 2010, p. 185). Surveys are useful for gathering factual information, data on attitudes and preferences, beliefs and prediction (Cohen 2007, p. 207).

The study employs convenience and systematic random sampling approaches to select the respondents. Convenience sampling is chosen to obtain some basic information quickly and efficiently (Sekaran 2010, p. 276). According to Cohen (2007, pp. 113-4), convenience sampling – or, as it is sometimes called, accidental or opportunity sampling involves choosing the nearest individuals to serve as respondents and continuing that process until the required sample size has been obtained and accessible at the time.

Moreover, convenience and systematic random sampling have been chosen in this study, in order to overcome the constraints of time and funding.

The sampling method was designed to capture a representation of Makassar demographic groups based first on age, income, level of education, household size, occupation, and so forth. Following Carpenter and Moore (2006), to control for size and cost of the survey, the sampling method focused upon providing representation among the demographic groups rather than exact proportion to the Makassar population. Questionnaires were developed and administered to 200 respondents. A sample size of 200 is considered the optimal size for a structured interview in survey questionnaires (Hinkin 1998). In addition, Roscoe (1969, pp. 155-7) proposes the rule of thumb for determining sample size is that sample sizes larger than 30 and less than 500 are appropriate for most research, especially with parametric statistics.

The respondents of this study were all consumers who buy beef and offal at traditional markets or supermarkets in Makassar. The data collection sites were purposively selected around Makassar city. In order to analyse the influence of broad measures of socioeconomic and demographic factors, especially income and education on household expenditure patterns, traditional markets and supermarkets were conveniently selected from different district areas in Makassar city namely Makassar district, Tamalanrea district, Biringkanaya district, Panakukang district, Rappocini district and Tamalate district. The traditional markets were located where the majority of households have low to moderate income and supermarkets were located where households have moderate to high income. Traditional markets and supermarkets were chosen for data collection, based on preliminary observation. It had been found that not all supermarkets and traditional markets sold imported offal and beef products due to the reduction of the imported quota regulation.

To make the systematic sampling selection, the researcher approached every third entrant to the market and inquiry if he/she bought beef or offal in the market, and if he/she ever consumed beef or offal in the month of survey carried out. If he/she is a buyer, he/she was asked to read the participant information sheet (Appendix G), then signed the consent form (Appendix H), and the questionnaire was administered directly (Appendix I). If he/she does not meet the criteria, the researcher apologised for the time that had been given. In this study, we assume that consumers are randomly enter the market and that the rate of entry is normally distributed.

All data is analysed using STATA software version 13 (See Appendix A and Appendix D).

3.3.2 Theoretical approach

A probit model has been used in several studies in dealing with the inclusion of households who reported zero consumption or expenditure in the analysis (Guenther et al. 2005; Morgan et al. 2004). The probit model is used because its likelihood functions maximise the probability or likelihood of observing the sample giving us the probability of observing the sample data (Hill 2001, pp. 372-3). The maximum likelihood (ML) estimation is used

to evaluate the probit model parameters. The ML focused on choosing parameter estimates that gave the highest probability or likelihood of obtaining the observed sample.

The probit model is a statistical probability model with two categories in the dependent variable (Aldrich 1984). The binary dependent variable, takes on the values of zero and one. Generally, the probit model has the probit link function:

$$g(x) = \Phi^{-1}(x) \qquad \textit{Equation 1}$$

Where the cumulative distribution function of a standard normal random variable:

$$\Phi(x) = \int_{-\infty}^{x} \frac{1}{\sqrt{2\pi}} Exp\left(-\frac{1}{2}u^2\right) du \qquad \textit{Equation 2}$$

Finally, the probit model with predictors $x_1, \ldots, x_k$ has the form:

$$\Phi^{-1}\big(P(Y=1)\big) = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k \qquad \textit{Equation 3}$$

3.3.3 Probit model

In this study, the preferences of local and imported beef offal, and local and imported beef are taken as 1 and 0 otherwise. The empirical model is estimated to be:

$$y_i^* = \beta_0 + \sum_{k=1}^{K} \beta_k x_{ki} + \varepsilon_i \qquad \textit{Equation 4}$$

Where:

y_i^* = the probability of purchasing meat products, 1 for "buying" and 0 "otherwise". Here the "zero" means no spending/expenditure on offal/beef and therefore this should imply that there is no consumption of offal/beef.

β_0 = intercept

β_k = the parameters

x_{ki} = independent variables: age, income, family size, years of education and ethnicity

ε_i = error term.

Following Khanam and Ross (2011), the marginal effects associated with continuous explanatory variables on the probability (P) ($Y_i = 1 \mid X$), holding the other variables constant, were derived as follows:

$$\frac{\delta P_j}{\vartheta X_i} = \beta_i P_j (1 - P_j) \qquad \textit{Equation 5}$$

Where:

P_j = the dependent variable probability of the event

X_i = independent variable

β_i = the probit coefficient for the independent variable.

The marginal effects give insight into how the explanatory variables shift the probability of frequency of offal and beef expenditure.

The independent variables used in the model estimation are presented in Table 5 as follows:

Table 5: Definitions of independent variables in the probit model

Variables	**Mean values**	**Standard deviation**
Age of household head (years)	43.38	9.54
Household income (Rp/month/household): Inc1 (Low income) = Rp. 1,500,001≥ Income≥ Rp.3,500,000; (1=yes) Inc2 (Middle income) = Rp.3,500,001≥Income≥ Rp.500,000; (1=yes) Inc3 (High Income)= Income ≥Rp. 5,500,001; (1=yes)	 0.275 0.33 0.395	 0.44 0.47 0.49
Total family size	3.71	1.30
Level of education of household head Elementary school (1=yes) Junior high school (1=yes) Senior high school (1=yes) University graduates (1=yes)	 0.12 0.22 0.50 0.14	 0.32 0.42 0.50 .35
Ethnicity: Bugis ethnic (1=yes) Makassar ethnic (1=yes) Other ethnic (1=yes)	 0.38 0.54 0.08	 0.48 0.49 0.27
Occupation: Officer (1=yes) Trader (1=yes) Service (1=yes)	 0.295 0.44 0.265	 0.45 0.49 0.44

Source: Author's calculation from field survey (2013)

As can be seen in Table 5, the independent variables used in the probit model include age, household income, total family size, level of education of household head, ethnicity and occupation. A continues variable is used for age and family size variables. A dummy variable is used for the categorical variables such as household income, level of education, ethnicity and occupation.

3.4 Descriptive analysis

A total of 200 beef offal consumers in Makassar were asked about their demographic characteristics such as age, family size, years of education, ethnicity, occupation and income. Table 6 displays the socioeconomic and demographic characteristics of beef offal consumers in Makassar, South Sulawesi Province, Indonesia. Approximately 21 per cent of the samples were between 20 and 35 years of age and around 57 per cent of the respondents were 36 to 51 years of age. The average age was 42.5 years old. In terms of family size, the average household size was 3.73 people.

The monthly household income was divided into three categories. Household income between Rp. 1,500,000 and Rp. 3,500,000 per month constituted 9 per cent of total respondents. Around 50 per cent of households had an income between Rp. 3,500,001 and Rp. 5,500,000, and 37.50 per cent of households had income of more than Rp. 5,500,001 per month.

Educational attainment was classified into three categories: elementary school graduates (11.5 per cent); secondary school graduates (74 per cent); and university graduates (14.5 per cent). Three types of occupations were identified. The first group were consumers who were working as officers for the government sector or in the private sector (29.5 per cent). The second group were consumers who worked as traders or entrepreneurs; 44 per cent of total respondents were in this group. The last group were consumers who worked in the service sector. In this study, service occupations were consumers who worked as traditional offal food sellers. They accounted for 26.5 per cent of total respondents.

Table 6: Socioeconomic and demographic characteristics of beef offal consumers in Makassar City

Characteristics	Per cent
Age classification	
20- 35	21.0
36-51	57.0
52 or older	22.0
Monthly household income	
Rp. 1,500,000≥Income≥Rp. 3,500,000	27.5
Rp. 3,500,001≥Income≥Rp. 5,500,000	33.0
Income≥ Rp. 5,500,001	39.5
Family size (number of people)	
1-2	25.0
3-5	48.0
6 or more	27.0
Respondent's level of education	
Elementary school	11.5
Junior high school	22.5
Senior high school	50.5
University graduates	14.0
Occupation	
Officer	29.5
Trader	44.0
Service	26.5
Ethnic group	
Bugis	38.0
Makassar	54.0
Other ethnic	8.0

Source: Field survey (2013)

People residing in Makassar city come from several ethnic groups. The main ethnic group of respondents were Makassar (54 per cent) and Bugis (38 per cent), with other backgrounds from Mandar, Sumatera, Java and Borneo make up the remaining 8 per cent. Most consumers with Makassar ethnic backgrounds were working as offal traditional food sellers and entrepreneurs and the remainder of the consumers with ethnical backgrounds generally worked as governmental officers or private company officers.

In terms of buying meat products, mostly imported products were sold in the supermarket and local products could be found in the traditional markets. In this study, from 200 total respondents, around 87.50 per cent of respondents bought local beef, 22 per cent bought imported beef, and 90 per cent of respondents bought local offal and 51 per cent bought

imported offal in a month (see Table 7). According to respondents, imported beef and offal were difficult to find in the market. As a result, the price of local beef and offal were very expensive.

Table 7: Type and amounts of beef and offal bought by respondents in Makassar City

Type of meat	Number of respondents bought	Per cent (%)
Local beef	175	87.50
Imported beef	44	22.0
Local offal	180	90.0
Imported offal	102	51.0

Source: Field survey (2013)

3.5 Results and discussions

The probit analysis for local and imported offal and beef is estimated by the Maximum Likelihood method. Table 8 presents the results for local and imported offal, and local and imported beef expenditures and Table 9 reports the marginal effects from probit analysis. The Maximum Likelihood estimation shows that all equations are significant at a 1% level of probability based on the log likelihood chi-square statistic.

In this study, several socioeconomic and demographic factors are analysed using probit model. It is known that demographic factors can have a large effect on the way marketers identify, target and communicate with their customers. When developing effective marketing strategies, marketers need to consider changes in population size, age structure, workforce participation, education and income levels (Quester 2007, p. 389).

The next section will discuss the probit model results of socioeconomic and demographic factors on offal and beef demand in Makassar which are summarised in Table 8 and Table 9.

3.5.1 Age

Age is found to be positive and statistically significant at the 5% level for imported offal. The marginal effect suggests that the probability of buying imported offal increases by 1.2 percentage points for every additional year of the consumers' age. The result shows that the probability of consumers purchasing imported offal increases as their age increases. Although the age coefficient is significant, it has a very negligible effect since the marginal effect is very low.

Age is found, not statistically significant in the model estimated for local offal and beef and imported beef expenditures. However, the negative sign of the Age coefficients shows that elderly people tended to reduce their consumption of local offal and beef. In contrast, the positive sign shows that consumers tend to increase their consumption of imported beef as their age increases.

Table 8: The probit estimation results for offal and beef (local and imported)

Variable	Local offal	Imported offal	Local beef	Imported beef
Constant	1.506 (1.312)	-3.936 (1.081)***	1.169 (1.040)	-1.367 (0.983)
Age	-0.0185 (0.019)	0.030 (0.012)**	-0.005 (0.017)	0.009 (0.015)
Inc1	1.006 (0.453)**	-0.666 (0.260)**	0.189 (0.391)	-0.536 (0.307)*
Inc2	0.151 (0.336)	-0.418 (0.251)*	-0.080 (0.277)	-0.555 (0.267)**
University graduates	-1.175 (0.514)**	0.895 (0.490)*	-1.370 (0.411)***	1.486 (0.425)***
Senior high school	-0.690 (0.452)	0.929 (0.367)**	0.262 (0.423)	0.230 (0.358)
Junior high school	-0.428 (0.454)	0.514 (0.382)	-0.181 (0.450)	0.262 (0.385)
Total family	0.097 (0.116)	0.156 (0.083)*	0.015 (0.113)	0.134 (0.103)
Bugis ethnic	0.652 (0.449)	1.084 (0.438)**	0.447 (0.343)	-0.826 (0.380)**
Makassar ethnic	0.846 (0.516)*	0.531 (0.424)	0.538 (0.451)	-0.594 (0.389)
Officers	-0.267 (0.396)	1.178 (0.307)***	-0.260 (0.401)	0.407 (0.324)
Traders	0.745 (0.460)*	1.367 (0.266)***	0.489 (0.434)	-0.062 (0.297)
Prob>chi2	0.0001	0.0000	0.0000	0.0000
Log pseudo likelihood	-47.0718	-104.637	-49.522	-81.769
Pseudo R-squared	0.2760	0.2450	0.343	0.2241
Wald chi-squared	37.39	70.12	56.60	49.55

Source: Author's estimate (2014)

Note: Figures in parenthesis represent the robust standard errors; * denotes significance at 10% level, ** denotes significance at 5% level, *** denotes significance at 1% level. ⊢ The reference category is *Inc3* ⊢The reference category is *other ethnic;* ⊣The reference category is *service*'s occupation; ⊢ The reference category is *Elementary school.*

Table 9: Marginal effects from probit analysis

Variable	Local offal	Imported offal	Local beef	Imported beef
Age	-0.0016 (0.0015)	0.012 (0.005)**	-0.0007 (0.002)	0.0025 (0.003)
Inc1	0.0652 (0.032)**	-0.258 (0.095)***	0.022 (0.042)	-0.122 (0.061)**
Inc2	0.0128 (0.0288)	-0.165 (0.097)*	-0.010 (0.036)	-0.130 (0.059)**
University graduates	-0.205 (0.147)	0.329 (0.152)**	-0.324 (0.135)**	0.507 (0.149)*
Senior high school	-0.063 (0.046)	0.357 (0.131)***	0.033 (0.055)	0.059 (0.092)
Junior high school	-0.046 (0.060)	0.201 (0.143)	-0.024 (0.066)	0.072 (0.112)
Total family	0.0086 (0.0097)	0.062 (0.033)*	0.002 (0.014)	0.034 (0.026)
Bugis ethnic	0.0521 (0.038)	0.409 (0.147)***	0.052 (0.037)	-0.193 (0.081)**
Makassar ethnic	0.083 (0.058)	0.209 (0.163)	0.071 (0.060)	-0.156 (0.104)
Officers	-0.026 (0.044)	0.433 (0.095)***	-0.035 (0.062)	0.113 (0.096)
Traders	0.063 (0.033)*	0.504 (0.083)***	0.060 (0.050)	-0.015 (0.075)

Source: Author's estimate from probit analysis (2014)

Note: Figures in parenthesis represent the standard errors, * denotes significance at 10% level, ** denotes significance at 5% level, *** denotes significance at 1% level.

3.5.2 Income

Income is one factor that affects the demand for a product and has a substantial impact on the consumption of that product (Layton 2005). In this study, low income is found to be positive and statistically significant at the 5 per cent level of probability in determining the consumers' decision to buy local offal. The positive marginal effect indicates that as households with low income increases then the household tends to increase the expenditure on local offal by about 6.5 percentage points. This indicates that consumers with lower income are more likely to buy local offal compared with consumers with higher income. According to Marti, Johnson and Mathews (2011) variety meats such as liver, heart, brains, kidney and tongue in some countries are considered delicacies and are the basis for many traditional dishes while in other countries, their consumption is associated with the low income population, where these products are used as an inexpensive way to obtain high-quality protein and nutrition.

The negative sign of the low and middle income coefficients show that households with low and middle incomes tend to decrease their expenditure on imported offal as their income increases. The marginal effect reveals that low income consumers decrease their expenditure on imported offal by 2.58 percentage points as their income increases. For middle income households, they reduce imported offal expenditure by 1.65 percentage points as their income increases. Since the Indonesian Government applied the policy in beef trade restrictions, imported offal is not distributed as evenly, so consumers have limited choice and will expend more for local offal even though its price is higher than imported offal. This situation has also occurred with imported beef expenditure, where households with low and middle income will lower their expenditure on the product as their income increases by 12.2 percentage points and 5.55 percentage points respectively. This study reveals that households in Makassar bought more local offal than imported offal, and more local beef than imported beef in their meat budget share expenditures (see Chapter 4, Table 10). This may have occurred because imported beef and offal were very limited in the local market.

This can be explained by the reality that currently the price of local beef and offal is very expensive in Indonesia due to limited local production. This finding is consistent with Permani (2013b) who found that as Indonesia's income per capita increases, domestic demand for imported beef increases. The study implied that there was a shock in terms of relative import quantity, because of the present government's decision to cut the beef import quota. This would have long-term impacts on domestic beef prices. By imposing trade barriers, beef prices will increase due to supply shortages and in the long run, the ability to meet demand will depend on productivity growth rates.

Throughout the year 2013, the price for beef and offal in Indonesia was around AUS$ 10/kg (Rp. 100,000) and AUS$7 (Rp. 70,000/kg) respectively. This situation was very difficult for middle and low income households and also medium and small enterprises which depended on the offal business as a core source of income.

3.5.3 Level of education

Level of education is also another factor that influences a consumer's decision to buy meat products. In the local offal equation, the university graduates coefficient is found to be negative and statistically significant at the 5% level. The marginal effect shows that the probability of expenditure on local offal decreases by 2.05 percentage points for consumers who graduated from university. In contrast, in the imported offal equation, the university graduates and senior high school constants are found to be positive and statistically significant at the 10 per cent level. The probability of expenditure on imported offal increases by 32.9 percentage points if the consumers were university graduates. Similarly, the probability of buying imported offal increases by 35.7 percentage points for consumers who graduated from senior high school.

Various studies on beef consumption in Indonesia have shown mixed results about the level of education. Ilham (2001) found that level of education was not statistically significant in beef consumption in Indonesia. However, Yusri (2012) revealed that the household's level of education was statistically significant in beef expenditure. In other studies, Guenther et al. (2005) found that consumers with a high level of education were associated with a lower likelihood of consuming beef and pork. Knowledge and attitudes about diet and meat products also influenced choices, especially the likelihood of consuming specific types of meat. Finally, the study found that socioeconomic and demographic factors, knowledge and attitudes toward diet and meat products were strong predictors of the probability of choosing particular types of meat and the amounts eaten.

For the local beef equation, university graduates figures are negative and statistically significant at 1 per cent level in the model. The negative marginal effects of university graduates variable imply that consumers with a university degree will reduce their probability of local beef expenditure by 32.4 percentage points. However, for imported beef expenditure, the probability of consumers buying imported beef will increase by 50.7 percentage points if the consumers have a university degree.

3.5.4 Family size

The number of family size is yet another factor in influencing the amount of total expenditure. As household size increases, the probability of buying the product also increases. In this study, only imported offal expenditure equations are found to be positive and statistically significant. The marginal effect shows that as household size increases, the probability of buying imported beef increases by 15.6 percentage points.

However, all other equations have also shown positive signs of the total family size which means as household size increases, the probability of purchasing local offal and beef and imported beef would also increase.

3.5.5 Ethnicity

Respondents' ethnicity shows a significant role in the local and imported offal and imported beef expenditures. Results show that consumers from the Makassar ethnic group were more likely to buy local offal compared with other ethnic groups. The marginal effect confirms that consumers from Makassar ethnic background increases their expenditure on local offal by 8.3 percentage points. Bugis ethnic cohorts are also positive and statistically significant at 1 per cent level of imported offal expenditure and at a 5 per cent level of imported beef expenditure. The marginal effect of imported offal implies that consumers from the Bugis ethnic group increases their expenditure by 40.9 percentage points.

These findings show that local and imported offal are important products for communities in Makassar. Communities in Makassar City have their own traditional foods (called *Coto Makassar, Sop Saudara* and *Pallubasa*) that use offal as primary ingredients. In addition, this study suggests that the expenditure of offal is influenced by cultural factors which must be taken into account by suppliers, producers and policy makers.

3.5.6 Occupation

Occupation is an added factor that affects the expenditure on local and imported offal, and local and imported beef. This study has identified three types of occupations: officers (government and private), trade and the service sector. With regards to the service sector in particular, most households were working as traditional food sellers. For local offal expenditure, this cohort of trade workers shows a positive and significant result. The marginal effect of 0.063 suggests that the probability of purchasing local offal would increase by 6.3 percentage points if the consumer's occupation is selling beef and offal.

The probability of purchasing imported offal increases by 43.3 percentage points if the head of the household works in an officer role. Similarly, if the household head is working as a trader, the probability of buying imported offal increases by 50.4 percentage points. The positive and highly marginal effects shows that more imported offal would be bought by officers and entrepreneurs in Makassar.

3.6 Chapter Summary

This chapter has explored the study findings for the impact of socioeconomic and demographic factors on consumer decision making toward local and imported offal, and local and imported beef expenditures in Makassar City, Indonesia. In order to achieve these objectives, a binary probit model is employed with Maximum Likelihood Estimation. The findings of this study reveal that several important factors significantly affect the expenditure on local and imported offal and local and imported beef. Six factors are considered; age, income, ethnicity, years of education, occupation and family size. The location where consumers purchased beef and offal is not notable in the estimation, because several respondents did not purchase beef and offal in the same market. On occasion, a customer purchased imported offal in a supermarket, and local beef in a traditional market.

It is found that age is a significant factor in the decision to buy imported offal. As consumer age increases, the probability of buying imported offal also increases. In addition, income level has a significant impact on the expenditure of local and imported offal and imported beef. The results imply that the higher income level of consumers, the more likely the low income earners would be to buy local offal. Conversely, the higher the income level of low income consumers, the less likely the consumers would be to buy imported offal and beef. This study implies that households shifted budget expenditure from imported offal and beef to local offal and beef due to limited imported offal in the market. Since the Indonesian Government has reduced the number of imported beef and offal proportions, the price of local beef and offal in Indonesia has skyrocketed and people attempt to find cheaper products for consumption. Imported offal has been difficult to locate in traditional markets in Makassar and as a result, the price for beef and offal increases almost daily.

The size of the household is associated with the probability of buying imported offal. Positive marginal effects in the equations show us that as household size increases, the probability of purchasing imported offal and beef increases. In terms of particular occupations, those working as traders are more likely to purchase local and imported offal, and officers are more likely to purchase imported offal.

The level of education affects expenditure on local and imported offal and local and imported beef. The positive marginal effects indicate the probability of purchasing imported offal and beef increases with every additional year of schooling. The negative marginal effects indicate that the probability of purchasing local offal and beef decreases with every additional year of schooling.

In terms of ethnicity, the probability of buying imported offal, and local and imported beef increases with the Bugis and Makassar ethnic communities. It is clear that Bugis and Makassar communities have their own traditional foods that use offal and beef as main ingredients. Therefore, the likelihood of these ethnic groups purchasing offal and beef in this case would increase. This study suggests that socioeconomic and demographic factors must be taken into account by the suppliers and producers in developing market strategies in Makassar City.

In light of the findings, this research would be useful to beef offal consumers, retailers, importers, exporters and policy makers. Probit model simulations reveal that factors, that affect the expenditure on imported offal include; age, income, family size, ethnicity and occupation. This could explain why imported offal is one of the most important meat products in Makassar. Furthermore, global market opportunities for imported offal and beef in Makassar will continue to rise due to limited local production, local food culture and population growth. Sustainable local beef production with intensive production practices and local community training, evaluation and assessment in international trade policy for beef and offal products are needed for satisfying local supply for offal and beef with affordable prices.

The next chapter will discuss the study results on the offal and beef demand system, application of the linear approximation of almost ideal demand system (LA/AIDS).

4. CHAPTER 4. OFFAL AND BEEF DEMAND SYSTEM, APPLICATION OF LINEAR APPROXIMATION OF ALMOST IDEAL DEMAND SYSTEM (LA/AIDS)

4.1 Preview

Chapter 3 has described the findings and discussion of research study objective one, which focused on the socioeconomic and demographic factors of beef and offal demand in Makassar City.

Chapter 4 presents the results and discussion of research study two. The study will explore the offal and beef demand system in Makassar with the application of the LA/AIDS model. This chapter is organised as follows. Section 4.2 will depict the introduction of the study. Section 4.3 outlines the methodology of the study, which includes data sources, theoretical approach and the LA/AIDS model analysis. Section 4.4 describes the study results and discussion. Finally, Section 4.5 will outline the summary of the study.

4.2 Introduction

In Indonesia, studies on meat supply and demand have been conducted extensively, but none of those studies considered offal products. With positive growth of the population, the demand for cattle offal in Indonesia continues to increase. The reasons are: the price of cattle offal is lower than beef meat prices; many Indonesians use beef offal as the main ingredient for traditional dishes; and many small companies sell processed food such as crackers, meatballs and sausages using offal products which are affordable for consumers on all income levels. Marti, Johnson and Mathews (2011) explained that variety meats such as liver, heart, brains, kidneys and tongue in some countries are considered delicacies and are the basis for many traditional dishes; in other countries, their consumption is associated with the low-income population. Kamenski (2006) identified that offal products are utilised as an affordable way for people to gain a high nutritional value from the high proteins in offal. Van Heerden and Morey (2014) also pronounced that offal comprises crucial food components at low cost. In South Sulawesi province in Indonesia, beef offal is highly sought after. Traditional dishes prepared regularly within the communities of South Sulawesi, are comprised of offal as key elements to the recipes. As the population grows, the demand for beef offal will also increase and in Makassar, beef offal is acquired from local cattle producers and imported offal. The local government has opted to import beef offal at an average of 15 tonnes per day (Saleh 2011).

The study of Saleh (2011) found that consumers in Makassar are gradually shifting away from local to imported cattle offal because of the higher price of local offal and limited local production. In addition, factors that cause friction between demand for local offal and imported Australian beef offal are: product quality, affordability and accessibility and

consumer willingness to try a different product. Meanwhile, since the beef self-sufficiency program released in 2011 (Food and Agricultural Directorate 2010) it has been very difficult to find imported products in the market.

Since domestic demand is greater than supply, it is important to have recent estimates of parameters such as demand elasticities of beef and offal. Therefore, this study investigates the demand for beef and offal, both locally and imported, in Makassar City using the LA/AIDS analysis. Mostly, previous meat demand studies in Indonesia did not consider zero expenditure on consumer outlays (Hutasuhut et al. 2001; Ilham 2001; Muzayyanah & Maharjan 2011). In order to avoid biased parameter estimates, the inclusion of zero expenditure or consumption in the estimation must be considered (Heien & Wesseils 1990; Jabarin & Al-Karablieh 2011).

There are two stages in estimating demand elasticities in this study. Firstly, the major socioeconomic and demographic factors responsible for changing market shares between local and imported offal, are identified by using a probit model (see Chapter 3). At the second stage, from the probit analysis, an Inverse Mills Ratio (IMR) is computed. The IMR ratios are then included in the LA/AIDS system to estimate the beef offal demand elasticities. This study uses the Laspeyres price index in order to avoid the problem of endogeneity in the model. The LA/AIDS will be estimated using the Zellner's Seemingly Unrelated Regression (SUR) procedure to improve the efficiency of estimates (Flake & Patterson 1999; Henningsen & Hamann 2007; Huang & Show 2011; Zellner 1962).

The empirical demand system of offal and beef is essential in structuring and developing agricultural policies in terms of accessibility, availability, stability, and quality; in this case restructuring beef and offal policies. Accordingly, the results of this study provide policy makers, producers, retailers, importers and exporters with information, analysis and recommendations that are expected to contribute to the availability and sustainability of the offal and beef market based on the household demand elasticities estimates.

4.3 Methodology

The second objective of this study is to estimate demand parameters or the elasticity of beef and offal in Makassar with the application of the LA/AIDS model. The LA/AIDS model estimates the own-price elasticity, expenditure elasticity and cross-price elasticity of beef and offal consumption. The next part will discuss the theoretical approach and the LA/AIDS model used in the study estimation.

4.3.1 Data sources

For the LA/AIDS study, the data used is similar to the data in the probit analysis (See Chapter 3). Additional information collected in the survey, includes offal consumers' income and their weekly expenditures on different types of offal and beef (local and imported).

All data is analysed using STATA software version 13 (See Appendix B and Appendix D).

4.3.2 Theoretical approach

The linear approximation of the almost ideal demand system (LA/AIDS) model is used to analyse beef offal demand in Makassar. Because of its simplicity, the linear approximation almost ideal demand system (LA/AIDS) is popular for empirical studies amongst agricultural economists (Buse 1994). Several food demand studies have applied the complete demand system in their studies (Cai et al. 1998; Flake & Patterson 1999; Heien & Pompelli 1988; Henneberry & Hwang 2007; Huang & Show 2011; Hutasuhut et al. 2001; Tshikala & Fonsah 2012).

The Cobb-Douglas utility function is the root of the AIDS model and reflects additive preferences between subsistence and above-subsistence levels of consumption (Pogany 1996). Models of consumer behaviour that are based on an underlying Cobb-Douglas type utility is occasionally called generalised linear (linear approximation) models.

The derivation of the AIDS model initiates an expenditure function, representing the Price Independent Generalised Logarithmic (PIGLOG) preference (Deaton & Muellbauer 1980). This preference is represented by the use of the cost or expenditure function which defines the minimum expenditure necessary to reach a specific utility level at a given price. The PIGLOG expenditure function is defined as:

$$log\ \ c(u,p) = (1-u)\ log\ \{a(p)\} + u\ log\ \ \{b(p)\} \qquad \textit{Equation 6}$$

Where function: *c (u, p)* for utility *u* and price vector *p*.

Specifying the PIGLOG expenditure function, we have:

$$log\ a\ (p) = \alpha_0 + \sum_k \alpha_k log p_k + \frac{1}{2}\sum_k \sum_j \gamma^*_{kj} log_{p_j} \qquad \textit{Equation 7}$$

$$log\ b\ (p) = log\ a(p) + \beta_0 \prod_k p_k^{\beta k} \qquad \textit{Equation 8}$$

The AIDS cost function is written:

$$log\ c\ (u,p) = \alpha_0 + \sum_k \alpha_k log p_k + \frac{1}{2}\sum_k \sum_j \gamma^*_{kj} log p_k log p_{j+} u\beta_0 \prod_k p_k^{\beta k} \qquad \textit{Equation 9}$$

Multiplying both sides by $p_i/c(u,p)$ we find:

$$\frac{\vartheta log c(u,p)}{\vartheta log p_i} = \frac{p_1 q_1}{c(u,p)} = w_i \qquad \textit{Equation 10}$$

Hence, logarithmic differentiation gives the budget share as a function of price and utility:

$$w_i = \alpha_0 + \sum_j \gamma_{ij} log p_j + \beta_i u \beta_0 \prod p_k^{\beta_k} \qquad \textit{Equation 11}$$

Where:

$$\gamma_{ij} = \frac{1}{2}\left(\gamma_{ij}^* + \gamma_{ji}^*\right) \qquad \textit{Equation 12}$$

For a utility-maximising consumer, total expenditure *x* is equal to *c(u,p)* and inverting *u* as a function of *p* and *x*, the indirect utility function; we do this for equation (11) and substitute the result into the equation (12). Lastly, we have the budget share as a function of *p* and *x*, or the AIDS demand functions in the budget share form:

$$w_i = \alpha_o + \sum_j \gamma_{ij} log_{p_j} + \beta_i log\{x/P^*\} \qquad \textit{Equation 13}$$

Where:

$w_i = p_i q_i/x$ is the budget share of commodity *i*, p_i is the price and q_i is the quantity purchased

x = total consumer's expenditures on all goods in the system;

α_0 = the constant parameter;

γij = the price parameter;

β_i = the expenditure parameter;

p_j = the price of *jth* good

P^* = The Stone price index defined by:

$$ln\, P^* = \sum_i w_i \ln(P_i) \qquad \textit{Equation 14}$$

The almost ideal demand system relates the values of budget shares to a logarithm of total expenditure. The unrestricted estimation satisfies the adding-up restriction. The

homogeneity and symmetry restrictions may be tested by imposing restrictions. The linear approximation is widely used when expenditure or budget data is available (Deaton & Muellbauer 1980). This system corresponds with a well-defined preference structure given that it is derived from a specific cost function. It satisfies the axioms of choice exactly, and is compatible with aggregation over consumers. Homogeneity and symmetry restrictions are easily tested and imposed because it depends only on estimated parameters, and provides an arbitrary first-order approximation to any demand system. It aggregates perfectly over consumers, and its' functional form is consistent with known household data (Deaton & Muellbauer 1980).

Symmetry and homogeneity restrictions from demand theory correspond to prior information that is often imposed on flexible forms through equality restrictions on the parameters. The restrictions reduce the dimensionality of the parameter space when demand systems, based on these forms are estimated; the symmetry and homogeneity restrictions provide considerable gains in degrees of freedom (Chalfant, Gray & White 1991).

The demand elasticities are measured based on the parameters estimated in the LA/AIDS model. Price elasticity is defined as the percentage changes in quantity demanded for some good with respect to a 1% change in the price of the good (own-price elasticity) or of another good (cross price elasticity). The resulting model, which is referred to as the LA/AIDS will be estimated using Zellner's Seemingly Unrelated Regression (SUR) procedure (Flake & Patterson 1999; Henningsen & Hamann 2007; Huang & Show 2011; Zellner 1962).

The SUR has been used in many areas of economics and sciences, and has contributed to the development of estimation, testing prediction and other inference techniques (Zellner & Ando 2010). The SUR model, proposed by Zellner (1962), can be viewed as a special case of the generalised regression model, however, it does not share all of the features or problems of other leading special cases (e.g. models of heteroskedasticity or serial correlation). In the SUR estimation, there is a little reason to test the null hypothesis and its parameters are easy to estimate consistently (Dwivedi & Srivastava 1978; Zellner 1962).

The efficiency gain of SUR to OLS (ordinary least squares) is a decreasing function of correlation of variables across equations. The SUR is potentially useful in dealing with multicollinearity within an equation. The occurrence of time trends in data is an example of a major cause of multicollinearity. If this happens, variable correlation across equations will essentially mirror that within equations. Conversely, if the variables are highly correlated, in between but not within equations, there may be little advantage in using SUR instead of OLS (Binkley 1982).

By applying the SUR with parameters constrained across equations, we are able to obtain a complete set of demand information, including own, cross-price, and food expenditure elasticities by excluding the quality effects from the estimates. The adding-up restriction is automatically satisfied when one equation is excluded from the system. However, homogeneity and symmetry restrictions are imposed in estimation (Flake & Patterson 1999).

The linear SUR model involves a set of regression equations with cross-equation parameter restrictions and correlated error terms having differing variances. Algebraically, the SUR model is given by:

$$\boldsymbol{y}_j = X_j \boldsymbol{B}_j + \boldsymbol{u}_j, \mathrm{j} = 1, \ldots, \mathrm{m}$$
$$\text{with} \quad E\left[\boldsymbol{u}_i \boldsymbol{u}_j'\right] = \begin{bmatrix} \omega_{ij} I & (i \neq j) \\ \omega_i^2 I & (i = j) \end{bmatrix} \qquad \textit{Equation 15}$$

Here $\boldsymbol{y}_j$ and $\boldsymbol{u}_j$ are *n x 1* vectors, X_j is the *n x* p_j matrix of rank p_j, and β_j is a p_j-dimensional coefficient vector. As shown in the SUR model, the equations of the model have different independent variables and error term variances. The SUR model permits error terms in the different equations to be correlated (Zellner & Ando 2010).

Next, in matrix form, the SUR model in Equation 15 is expressed as:

$$\boldsymbol{y} = X\beta + \boldsymbol{u}, \qquad \boldsymbol{u} \sim N(0, \Omega \otimes I) \qquad \textit{Equation 16}$$

Where N $(\mu, \sum)$ denotes the normal distribution with mean $\boldsymbol{\mu} = (\mu_1, \ldots, \mu_m)'$ and covariance matrix $\sum$, $\otimes$ is the tensor product, Ω is an *m x m* matrix with the diagonal elements $\{\omega_1^2, \ldots, \omega_m^2\}$, and the off-diagonal *ij*th elements are ω_{ij}, $\boldsymbol{y}' = (\boldsymbol{y}'_1, \ldots, \boldsymbol{y}'_m)$, $X = diag\{X_1, \ldots, X_m\}$, $\boldsymbol{\beta}' = (\boldsymbol{\beta}'_1, \ldots, \boldsymbol{\beta}'_m)$, $\boldsymbol{u}' = (\boldsymbol{u}'_1, \ldots, \boldsymbol{u}'_m)$.

4.3.3 The LA/AIDS model

In this study, there are two steps in estimating the beef and offal demand system. In the first step, the Inverse Mill Ratio (IMR) is projected after probit regression estimation (Heien & Wesseils 1990). The Inverse Mill Ratio is estimated by the collected data of zero expenditures. Heien and Wesseils (1990) concluded that the Heckman procedure deals with the inclusion of zero consumption in the analysis and therefore avoids biased parameter estimates with the IMR, and then uses all observations in the second step.

Heckman (1979) established an approach to solve the problem of zero consumption. Heckman computed the IMR after Probit regression estimations with the Maximum Likelihood System. The IMR is the ratio of the estimates of standard density function on the estimates of standard normal accumulative distribution function.

In the second stage, the estimated variables which represents the unobservable influence on the participation decision, are then included in the AIDS model (see Equation 13) to estimate the beef offal demand elasticities as an explanatory variable. Following Kankwamba et al. (2012), the Inverse Mills Ratio is computed as:

$$IMR = \hat{\lambda} = \frac{\varphi(\beta' x)}{[1 - \phi(\beta' x)]} \qquad \textit{Equation 17}$$

Where φ is the standard normal probability density function, ϕ is the standard normal cumulative distribution function, x is explanatory variables including socioeconomic and demographic variables, and β is appropriate parameter vector. Then, in order to increase the model's efficiency, an extension of the above model which uses all observations in the second step of the estimation, and modifies the IMR for zero observations as:

$$IMR = \hat{\lambda} = \frac{-\varphi(\beta' x)}{[1 - \phi(\beta' x)]} \qquad \textit{Equation 18}$$

In many previous studies, the Stone index (equation 14) was suggested for the LA/AIDS model and used in numerous studies. The model that uses Stone's index is called the "linear approximate AIDS (LA/AIDS)" (Green & Alston 1990).

Moschini (1995) suggested using a Laspeyres price index rather than the Stone index in order to overcome the measurement error. The Stone price index may cause inconsistent estimations as it is not invariant to changes in unit measurements. Furthermore, the Laspeyres price index avoids the problem of endogeneity in the model and could decrease the heteroscedasticity (Jones et al. 2003; Kuo, Liu & Chen 2014). The Laspeyres price index is calculated using the mean budget shares on commodities. Hence, the Laspeyres price index becomes a geometrically weighted average of prices, as follows:

$$\ln (P^{LPI}) = \sum_i \overline{w_i} \ln(P_i) \qquad \textit{Equation 19}$$

The insertion of equation 18 and equation 19 into equation 13, will yield a modified LA/AIDS function with Laspeyres price index used in this study, as follows:

$$w_i = \alpha_o + \sum_j \gamma_{ij} lnp_j + \beta_1 ln\{x/P^{LPI}\} + IMR \qquad \textit{Equation 20}$$

Finally, the offal and beef demand system estimated in this study involves three types of meat with their respective prices and expenditures. The three equations namely:

$$wlocoffal = \alpha_0 + \beta_{i2} lnplocoffal + \beta_{i2} lnpimpoffal + \beta_{i3} lnpbeefloc + \delta_i lnexpend + IMR \qquad \textit{Equation 21}$$

$$wimpoffal = \alpha_0 + \beta_{i2} lnplocoffal + \beta_{i2} lnpimpoffal + \beta_{i3} lnpbeefloc + \delta_i lnexpend + IMR \qquad \textit{Equation 22}$$

$$wlocbeef = \alpha_0 + \beta_{i2} lnplocoffal + \beta_{i2} lnpimpof + \beta_{i3} lnpbeefloc + \delta_i lnexpend + IMR \qquad \textit{Equation 23}$$

Where *wlocoffal* is the budget share of local offal, *wimpoffal* is the budget share of imported offal, *wlocbeef* is the budget share of local beef, *lnplocoffal* is the price of local offal (natural log), l*npimpoffal* is the price of imported offal (natural log), *lnpbeefloc* is the price of beef local (natural log), $\delta lnexpend$ is the total expenditure (natural log) and *IMR* is the inverse mills ratio, α_0, β_i, and δ_i are the unknown parameters to be estimated. With homogeneity, symmetry and adding up restrictions imposed, the system of equation 20 is estimated jointly using Zellner's Seemingly Unrelated Regressions.

The demand functions for offal are formulated according to the linear approximation of the almost ideal demand system (LA/AIDS) specification, where commodity *i*'s share of the total commodity group budget can be derived. The theoretical demand restrictions in terms of adding up, homogeneity in prices and income, and the symmetry of cross effects of demand functions are given below:

$$\text{Adding} - \text{up is satisfied if} \sum_{i=1}^{n} \alpha_0 = 1 \;\; \sum_{i=1}^{n} \gamma_{ij} = 0 \,; \;\; \sum_{i=1}^{n} \beta_i = 0 \qquad \textit{Equation 24}$$

$$\text{Homogeneity is satisfied if} \sum_{j} \gamma_{ij} = 0 \qquad \textit{Equation 25}$$

$$\text{Symmetry is satisfied if} \, \gamma_{ij} = \gamma_{ji} \qquad \textit{Equation 26}$$

Theoretical demand restrictions are maintained when each demand model is estimated using SUR techniques (Zellner 1962).

Because the conditional demand system is expressed as a budget share, one equation has to be dropped from the system. Excluding one equation automatically implies adding-up restrictions. Accordingly, in this study, three equations in the model are included consisting of the four beef offal types which are local and imported offal, and local and imported beef.

The Marshallian demand elasticities are computed using estimated parameters of the LA/AIDS model (Hayes, Wahl & Williams 1990). The own-price, cross-price and expenditure elasticities are computed with the following equations:

$$e_i = -1 + \frac{\gamma_{ii}}{\overline{w}_i} - \beta_i \qquad \textit{Equation 27}$$

$$e_{ij} = \frac{\gamma_{ij}}{\overline{w}_i} - \beta_i \left(\frac{\overline{w}_j}{\overline{w}_i} \right) \qquad \textit{Equation 28}$$

$$e_{ii} = \frac{\beta 1_i}{\overline{w}_i} + 1 \qquad \textit{Equation 29}$$

Where e_i is the own price elasticity, e_{ij} is the cross price elasticity, e_{ii} is the expenditure elasticity, Y_{ii} is the coefficient of the equation *i* on price of commodity *i*, Y_{ij} is the coefficient of the equation *i* on price of commodity *j*, $\overline{w}_i$ is the mean of the share of the commodity *i*, and $\overline{w}_j$ is the mean share of the commodity *j*.

4.4 Results and discussions

4.4.1 Analysis of Linear Approximation of Ideal Demand System (LA/AIDS) model

Analysis on offal and beef demand is estimated using the Seemingly Unrelated Regression (SUR) method (Zellner & Ando 2010). A symmetry and homogeneity restriction from demand theory is imposed on flexible forms through equality restrictions on the parameters. In order to avoid the singularity problem, one of the share equations is released from the system, which is the imported beef share equation. Excluding one equation automatically implies the adding-up restrictions and the omitted share equation can be recovered from the adding-up conditions (Jabarin 2005). Homogeneity, symmetry and adding-up restrictions have been implemented in the LA/AIDS estimation model due to the demand theory condition. The results of the estimates of the LA/AIDS model with the SUR method are presented in Table 10.

As indicated previously in Chapter 3, the results of the probit model are used to compute the Inverse Mills's Ratios (IMR), which are then used as explanatory variables in estimating the modified LA/AIDS model. The IMR for each commodity is included to correct selectivity bias. All commodities show positives and statistically significant coefficients at the 1% significance level for the IMRs. This result implies that if the zero consumption problems are ignored, there will be a strong sample selection bias.

In Table 10, we can see that the mean budget expenditure share for local offal is 40 per cent, imported offal is 17 per cent, local beef is 37 per cent and imported beef is 5 per cent. As a whole, Makassar people spent more on offal products than beef in their budget expenditures. It is clear that Makassar people also use offal as focal components in their local dishes; therefore the availability of offal products in the market is necessary.

The estimation results indicate that the expenditure parameter of local offal is negative and statistically significant at the 10 per cent level, suggesting that local offal is a necessity good. Similarly, imported offal has a negative expenditure coefficient and could be categorised as a necessity good. Conversely, local beef has a positive expenditure coefficient signifying that local beef is a luxury good.

For local offal budget expenditure, price of imported offal is negative and statistically significant for the proportion of local offal expenditure. This shows us that if the price of imported offal increases, the demand of local offal will decrease. Offal is one of the most important beef products in Makassar, so if the price of imported offal increases or decreases, the demand for local offal will also be affected.

Table 10: The parameter estimates of the LA/AIDS model

Independent variables	Type of expenditure			
	Local offal	**Imported offal**	**Local beef**	**Imported beef**
Price of local offal	0.210 (0.133)	-0.220 (0.066)***	0.009 (0.182)	NA
Price of imported offal	-0.220 (0.066)***	-0.314 (0.042)***	0.535 (0.095)***	NA
Price of local beef	0.009 (0.182)	0.535 (0.095)***	-0.544 (0.270)**	NA
Expenditure	-0.059 (0.035)*	-0.005 (0.044)	0.089 (0.060)	NA
IMR	0.212 (0.033)***	0.025 (0.005)***	1.181 (0.077)***	NA
Mean budget shares	0.40	0.17	0.37	0.05

Source: Author's estimate (2014)
Note: Figures in parenthesis represent the standard errors, * denotes significance at 10% level, ** denotes significance at 5% level, *** denotes significance at 1% level.

The price coefficient of local beef is positive and statistically significant, which means that if the price of local beef increases, the demand for local offal will also increase. People will choose to purchase local offal if the local beef price increases. Likewise, the price of expenditure coefficient is negative and statistically significant meaning that if family income increases, the expenditure on local offal will decrease. For imported offal expenditure, price of local offal is negative and statistically significant. It means that if the price of local offal increases, the demand of imported offal will decrease.

4.4.2 Analysis of elasticity estimates

The estimated parameters in the LA/AIDS model are used to calculate demand elasticities. The calculated elasticities are presented in Table 11. Based on the value of own price elasticities, all meat products are negatives. Imported offal has the highest price elasticity (-2.884) followed by local beef (-2.553) then local offal (-0.416). All commodities have negative own-price elasticities (inelastic elasticities or irresponsive to changes in price), this means consumers would not change their demand for offal and beef (local and imported) as prices go up. Since the own-price elasticities are less than one, indicating the

lack of elasticity, the consumption will not be easily influenced by price (Huang & Show 2011).

In this study, the uncompensated price elasticities are considered. The table shows clearly that in the case of a 1% increase in offal and beef price, the demand for imported offal will reduce by 2.888%; the demand for local beef will reduce by 2.553%; and the demand for local offal will decrease by 0.416%. In line with this, it is possible to say that consumers are less responsive to price changes in beef and offal.

Table 11: Calculated elasticities of the LA/AIDS model

	Local offal	**Imported offal**	**Local beef**
Local offal	**-0.416**	-0.702	-1.344
Imported offal	1.125	**-2.844**	-3.310
Local beef	0.428	-0.907	**-2.553**
Expenditure	0.852	0.966	1.239

Source: Author's estimate (2014)
Note: The bold values are own price elasticities. Others are cross price elasticities.

This means that consumer would continue to purchase offal and beef products despite price increases. We could say that both imported and local offal and beef are inelastic due to lack of substitute's products (See Pindyck 2013, pp. 33-5). These two types of meats are significant in Makassar. People use offal and beef as central ingredients in their traditional dishes and as specific foods, which could not be replaced with fish or chicken. Traditional food such as *coto Makassar* and *sop saudara* are considered favourite foods in Makassar.

Expenditure elasticity is calculated to indicate whether the demand or expenditure of a product would increase or decrease as consumers' income increases or decreases. In this study, the expenditure elasticity is positive for all types of expenditures. Therefore, the demand for both local and imported offal and beef can be expected to increase as income increases. Thus, if there is an increase in income this will cause an increase in the demand of the products (Hutasuhut et al. 2001).

For local offal expenditure, assuming all the variables are constant, the increase of household income by 1% would lead to the increase of local and imported offal expenditures by 0.852% and 0.966% respectively. This result implies that offal in Makassar could be considered a normal product because when income increases the demand for this product increases. Likewise, local beef has positive expenditure elasticity, therefore consumers would increase their expenditure on local beef by 1.239% if their income increases by 1%, assuming all the other variables are constant. Local beef could be considered as a luxury good because the expenditure elasticity is greater than 1. Similarly, Hutasuhut et al. (2001) found that meat groups comprise beef, buffalo meat and trimmings and expenditure elasticities were found to be positive which implies that demand for these meat groups can be expected to increase as income increases. Hence,

when the total expenditure of beef and offal increases, the consumption of local and imported offal and beef also increases. These results show us that all of the meat products examined are normal goods.

Cross price elasticity coefficient reveals whether a good or service is a substitute or a complement. If there is a close substitution the cross price elasticities will be positive as a price of good *i* will make the consumers substitute towards good *j*. If *i* and *j* are complementary goods the cross-price elasticity will be negative. As can be seen from Table 11, the cross-price elasticity between local and imported offal is either negative or positive. Local and imported offal can be substituted, indicating when the price of local offal increases, the Makassar people will choose to purchase imported offal. Imported offal and local beef are complementary possibly because particular offal parts are preferred by the Makassar people and cannot be substituted. Similarly, local offal and beef are complementary. In general, offal and beef are complementary, perhaps because offal is a specific product for Makassar people, which they use as a primary ingredient in their traditional foods. Local producers and exporting countries should have marketing and pricing strategies in Makassar due to high demand of the products. The pause of imported beef and offal will have a negative impact on the beef cattle population in Indonesia because of the number of calves born and life will not be balanced by the number of cattle slaughtered (Purba & Hadi 2012). Reducing import quotas has also impacted the Australian beef industry. For instance, Australian live cattle exports have fallen by almost 50 per cent since 2010. In addition, the Indonesian Government should stabilise beef and offal prices and maintain the sustainability of meat products in the country with efficient trade policies of imported beef and offal.

4.5 Chapter summary

This chapter has described the determinants of change in demand for offal and beef, local and imported. The study uses a probit model and the linear approximation of the Almost Ideal Demand System (LA/AIDS). Firstly, the probit model analyses the determinants of offal and beef expenditures. Secondly, the LA/AIDS model estimates the demand model for offal and beef and finally, Uncompensated or Marshallian is calculated using the parameter estimates of each demand model. The own price elasticity, cross-price and expenditure elasticities of the commodities are computed and the elasticity calculations in the study are consistent with the demand theory. All goods have negative own-price elasticities and all estimated expenditure elasticities are positive.

This research emphasises that the inclusion of zero consumption observations and demographic variables from probit analysis, and using the IMR as explanatory variables in estimating the modified LA/AIDS model, improves the estimation results. All commodities show positives and statistically significant coefficients at the one per cent significance level for the IMRs. This result implies that the inclusion of zero consumption must be taken into account in the estimation, in order to avoid a strong sample selection bias.

Factors that determine the expenditure of local offal in Makassar are income and occupation. For imported offal expenditure, it is influenced by age, income, family size,

ethnicity and occupation. Local beef expenditure is influenced by ethnicity and years of schooling and finally, imported beef expenditure is influenced by family size, ethnicity, years of schooling and occupation.

The empirical results of this study suggest several interesting points with regards to traders, policy makers, producers and researchers in how consumers respond if there is a change in the price of the commodities and in household income based on expenditure elasticity. Firstly, the inelastic own-price elasticities of all meat items studied in this research suggest that any changes in the prices of these meat items could have a significant shift in beef and offal expenditures. Secondly, positive expenditure elasticities for all meat items in this study suggest that households in Makassar consume more offal and beef (local or imported) as their income increases. The combination of the inelastic own-price elasticity and the elastic expenditure should encourage local producers and exporting countries to produce and sell more offal and beef products in Makassar.

Further estimations that use more complete household panel data by means of different estimation approaches should be applied to a study of such change and future predictions of the livestock product consumption in Makassar City, and in Indonesia as a whole.

In order to get a deep understanding about offal consumption in Makassar, the following chapter will study and discuss consumer willingness to pay for imported offal in terms of quality, price, availability in the market and whether consumers want more imported offal in the local market or not.

The next chapter will discuss the study results on consumer WTP for imported offal in Indonesia and Australia's trade prospects.

5. CHAPTER 5. CONSUMERS' WILLINGNESS TO PAY FOR IMPORTED OFFAL IN MAKASSAR CITY, INDONESIA – AUSTRALIA'S TRADE PROSPECTS

5.1 Preview

Chapter 4 has discussed the results of research study two on the offal and the beef elasticity demand system in Makassar with the application of the LA/AIDS model.

In this chapter, the consumers' WTP for imported offal in Makassar City will be estimated, and the trade prospects of offal products for Australia in Indonesia will be discussed. In this study, the hedonic price method will be employed to estimate consumer WTP for imported offal. The organisation of this chapter is as follows, section 5.2 will provide the introduction or the background of the study, section 5.3 will explain the methodology of the study, including the data sources, theoretical approach and the hedonic price model analysis, section 5.4 will explore the study results and the discussion and the chapter will conclude with the chapter summary.

5.2 Introduction

In Indonesia, people consume offal very frequently. The price of offal is higher than that of neighbouring countries such as Australia. The offal price in Indonesia can reach around AUD 6/kg, while in Australia the price of offal such as liver is only AUD 1/kg. There are several factors that lead to very high demand for offal. Firstly, some provinces have traditional foods that use offal as a primary ingredient. Secondly, many small companies sell processed food such as crackers, meatballs and sausages using offal, products which are affordable for consumers of all income levels. Thirdly, offal is an alternative source of protein and the price of beef can be very high reaching AUD 10/kg. Offal products such as liver, lung and spleen are good sources of protein and very rich sources of iron (Subba 2002). Offal is a meat product consumed commonly in Indonesia and as a source of protein can be compared favourably against high priced beef. According to Stanley (2009) offal is a valuable, inexpensive protein in most developing countries with very poor populations, and offal is a staple of many diets.

The Indonesian Government has introduced a policy objective of achieving self-sufficiency in beef production by reducing the import quota of live cattle and beef products including offal. To work towards self-sufficiency, the Indonesian Government has developed a blueprint (Food and Agricultural Directorate 2010) which gives details of a number of trade and production policies and projections for domestic production and the importation of live and processed beef. The Indonesian beef self-sufficiency policy aims to reduce live cattle and beef product imports to approximately 42 per cent of 2010 levels

by 2014. Hence, due to these policy objectives, the volume of offal exported to Indonesia halved to about 6000 tonnes in 2011.

In South Sulawesi Province, especially in Makassar, the demand for offal is continuously increasing. The primary reason for this is that local communities use offal greatly in preparing traditional meals. Mostly, the Makassar City requires approximately 16 tonnes of offal per day, but only one tonne can be supplied from local slaughterhouses (Republika 2012). Because the quantity of imported offal in the market is limited and regulated, this has led to excessively high prices, limited offal products and unobservable offal products in the market. In Chapter 4, it is discussed that households in Makassar buy more local offal than imported offal, and more local beef than imported beef in their meat budget share expenditures. This may occur because imported beef and offal had been very limited in the local market. In contrast, studies of Saleh (2011) found that offal consumers in Makassar shifted their purchasing from local offal to imported offal. Therefore, it is important to know about the consumer WTP in terms of imported offal due to the Indonesian Government beef self-sufficiency program by 2014 which was set up in 2011.

Indonesia is a key market for Australian offal with a trade value of AUD 22.7 million in 2010 to 2011 (Department of Agriculture Fisheries and Forestry 2012). In 2007, Indonesia's imported offal products were 972,706 kg from Australia and 591,690 kg from New Zealand (Director of Community Veterinary 2009). Due to the Indonesian Government's self-sufficiency program for beef products, import permits allow between 90,000 and 100,000 tonnes of beef and offal. The Australian share of the market was 41,000 tonnes of boxed beef and 14,200 tonnes of offal in 2011. From this perspective, it is of vital importance to get a better understanding of consumer perception toward imported offal especially in Makassar City.

The objectives of this study are: (1) to estimate factors influencing consumer willingness to pay for imported offal (2) to calculate the value of marginal implicit price (marginal willingness to pay) for imported offal (3) to discuss Australia's trade prospects for imported offal. Socioeconomic and demographic factors will be incorporated with some product characteristics and market factors, on the retail prices paid by consumers.

Economic theory suggests that a consumer's WTP is influenced by their individual tastes and preferences, income and attitudes towards and perceptions of different types of products, as well as household and demographic characteristics (Cranfield & Magnusson 2003; Huang, Kan & Fu 1999; Radam et al. 2007). Knowledge about a product on behalf of its (potential) customer plays a crucial role in many key areas of marketing management such as designing optimal pricing policies or new product development (Breidert, Hahsler & Reutterer 2006).

This study provides new evidence of consumer willingness to pay for imported offal which has not been done before, particularly in Indonesia. The study will provide information, analysis and recommendations to retailers in the offal supply chain that are expected to contribute to the sustainability of the offal industry in Makassar.

5.3 Methodology

The study objective is to analyse consumer willingness to pay for imported offal and Australia's trade prospects. In this attempt, a hedonic price model is used. The theoretical approach and the model used are explained in the following section.

5.3.1 Data sources

In this study, the data used is similar to the data in the previous analyses (Chapter 3 and Chapter 4). For the study of consumer WTP for imported offal, 200 consumers were randomly selected in different traditional markets and supermarkets. Then, this total sampling was reduced from 200 total sample size based on consumer expenditure on imported offal and only 102 consumers were selected as respondents in the WTP analysis which represented imported offal buyer in Makassar City. Respondents were asked about the amount and the price of imported offal that they bought. In the questionnaire, respondents were also asked to determine several factors such as the quality, price and availability of imported offal in the market and indicate their attitude toward free trade or additional imported offal in the market. Respondents gave indications of whether they agreed or disagreed for each factor.

Information related to respondents' socio-demographic characteristics such as age, income and years of education were also included in the questionnaire and the WTP analysis.

The main purpose of the survey was to collect data on the actual individual willingness to pay for imported offal in Makassar. The sample selection was based on the actual offal purchase. A large body of literature suggests willingness to pay is overstated in hypothetical valuation questions as compared to when actual payment is required (Blumenschein et al. 1998; Lusk 2003). According to Bolliger and Reviron (2008), using the participants' actual purchase during the survey means hypothetical statements can subsequently be compared with actual purchases.

In the questionnaire, offal consumers were asked a variety of questions concerning their perceptions about imported offal. Respondents were asked about the amount and the price of imported offal that they purchased. Information related to respondent socio-demographic characteristics such as age, income, education, occupation, and ethnicity was asked. In the questionnaire, respondents were also questioned to determine several factors which relate to product attributes and market factors. In this study, respondents were asked about product attributes in terms of the quality of imported offal (good or not) and the price of imported offal (affordable or not). For market factor, the availability of imported offal in the market was asked (easy to get or not). Overall, respondents gave indications of yes or no for each factor.

A description of the dependent and independent variables used is shown in Table 12.

Table 12: Definitions of dependent and independent variables of consumers' WTP for imported offal in Makassar City

Variable	Definition	Mean (Std Dev.)
Dependent Variable		
PRICE	Price of imported offal (Rp/Kg)	51,470 (7091.629)
Independent Variable		
Product Attributes:		
QUALITY	=1 if product quality is good; = 0 otherwise	0.794 (0.406)
NON-AFFORDABILITY	=1 if the product is non affordable or expensive; = 0 otherwise	0.882 (0.323)
Market Factor:		
ACCESSIBILITY	= 1 if the product is easy to get; 0 = otherwise	0.803 (0.398)
Household Characteristics		
AGE>40	= 1 if age of household head is more than 40 years; 0= otherwise	0.598 (0.492)
INC_HIGH	= 1 if the household income is more than Rp. 6,000,000/month; 0=otherwise	0.509 (0.502)
UNIVERSITY GRADUATES	= 1 if household head graduated from university/college; = 0 otherwise	0.196 (0.398)
BUGIS	= 1 if the ethnic of household is Bugis; = 0 otherwise	0.529 (0.501)
OFFICER	= 1 if the household head's occupation is an officer; = 0 otherwise	0.372 (0.485)
FAM2	=1 if family size are 3-4 people; 0 = otherwise	0.441 (0.498)

Source: Author's calculation from field survey (2013)

The dependent variable for WTP hedonic price analysis is the price of imported offal paid by respondents. The independent variable is divided into three parts: product attribute variables (quality and non-affordability), market factor variable (product accessibility) and household characteristic variables (age, income, education, ethnicity, occupation and family size).

All the independent (explanatory) variables are specified as qualitative (dummy) variables for the WTP analysis (See for example:Misra, Huang & Ott 1991; Peterson & Yoshida 2004). Binary or dummy variables assume the value of zero or one depending upon the attainment or non-attainment of particular attributes (Capps Jr & Cheng 1986). The use of dummy variables provide benefits such as large measurement errors in the variable will have less of a misspecification impact, and a series of dummy variables represent a more general specification (Oczkowski 1994). In this study, the dummy variables are able to incorporate consumers' demographic characteristics, attitudes and perceptions toward imported offal prices, to better explain variation in the WTP estimation.

All data is analysed using STATA software version 13 (See Appendix C and Appendix E).

5.3.2 Theoretical approach

Lancaster (1966) developed an alternative theory of consumer behaviour. He described consumption as an activity in which goods, individually or in combination, are inputs and in which the output is a collection of characteristics. Lancaster's theory plays a crucial role and builds the necessary conceptual framework for the development of a modern hedonic demand analysis (Huang & Lin 2007). Rosen (1974) said that based on the hedonic hypothesis, goods are valued for their utility-bearing attributes or characteristics.

Many researchers have applied Lancaster's theory to estimate consumer willingness to pay by using a hedonic price approach especially for food products (Huang & Lin 2007; Stanley & Tschirhart 1991; Unnevehr & Bard 1993; Wahl, Shi & Mittelhammer 1995; Wang, Mao & Gale 2008). The hedonic function is estimated using the market price, consumption or expenditure data, and objective characteristics that can be observed in a point of decision making based on what consumers actually do (Kyung Hee & Hatcher 2001).

According to Wang, Mao and Gale (2008), the hedonic model is based on the notion that products are heterogeneous, and a particular product's price is determined by a bundle of distinct attributes embodied in the product. In essence, the hedonic approach is the aggregation of commodities into characteristics and the estimation of implicit prices for units of characteristics (Huang & Lin 2007). Following Ladd and Suvannunt (1976), total consumption of each characteristic can be expressed as a function of quantities of products consumed and of consumption input-output coefficients:

$$x_{0j} = f_j(q_1, q_2 \ldots, q_n, x_{1j}, x_{2j} \ldots, x_{nj}) \qquad \textit{Equation 30}$$

For $j = 1, 2, \ldots, m$,

and

$$x_{0m+i} = f_{m+i}(q_i, x_{im+i}), \qquad \textit{Equation 31}$$

For $j = 1, 2, \ldots, n$.

Where x_{0j} is the total amount of the *j*th product characteristic provided to the consumer by consumption of all products, q_i is the quantity of the *i*th product consumed, and x_{ij} is the quantity of the *j*th characteristic provided by one unit of product *i*. Next, x_{0m+i} represents the number of unique characteristics available only from the consumption of the *i*th product.

The consumer's utility function is expressed as:

$$U = U(x_{01}, x_{02}, \ldots, x_{0m}, x_{0m+1}, \ldots, x_{m+n}) \qquad \textit{Equation 32}$$

Because each x_{oj} is a function of the q_i's and the x_{ij}'s, so the consumer's utility function can be specified as:

$$U = U(q_1, \ldots, q_n, x_{11}, x_{12} \ldots, x_{1m}, x_{21}, \ldots, x_{nm}, \ldots, x_{nm+n}) \qquad \textit{Equation 33}$$

It is assumed that the consumer can vary only the q_i's. The magnitudes of the x_{ij}'s are parameters to the consumer; their magnitudes are determined by the producers.

The market equilibrium hedonic price function is estimated by regressing the equilibrium prices of products on the characteristics of the products (Wahl, Shi & Mittelhammer 1995). A general hedonic price model can be written as:

$$p_i = f_i(z) \qquad \textit{Equation 34}$$

Where *z* represents a vector of all product attributes associated with the *i*th product.

5.3.3 The hedonic price model

For the purpose of this study, the projected model is specified in the logarithmic function (the semi-log) and estimated using Ordinary Least Squares (OLS). The hedonic price model of the equation represents essentially, a reduced form equation reflecting both supply and demand influences. Following Huang and Lin (2007) and Taylor (2003), the semi-log form is implemented in this study, because it has the advantage of transforming the dependent variable to approximate a normal distribution. Also, the semi-log allows for incremental changes in characteristics to have a constant effect on the percentage change in price.

The dependent variable is in the log-linear form except for the independent (explanatory) variables. The hedonic price model in this study is expressed as:

$$ln(P) = \beta_0 + \beta_1 AGE > 40 + \beta_2 INC\_HIGH + \beta_3 UNIVERSITYGRADUATES + \beta_4 FAM2 + \beta_5 BUGIS + \beta_6 OFFICER + \beta_7 - AFFORDABILITY + \beta_8 QUALITY + \beta_9 ACCESSIBILITY + \varepsilon_i \quad \text{Equation 35}$$

Where $ln(P)$ is the log linear form of imported offal price, β_0 is an intercept, $\beta_1 - \beta_9$ are parameters estimated; ε_i is error term.

All variables definition is presented in Table 12.

Following Taylor (2003), the marginal implicit price (*MIP*) or marginal willingness to pay is computed as:

$$MIP = c \times \bar{p} \quad \text{Equation 36}$$

Where *MIP* is the marginal implicit price for the estimated coefficient, *c* is the estimated coefficient and $\bar{p}$ is the average price paid or mean value of the dependent variable.

5.4 Results and discussion

5.4.1 Hedonic price model estimation

The purpose of the estimated model is to determine factors that affect consumer willingness to pay for imported offal in Makassar City by using a hedonic price model and to calculate the marginal implicit price (*MIP*) or marginal willingness to pay. Table 13 shows the results of the parameter estimation of demographic and attitude variables on willingness to pay for imported offal obtained from the hedonic price model.

This study uses market data which represent customer purchase behaviour in order to measure 'real' WTP. Since WTP estimates are derived from actual demand data, they are generally very reliable and reflect highly external valid results (Breidert, Hahsler & Reutterer 2006). Also, this can be a cost effective and time efficient method to estimate consumer WTP. In practice, the real WTP based on the consumers, pay the stated price or the price of the imported offal.

In Table 13, the hedonic model estimation shows that the *p*-value of *F*-test is statistically significant; this means that the overall model is statistically significant. The estimated model has an R-squared of about 0.1915 which means 19.15 per cent of the variance of imported offal price (dependent variable) is accounted for by the model. The tests for heteroskedasticity is given by the Breusch-Pagan (Breusch & Pagan 1979).

Table 13: Effect of socioeconomic and demographic factots, product attributes and market factor on consumers' WTP for imported offal

Variable	Coefficient	*MIP* ($\bar{p}$ = Rp. 51,470)
Household characteristics		
AGE>40	-0.077 ***	Rp. 3,963
	(0.031)	
INC_HIGH	0.029	Rp. 1,492
	(0.030)	
UNIVERSITY GRADUATES	-0.024	Rp. 1,235
	(0.041)	
FAM2	0.025	Rp. 1,286
	(0.030)	
BUGIS	0.055*	Rp. 2,830
	(0.030)	
OFFICER	0.068*	Rp. 3,499
	(0.036)	
Product attributes		
QUALITY	0.071	Rp. 3,654
	(0.063)	
NON-AFFORDABILITY	-0.159**	Rp. 8,183
	(0.069)	
Market factor		
ACCESSIBILITY	-0.082*	Rp.4,220
	(0.048)	
Constant	10.959***	
	(0.052)	
$\backslash R^2$	0.1915	
F-Test	0.0162	
Breusch-Pagan test for heteroskedasticity, Chi2(1)	0.33	
Mean VIF	1.93	

Source: Author's estimate (2014)

Note: Figures in parenthesis represent the standard errors; ***, **, * denote significance at 1% level, 5% level, and 10% level, respectively.

The test is designed to detect any linear form of heteroskedasticity by testing the null hypothesis that error variances are all equal versus the alternative that the error variances are a multiplicative function of one or more variables. In this study, the Breusch-Pagan test shows that the *p*-value is very small (Prob>chi2 = 0.33), indicating that heteroskedasticity is almost certainly not a problem.

Difficulties arise in regression when the predictors are highly correlated or multicollinearity. In order to check the evidence of multicollinearity, this study performs a calculation of VIF (variance inflation factors) (see for example: Chatterjee & Hadi 1986). VIF calculates the centred or uncentred variance inflation factors (VIFs) for the independent variables specified in a linear regression model. According to the values of the centred VIFs, we have no VIFs greater than 10 (mean VIF = 1.93). It means no harmful collinearity is detected in the model.

For the socioeconomic and demographic variables, the age of the household head (*AGE*>40) is found to be negative and statistically significant in affecting prices paid for imported offal. The marginal willingness to pay for older households suggest that each percentage point increases for household age, reduces the willingness to pay less than or equal to Rp. 3,963/kg. These findings show us that consumers are less likely to buy imported offal as age increases.

In terms of occupation, officer variable is found to be positive and had a statistically significant effect on consumer WTP at the 10 per cent level. The positive effect of *MIP* suggests that each percentage point increases in a household where someone works as an officer, the willingness to pay for imported offal increases by Rp. 3,499/kg.

In terms of the ethnicity, Bugis ethnicity has a positive effect and statistically significant on the WTP for imported offal. The MIPs show that each percentage point increases in the number of Bugis households. Other ethnic households increase their willingness to pay more for imported offal by Rp. 2,830/kg. This figure shows us that local ethnic (*BUGIS*) in Makassar will pay more for imported offal.

In this study, other socioeconomic and demographic factors such as income, level of education and number of family household members do not have a significant impact on the WTP for imported offal in Makassar City. Based on the *MIP* and the positive sign of the income (*INC_HIGH*) and family size (*FAM*2), coefficients confirm that consumers increase their WTP for imported offal as their income and number of family size in the household increased by Rp. 1,492/kg and Rp. 1,286/kg respectively. In contrast, consumers decrease their WTP if the level of education increases or people graduate from university by Rp. 1,235/kg.

In terms of the product attributes and market factors, only *NON-AFFORDABILITY* and *ACCESSIBILITY* variables have shown a significant impact on the WTP, while *QUALITY* has insignificant impacts on the WTP. The coefficient of *NON-AFFORDABILITY* variable is negative and statistically significant at the 5 per cent level. The *MIP* value confirms that if the price of imported offal in the market increases, the willingness to pay for the product decreases by Rp. 8,183/kg. Consumers implied that imported offal was quite expensive and was very difficult to find in the market. If the price of imported offal increases, it is

less affordable and consumer WTP for imported offal will decrease. Beef and offal exports to Indonesia have decreased since quotas were introduced to limit overseas supply, in order to encourage local meat production. In 2011, the volume of offal exported to Indonesia halved to about 6000 tonnes. As a result, offal price has increased significantly. In 2007, the price of offal was Rp. 20,000 to Rp. 25,000/kg, but since 2011 it has reached Rp. 35,000/kg to Rp. 60,000/kg. The study (Saleh 2011) found that offal consumers in Makassar shifted their expenditure from local offal to imported offal. At this time, the restriction on imported quotas had not been put into effect.

The *ACCESSIBILITY* variable is found to be negative and had a significant impact on the WTP for imported offal at the 10 per cent level. The *MIP* value suggests that if imported offal is easy to find in the market, consumers' WTP for imported offal decreases by Rp. 4,222/kg. Thus, supply of imported offal needs to be added in Makassar City because it is less accessible.

The quality of a product is an important factor in influencing the willingness to pay. In this study, the *QUALITY* variable is not significant in affecting consumers' WTP for imported offal. However, the *MIP* value and the positive sign of the coefficients indicate that consumers will increase their WTP if the quality of imported offal is good, and increased by Rp. 3,654/Kg. Based on our survey, the main reason for most of respondents not being willing to pay for cheap imported offal was because of the quality of the product was low. Especially for imported offal sold in the traditional markets. Offal with high price was mostly found in the supermarket while lower price was mostly found in the traditional market. Some consumers who bought imported offal in the traditional markets found the low quality of imported offal in terms of the freshness and packaging. Thus, in this study, quality effects do exist and should be taken into account when the supply of imported offal is brought into the market.

5.4.2 Australia's trade prospects for imported offal

Based on the hedonic price analysis, it is clear that consumers in Makassar are likely to purchase more imported offal if the product is available in the market. Also, the LA/AIDS analysis shows that the combination of the inelastic own-price elasticity and the elastic expenditure should encourage local producers and exporting countries to produce and sell more offal and beef products in Makassar.

Reduction in the number of cattle and offal imports has meant that the availability of beef and offal is not evenly distributed throughout the Indonesian market. As a result, the Minister of the Trade Republic of Indonesia announced a new regulation on imported live cattle and beef products in order to create beef price stabilisation throughout Indonesia in 2013 (The Minister of Trade Republic of Indonesia 2013).

Indonesia's ministries of agriculture and trade released a new regulation on the import of meat and meat products in late August or early September 2013. The regulation set a reference price system, and meat imports were allowed when local price was set above a particular level. Accordingly, the supply of cattle by conducting a gradual import of cattle and beef products including offal products in sufficient amounts, was for the purpose of beef price stabilisation. This regulation would open more international animal products in

the market. According to Condon (2014) Australian beef offal exports to Indonesia doubled in volume, reaching 12,400 tonnes in the 2013-2014 financial year.

Indonesia is one of Australia's most important bilateral trade partners. In 2007, Indonesia's imported offal products were 972,706 kg from Australia and 591,690 kg from New Zealand (Director of Community Veterinary 2009). Types of offal that are permitted to be exported to Indonesia are liver aneart, oxtail, tongue, lips and feet (Australian Meat Industry Council 2007; Director of Community Veterinary 2009). Since 2011, the Indonesian Government has only permitted liver and heart to be exported to Indonesia (Minister of Agriculture 2011). In this study, in order to get more understanding about consumer attitude with regards to the need of imported offal in Makassar, respondents were asked whether they agreed or not for more imported offal to come into the marketplace. The majority of respondents (91.18 %) agreed for more imported offal in the marketplace. Since 2011, beef and offal prices in Makassar have been very expensive, reaching AUS$ 10/kg and AUS$ 6/kg respectively. Therefore, consumers need more variety of meat products in the market (local and import) to normalise the price. The high price of meat products was also observed in most provinces in Indonesia from 2011 to 2013. Thus, before self-sufficiency in beef products can be achieved in Indonesia, a new regulation is needed to increase the supply of cattle by conducting gradual import of cattle; and beef products including offal products in a sufficient amount for the purpose of beef price stabilisation. This regulation would open more international trade prospects for offal products in Indonesia, and consumers could have more choice. Price would also be normalised.

For the Australia's trade prospects, currently there are quotas allowed for Australian beef export into Indonesia, however, this is carried by quarterly basis over a year. This policy has tremendous negative effect on the Australian producers (exporters) as they cannot properly plan their production. This policy can be rather on an "annual quota" than "quarterly quota" to provide stability to Australian producers as well as Indonesian consumers.

The study of Firdausy et al. (2005) revealed that Indonesia's comparative advantage (RCA index) for animal production in 1999 was 0.39 and decreased significantly into 0.29 in 2003. It was explained that the RCA index below one means that the country does not specialise in that animal production. Accordingly, the effectiveness of livestock production, especially from cattle products have been very low; therefore, Indonesia needs to import the products over the coming years.

Another concern from consumer is about imported halal meat in the market. They need to be assured that the products they buy have halal certificates. Indonesia is the largest Muslim population in the world (88 % of Indonesia's population are Muslim), and Muslims are required to consume only halal foods. The basic requirements for the production of halal meat are obtained from the Holy Qur'an (Nakyinsige et al. 2012). Muslim consumers' trust in halal meat relates to the certainty about the process attributes (i.e. meat processing and handling of the halal status) and safety in term of meat wholesomeness (Hanzaee & Ramezani 2011).

Indonesia is one of Australia's most important bilateral trade partners. The Muslim market is very important to Australian meat companies and each company has documented procedures to ensure halal slaughtering and processing at all stages of production. Australia has an Australian Government Authorised Halal Program (AGSHP) which ensures a high-quality product that is strictly halal ('lawful' in Arabic) (Meat & Livestock Australia 2013). Moreover, Australia is recognised as a world leader in halal meat production. As the world's most populous Muslim country, Indonesia has the potential to become a major market for Australia. According to Kidane (2003), Australian exports of meat account for about 46 per cent of the total Australian production of meat, and 19 per cent of total world exports of meat. About 52 and 33 per cent of Australian meat exports are sold on Asian and American markets, respectively. The requirements for listing establishments for export to Indonesia are that (1) establishments must comply with the Australian Standard for the Hygienic Rendering of Animal Products; (2) animal by-product meals are free of pig materials, (3) import permits are required; (4) produce should be shipped directly from Australia to Indonesia (Australian Meat Processor Corporation 2010).

Thus, consumers will have more choice and price could be normalised. Again, Australia as a major exporter of meat products to Indonesia could have more trade prospects in this regard.

5.5 Chapter summary

In Chapter 5, the study results on the social-demographic, product attributes and market factors which affect consumer willingness to pay for imported offal and the marginal implicit prices, using the hedonic price model, have been discussed. The evaluation of consumer willingness to pay will be useful for offal marketers, traders and policy makers in understanding the amount that a consumer is willing to pay for imported offal. In this study, we divide independent variables into three categories: product attributes, market factor and socioeconomic and demographic factors.

The results of the hedonic price analysis imply that age, occupation (*OFFICER*), level of education (*UNIVERSITY GRADUATE*), ethnicity (*BUGIS*), *NON-AFFORDABILITY* and *ACCESSIBILITY* variables has significant impact on WTP for imported offal in Makassar. Based on the marginal implicit price *(MIP)* calculation, the willingness to pay of higher prices for imported offal decreases for older consumers.

In terms of ethnicity, the *MIP* reveal that consumers with a Bugis ethnic background are willing to pay more for imported offal. Heads of households with officer type occupations would also pay more for imported offal.

Makassar consumers are still willing to pay for imported offal; international trade opportunities are still present for exporters. Local retailers, importers and exporters should consider better quality products and requirements such as halal certificates, and handling and packaging of imported offal. Quality improvement strategies in all aspects must be effective. Furthermore, ongoing research on the demand and supply of offal should be continued to support the accurate data of consumption and production nationally.

Overall, this study suggests that consumer WTP for imported offal in Makassar has undergone structural change due to government programs for beef self-sufficiency by 2014. This has had an important implication for consumer expenditure, preferences and resource allocation in the exporting countries.

Finally, the next chapter concludes this dissertation. It summarises all chapters and findings in this study. The contributions of this study to the body of knowledge and policy implications will be discussed. The chapter will also present the limitations and recommendations for further study.

6. CHAPTER 6. CONCLUSIONS

6.1 Preview

Chapter 5 has explained the study findings of consumer WTP for imported offal in Makassar City, and the trade prospects of offal products and other meat products for Australia.

Chapter 6 will briefly set out the major findings in answering to the three research objectives of this study. Section 6.2 will summarise the study findings. The next section will provide policy recommendations based on the findings, which is described in Section 6.3. Finally, this chapter will be concluded by presenting contribution and recommendations for further study and the limitations of the study, which can be found in Section 6.4 and 6.5. The final segment, 6.6 is the chapter summary.

6.2 Summary of the study

This study utilises survey data to estimate market demand functions for beef and offal products purchased in Makassar. In addition, it estimates consumer willingness to pay for imported offal and Australia's trade prospects for offal and other beef products. This study is motivated by the growing beef and offal market in Makassar and the lack of quantitative studies about beef and particularly, offal demand. The information collected includes socioeconomic and demographic variables, including age, occupation, level of education, ethnicity, total family size, and income. Information on purchasing includes meat prices, meat types and the amount of meat bought. Consumer perceptions about imported offal in terms of its quality, availability and affordability were also questioned.

In this empirical study, we assume weak separability between the demand for beef and offal, and the demand for other food or meat commodities. Accordingly, the demand model includes information on both domestic and imported products of offal and beef. In Makassar, beef and offal products are important ingredients in the community. The demand for local and imported products continues to increase. However, none of empirical studies have performed the structures of substitution among different types of local and imported products for beef and offal.

There are predominantly five objectives in this study. The first objective of the study is to analyse the determinants of socioeconomic and demographic factors responsible for the changing market shares for local and imported offal and local and imported beef demand by using the Maximum Likelihood (ML) method of the binary probit.

The LA/AIDS model for beef and offal demand is used to achieve the second objective of this study. The LA/AIDS model is estimated by the seemingly unrelated regression (SUR) technique. The uncompensated or Marshallian elasticities are calculated as the sample mean using the parameter estimates of each demand model. Estimation of the price and expenditure elasticities of the commodities is carried out based on the LA/AIDS results.

This study uses the Heckman procedure to associate the IMR with zero valued observations in dependent variables, then using all observations in the second step. The IMR is calculated based on the probit regression model. The homogeneity and symmetry restrictions are imposed on the estimated model. In order to avoid singularity derived from adding-up constraint, one equation is deleted from the estimation in the demand system, in this case the imported beef equation. Then, homogeneity, symmetry and adding-up conditions improve the parameter estimates of this equation.

The third objective of this study is to examine several factors that affect consumer WTP for imported offal and trade prospects for Australia. The estimation is run using a hedonic price model and calculated using the *MIP* of WTP for imported offal. In this study, three categories of independent variables include socioeconomic and demographic variables; market factor variable and product attribute variables.

The fourth objective of this study is to examine the actual willingness to pay (WTP) for imported offal and calculate the marginal implicit price (marginal willingness to pay) by using the hedonic price model approach. Finally, the fifth objective is to explore Australia's trade prospects for imported offal in Indonesia based on WTP analysis.

All statistical analyses in this study are estimated using STATA version 13 statistical package.

The results of this study show five major conclusions. Firstly, several important factors such as age, income, ethnicity, occupation, family size and level of education significantly affect the expenditure on local and imported offal and beef. Households in Makassar shift their budget expenditures on imported offal and beef to local offal and beef due to limited imported products in the market.

Secondly, study results show that regression coefficients of the IMR variables in the LA/AIDS estimation are statistically significant in all beef and offal equations. Estimates from the probit regression model by including the zero consumption are then used to compute the IMR. It is important to deal with the zero consumption to avoid a strong sample selection bias. Parameter estimates gained from the LA/AIDS show that the inelastic own-price elasticities of local beef and offal and imported beef and offal any changes in the prices of these meat items could have a significant shift in the product expenditures. The inelastic own-price elasticities confirm that the demand of the product does not respond to price change n are they categorised as necessity goods, indicating that they are inferior goods in Makassar. It has been observed that meat is an important product in Makassar, therefore price changes will not affect consumer demand. This result is supported by positive expenditure elasticity from the study. The results show that as consumer income increases the demand for local offal and beef and imported offal and beef will increase.

As the price of commodities increases, the amount of quantity demanded declines. For expenditure elasticities, all types of commodities have positive expenditure elasticities. This result reveals that if consumer income increases, the demand for products increases. Thus, all products are categorised as a normal product. In terms of cross price elasticities, it is found that local and imported offal can be substituted goods, indicating when the price

of local offal increases, consumers will choose to purchase imported offal. Imported offal and local beef are complementary goods, since particular offal parts are preferred by the Makassar consumers and could not be substituted.

Thirdly, with the hedonic price model, the results indicate that selected socioeconomic and demographic characteristics have significant effects on the prices paid for imported offal. Similarly, accessibility and affordability of imported offal characteristics have significant effects on WTP for imported offal. By this, consumers thought that the price of imported offal was very expensive compared with the price before 2011 when the import quota had not been reduced. Generally, consumers increase expenditure on imported offal if the product is available in the market and affordable, and the quality is improved.

Fourthly, the study describes that people over the age of 40 years are less likely to buy imported offal as their age rises. In terms of occupation, the *MIP* that percentage goes up with one member of the household working as an officer, the WTP for imported offal rises by Rp. 3,499/kg. The *MIP* for the ethnicity variable suggests that percentage increases with the number of Bugis households increasing their WTP for imported offal by Rp. 2,830/kg. With regards to product attributes and market factors like cost, superiority and convenience of imported offal in the market, the study established that if the cost of imported offal increases, then the WTP for the product decreases by Rp. 8,183/kg. Looking at the availability variable, the *MIP* value advises that if imported offal is simple to locate, consumer WTP for imported offal decreases by Rp. 4,222/kg. The great aspect of the quality variable demonstrates that customers will increase their WTP if imported offal's quality is superior.

The remaining factor of this study shows that in terms of the hedonic price analysis, it is found that in meat characteristics and market factors, only *NON-AFFORDABILITY* and *ACCESSIBILITY* variables have demonstrated a major effect on the WTP, while *QUALITY* has irrelevant effects on the WTP. The coefficient of *NON-AFFORDABILITY* is negative and statistically significant at 5%. The *MIP* value endorses the fact that if the fee for imported offal in the market goes up, then the inclination to buy the product decreases by Rp. 8,183/kg. Customers inferred that imported offal was more expensive and difficult to obtain. Should the cost of imported offal increase, then it is less affordable and consumer WTP for imported offal will lessen. Consumers are willing to pay more for imported offal if the product is available, affordable and is of good quality.

The *ACCESSIBILITY* variable is negative and had a noteworthy influence on the WTP for imported offal at 10%. The *MIP* value recommends that if imported offal is easily obtainable, then consumer WTP for imported offal decreases by Rp. 4,222/kg. Therefore, to assure a steady supply at affordable prices, the supply of imported offal needs to be directed to Makassar City.

The excellence of produce is an imperative motive in influencing the willingness to pay. The *QUALITY* variable is not substantial in affecting consumer WTP for imported offal. The *MIP* value and the positive sign of the coefficients point out that shoppers will increase their WTP if the quality of imported offal is respectable, and increased by Rp. 3,654/kg.

The fifth objective of this study is to explore Australia's trade prospects for imported offal in Indonesia. By observing imported offal qualities, LA/AIDS, WTP, and market factors analysed in this study, it is understandable that regulars in Makassar are keen to spend more for imported offal when it is available, affordable and is off good quality. Thus, Australia could gain more if the quota of imported offal in Indonesia is increased. Indonesia's ministries of agriculture and trade released a new regulation on the import of meat and meat products in late August or early September 2013. The regulation set a reference price system, and meat imports were allowed when local price was set above a particular level. Hence, the supply of cattle by conducting a gradual import of cattle and beef products including offal products in sufficient amounts, was for the purpose of beef price stabilisation. This regulation would open more international animal products in the market. By this condition, Australia as a major exporting beef and offal products to Indonesia could advantage more in trade.

6.3 Policy implications and recommendations

The analysis of household demand for beef and offal products is important in the structuring and development of agricultural and trade policies in Makassar, and Indonesia as a whole.

In this study, several important findings are revealed. This study has shown that both local and imported offal is a necessity good, while both local and imported beef is a luxury good based on the expenditure elasticity estimates. The probit model simulations reveal that factors, which affect the expenditure on imported offal and beef, include age, income, family size, ethnicity and occupation. Hence, consumer demographic characteristics play a major role in the decisions associated with beef and offal expenditure.

From the WTP analysis, it is clear that imported offal was relatively expensive and was very difficult to find in the market. Accordingly, some consumers who bought imported offal in the traditional markets found the lower quality of imported offal in terms of freshness and packaging.

According to expenditures, the majority of homes in the city of Makassar purchased more local offal and beef than offal and beef from overseas. This assists not only families to meet with tradition and prepare local dishes but affects small businesses like markets and restaurants who require beef and offal.

For those reasons, it is very important to maintain the new regulation for imported beef and offal which was released in 2013 to ensure more products in the market with an affordable price. This could be accomplished by increasing the import quota as it was before self-sufficiency in beef production. The Indonesian program for self-sufficiency in beef products by the year 2014 should be evaluated because the program has not achieved the target results. Furthermore, local government should provide more supervision on the quality and prices of products sold in the market due to the high demand of the products.

Achievement of food security must be carried out without harming consumers. Drastic reduction in beef products imported since 2011 has meant that meat and offal in Indonesia is very expensive because of limited supply. By increasing the import quota in 2013, the

beef price remains expensive. Many factors should include increasing the local beef and offal supply, so that prices and product stability can be achieved. More importantly, Indonesia should conduct beef and live cattle censuses and survey more accurately, so that the projected national supply and demand is provided accurately and not based on assumptions. Accordingly, the exact amount of import quotas can fulfil the real national demand for beef and offal.

Indonesia needs to do further research to improve cattle and agricultural productivity in the country. Trade quota restrictions are not relevant to the progress of the livestock industry in Indonesia. Thus, beef scarcity persists. A transparency import mechanism is required in the beef import policy. The government must disclose information about the mechanism of determining the importer, and the distribution of import quota for importers through open auction.

Government decisions to reduce imports must be followed up by improvements in all sectors of animal farming in order to increase the number of the local animal population. If the reforms are not carried out in total, the livestock population will gradually reduce. Government programs to boost local production could be done by conducting soft loans to farmers, farm extension services, and improvements in security systems, slaughterhouse facilities, and animal health assistance. The qualities and quantities of these elements must be continually improved and monitored. Furthermore, in realising the sustainable self-sufficiency beef program, Indonesia could import breeding cattle that can be sourced from Australia as a major exporting country for beef and live cattle to Indonesia. The main point is to increase cattle population. Recently, Indonesia has imported live cattle for beef slaughtering and not for breeding purposes. Also, foreign aid should be utilised as much as possible to advance the industry.

Further field research could be done to analyse the import trade policy by using real market data. In addition, policy simulations can also be performed to determine the best strategies for self-sufficiency in beef products. In addition, supplementary research on the beef price stabilisation strategy is needed.

Issues around the import quota restriction policy need to be improved by viable technology and farming systems to boost productivity and assist in achieving beef self-sufficiency in Indonesia. This would reduce beef and offal prices, promote availability, enhance nutrition and accommodate local tradition by providing appropriate food for dishes.

6.4 Contributions of the research

6.4.1 To the literature

We believe an important contribution can be made to the literature by presenting an overview of Makassar' beef and offal market based on household survey data. The importance of this study shows that there have been many empirical studies done on demand for beef in Indonesia, but the demand study on offal products has rarely been conducted. This study provides important insights, particularly in explaining consumer expenditure and behaviour in terms of the purchase of offal and beef, both local and

imported. Furthermore, the findings in this study have important implications for the Indonesian beef and offal industries.

The implications of the study relating to the probit, LA/AIDS and hedonic price methods using actual data such as the real market price, consumption/expenditure data, and objective characteristics in a point of decision making are important in identifying socioeconomic and demographic factors, product and market attributes that affect price consumers paid for offal and beef in the Makassar market. Moreover, by using actual data in the WTP hedonic price analysis, we can avoid the hypothetical bias (the difference between what respondents or consumers say they will pay and what they would actually pay) in the analysis. Overall, this study is likely to contribute to both the literature and practice.

6.4.2 To practice

In the first stage, the study results provide more insight in understanding consumer behaviours in Makassar specifically, and in Indonesia generally. Following this, the study serves as a reference for exporting countries, especially Australia in pricing and marketing strategies for meat products in Makassar. The statistical procedures for the LA/AIDS model developed in this study are a cost-effective method of estimating a complete demand system. By incorporating the theoretical restrictions such as the homogeneity, symmetry and adding-up in the model estimation using maximum likelihood methods, has provided a greater statistical efficiency to the estimated parameters. The inclusion of zero consumption observations and demographic variables from probit analysis, and using the IMR as explanatory variables in estimating the modified LA/AIDS model, improve the estimation results. Accordingly, the combination of the inelastic own-price elasticity and the elastic expenditure elasticity show that beef and offal products are important products in Makassar. Therefore, the availability of the products in the market is essential.

These study findings should encourage suppliers and retailers to produce and import more beef and offal products for the Makassar market. For policy makers, this study should give abundant input in terms of improving the sustainability of beef and offal products in Indonesia. The demand estimation and WTP analysis for beef and offal products should provide the supplier with information that could help them identify and understand market segments, consumer preferences and improve marketing strategies.

6.5 Study Limitations and recommendations for further study

The empirical results in this research should be interpreted with caution due to the limited sample size and the narrow study area. This study is based only on data from urban households due to time and budget constraints. The consumer survey was based on beef and offal buyers from local markets in Makassar City which did not represent the whole consumers. Therefore, the result could not be generalised to Indonesia as a whole due to the fact that a restricted sample was used. Furthermore, broadening the study area should be done for further development in the future.

This study mainly analyses cross sectional data, however the factors affecting the demand can change over the time. Therefore, there is a scope for future studies to analyse the effects of time variables/factors on the offal/beef demand and their imports.

In this study, the location where consumers purchased beef and offal was not distinguished in the estimations, because several respondents did not purchase beef and offal in the same supermarket or traditional market. It was found that, a customer purchased imported offal or beef in a supermarket, and local products were purchased in a traditional market.

In order to get a general picture on offal and beef demand, further research should be conducted to estimate meat demand for all provinces in Indonesia, by including all types of meat and using different estimation approaches.

Further experimental research on consumer WTP is needed to satisfy customer preference and establish better prices. A positive attribute would be the inclusion of nutritional benefits and quality characteristics about the meat such as tenderness, juiciness, flavour and freshness.

6.6 Chapter summary

This chapter is the conclusion of the dissertation. It summarises the findings of the study and outlines the policy implications and recommendations. The findings of this study may have an important contribution to the literature, firms and policy makers. There are three major findings in this study. Firstly, consumer demographic characteristics such as age, income, family size, ethnicity and occupation play a major role in the decision making associated with beef and offal expenditure. Secondly, the elasticity calculations in this study were consistent with demand theory, whereas local beef and offal and imported beef and offal have negative own-price elasticities and all estimated expenditure elasticities are positive. It means any changes in the prices of these meat items could have a significant shift in beef and offal expenditures. Positive expenditure elasticities suggest that households in Makassar will consume more offal and beef (local or imported) as their income increases. Furthermore, offal products are an inexpensive source of protein, and their consumption is strongly related to Makassar households.

The LA/AIDS analysis with the inclusion of IMR shows that all commodities estimated, are positives and statistically significant at the one per cent significance level for the IMRs. This result implies that if the zero consumption problems are ignored, there will be a strong sample selection bias.

The third outcome proposes that age, occupation, level of education, ethnicity, whether imported offal is expensive or unaffordable and availability, all have a weighty influence on the WTP for imported offal in Makassar. The hedonic price breakdown demonstrates that based on affordability and availability of imported offal in the market, customers decreased the willingness to pay for the product. These three main results suggest that beef and offal are certainly essential foodstuffs in Makassar. The obtainability of the products in the market should become a focal worry of the Indonesian Government, including local and international firms. Enhancement of the domestic beef industry must play a vital part in the effort to stimulate both offal and beef mandates Australia as a major

exporter of live cattle and beef products in Indonesia could take advantage from this perspective.

This chapter also presents the study limitations, contributions and recommendations for further study. Because of time and budget constraints, the study is located only in the urban location of Makassar City. Consequently, study results could not represent all consumers in Indonesia. Further research should be conducted in the regional areas with national scale using different estimation and simulation approaches. Household consumption patterns and behaviours are important measurements of individual wellbeing. It is suggested to include more beef and offal nutritional attributes and quality attributes such as tenderness, juiciness, flavour and freshness through various model estimations in the consumer's WTP analysis.

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Appendix A. Probit analysis of socioeconomic and demographic characteristics of offal and beef consumers (STATA results)

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   13.0   Copyright 1985-2013 StataCorp LP
  Statistics/Data Analysis            StataCorp
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                                      979-696-4601 (fax)

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Notes:
      1.  You are running Small Stata.


. probit LocOffalDum Age Inc2 Inc1 Univ_graduates Juniorhigh_school Seniorhigh_school Tot_Fam Bug
> is Makassar officers trade,  vce(robust)

Iteration 0:   log pseudolikelihood = -65.016595
Iteration 1:   log pseudolikelihood = -48.714975
Iteration 2:   log pseudolikelihood = -47.127933
Iteration 3:   log pseudolikelihood = -47.071838
Iteration 4:   log pseudolikelihood = -47.071823
Iteration 5:   log pseudolikelihood = -47.071823

Probit regression                                 Number of obs   =        200
                                                  Wald chi2(11)   =      37.39
                                                  Prob > chi2     =     0.0001
Log pseudolikelihood = -47.071823                 Pseudo R2       =     0.2760

------------------------------------------------------------------------------
             |               Robust
  LocOffalDum|      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         Age |  -.0185232   .0197632    -0.94   0.349    -.0572583    .0202119
        Inc2 |   .1515104   .3369274     0.45   0.653    -.5088552     .811876
        Inc1 |   1.006584    .453773     2.22   0.027      .117205    1.895962
Univ_graduates| -1.175797   .5142462    -2.29   0.022    -2.183701    -.167893
Juniorhigh_school| -.4289659   .4540351    -0.94   0.345    -1.318858    .4609266
Seniorhigh_school| -.6903261   .4527673    -1.52   0.127    -1.577734    .1970816
      Tot_Fam |    .097811   .1169002     0.84   0.403    -.1313091     .326931
        Bugis |   .6527759   .4496964     1.45   0.147    -.2286128    1.534165
     Makassar |   .8460062   .5169305     1.64   0.102     -.167159    1.859171
     officers |  -.2670997   .3967314    -0.67   0.501    -1.044679    .5104796
       trader |   .7451051   .4609071     1.62   0.106    -.1582561    1.648466
        _cons |   1.506515   1.312749     1.15   0.251    -1.066426    4.079455
------------------------------------------------------------------------------
```

```
. mfx

Marginal effects after probit
      y  = Pr(LocOffalDum) (predict)
         =  .95883012
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
Age	-.001634	.00158	-1.03	0.302	-.004738	.00147	43.385
Inc2*	.012802	.02881	0.44	0.657	-.043662	.069266	.33
Inc1*	.0652704	.03209	2.03	0.042	.002377	.128164	.275
Univ_g~s*	-.2053004	.14751	-1.39	0.164	-.494418	.083817	.14
Junior~l*	-.0466945	.06014	-0.78	0.438	-.164569	.07118	.225
Senior~l*	-.0629293	.04665	-1.35	0.177	-.154371	.028513	.505
Tot_Fam	.0086283	.00973	0.89	0.375	-.010433	.027689	3.715
Bugis*	.0521184	.03823	1.36	0.173	-.02281	.127046	.38
Makassar*	.0834641	.05886	1.42	0.156	-.031891	.198819	.54
officers*	-.0260149	.04418	-0.59	0.556	-.112611	.060581	.295
trader*	.0637557	.03393	1.88	0.060	-.002743	.130255	.44

```
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
end of do-file
```

```
. //***Probit and Marginal effects for Imported offal expenditures****//
. probit ImpOffalDum Age  Inc1 Inc2  Univ_graduates Juniorhigh_school Seniorhigh_school Tot_Fam B
> ugis Makassar officers trade,  vce(robust)

Iteration 0:   log pseudolikelihood = -138.58943
Iteration 1:   log pseudolikelihood = -104.99239
Iteration 2:   log pseudolikelihood = -104.63744
Iteration 3:   log pseudolikelihood = -104.63715
Iteration 4:   log pseudolikelihood = -104.63715

Probit regression                                 Number of obs   =        200
                                                  Wald chi2(11)   =      70.12
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -104.63715                 Pseudo R2       =     0.2450
```

ImpOffalDum	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.0303578	.0128852	2.36	0.018	.0051033	.0556123
Inc1	-.6660791	.260579	-2.56	0.011	-1.176805	-.1553536
Inc2	-.4183487	.251599	-1.66	0.096	-.9114736	.0747762
Univ_graduates	.8956904	.4906917	1.83	0.068	-.0660477	1.857428
Juniorhigh_school	.5149216	.3820428	1.35	0.178	-.2338686	1.263712
Seniorhigh_school	.9296311	.3679312	2.53	0.012	.2084993	1.650763
Tot_Fam	.1567651	.083853	1.87	0.062	-.0075838	.321114
Bugis	1.084046	.4386449	2.47	0.013	.224318	1.943774
Makassar	.5312203	.4248241	1.25	0.211	-.3014197	1.36386
officers	1.178886	.3076295	3.83	0.000	.5759431	1.781829
trader	1.366931	.2661252	5.14	0.000	.8453349	1.888527
_cons	-3.936975	1.081773	-3.64	0.000	-6.057212	-1.816739

```
. mfx

Marginal effects after probit
      y  = Pr(ImpOffalDum) (predict)
         =  .49999581
```

variable	dy/dx	Std. Err.	z	P>|z|	[	95% C.I.	]	X
Age	.012111	.00514	2.36	0.018	.002036	.022186		43.385
Inc1*	-.2580872	.09524	-2.71	0.007	-.444761	-.071413		.275
Inc2*	-.1652753	.09746	-1.70	0.090	-.356288	.025737		.33
Univ_g~s*	.3293334	.15273	2.16	0.031	.029987	.62868		.14
Junior~l*	.2011946	.14333	1.40	0.160	-.079724	.482113		.225
Senior~l*	.3579329	.13173	2.72	0.007	.099738	.616128		.505
Tot_Fam	.0625402	.03345	1.87	0.062	-.003026	.128106		3.715
Bugis*	.4090507	.14799	2.76	0.006	.11899	.699111		.38
Makassar*	.2094143	.16347	1.28	0.200	-.110981	.52981		.54
officers*	.4330406	.09543	4.54	0.000	.24601	.620071		.295
trader*	.5042375	.0835	6.04	0.000	.340574	.667901		.44

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. //***Probit and Marginal effects for Local beef expenditures****//
. probit BeefLocDum Age Inc1 Inc2 Univ_graduates Juniorhigh_school Seniorhigh_school Tot_Fam Bugi
> s Makassar officers trade,  vce(robust)

Iteration 0:   log pseudolikelihood = -75.354032
Iteration 1:   log pseudolikelihood = -50.489731
Iteration 2:   log pseudolikelihood = -49.531183
Iteration 3:   log pseudolikelihood = -49.522349
Iteration 4:   log pseudolikelihood = -49.522346

Probit regression                                 Number of obs   =        200
                                                  Wald chi2(11)   =      56.60
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -49.522346                 Pseudo R2       =     0.3428
```

BeefLocDum	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	-.0055359	.0178443	-0.31	0.756	-.0405101	.0294383
Inc1	.1890562	.3913093	0.48	0.629	-.577896	.9560083
Inc2	-.0808425	.2773969	-0.29	0.771	-.6245304	.4628453
Univ_graduates	-1.370037	.4116114	-3.33	0.001	-2.176781	-.5632937
Juniorhigh_school	-.1818016	.4506333	-0.40	0.687	-1.065027	.7014234
Seniorhigh_school	.2621023	.423302	0.62	0.536	-.5675544	1.091759
Tot_Fam	.0159573	.1137228	0.14	0.888	-.2069352	.2388499
Bugis	.4476098	.3438066	1.30	0.193	-.2262388	1.121458
Makassar	.538299	.4517878	1.19	0.233	-.3471888	1.423787
officers	-.2603876	.40155	-0.65	0.517	-1.047411	.5266359
trader	.4895614	.4348553	1.13	0.260	-.3627393	1.341862
_cons	1.169164	1.040565	1.12	0.261	-.8703051	3.208634

```
. mfx

Marginal effects after probit
      y  = Pr(BeefLocDum) (predict)
         =  .93480918
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
Age	-.0007035	.00227	-0.31	0.757	-.005157	.00375	43.385
Inc1*	.0225557	.04247	0.53	0.595	-.06068	.105792	.275
Inc2*	-.0104921	.03678	-0.29	0.775	-.082574	.06159	.33
Univ_g~s*	-.3248986	.13569	-2.39	0.017	-.590852	-.058945	.14
Junior~l*	-.0249267	.06629	-0.38	0.707	-.154845	.104992	.225
Senior~l*	.033497	.05563	0.60	0.547	-.075541	.142535	.505
Tot_Fam	.0020279	.01429	0.14	0.887	-.025981	.030037	3.715
Bugis*	.0529983	.03728	1.42	0.155	-.02007	.126066	.38
Makassar*	.0716839	.06032	1.19	0.235	-.046547	.189915	.54
officers*	-.0359362	.06217	-0.58	0.563	-.157784	.085912	.295
trader*	.0602939	.05021	1.20	0.230	-.038117	.158705	.44

(*) dy/dx is for discrete change of dummy variable from 0 to 1

```
. //***Probit and Marginal effects for Imported beef expenditures****//
. probit ImpBeefDum Age Inc1 Inc2 Univ_graduates Juniorhigh_school Seniorhigh_school Tot_Fam Bugi
> s Makassar officers trade, vce(robust)

Iteration 0:   log pseudolikelihood = -105.38159
Iteration 1:   log pseudolikelihood = -82.041602
Iteration 2:   log pseudolikelihood = -81.770381
Iteration 3:   log pseudolikelihood = -81.769665
Iteration 4:   log pseudolikelihood = -81.769665

Probit regression                                 Number of obs   =        200
                                                  Wald chi2(11)   =      49.55
                                                  Prob > chi2     =     0.0000
Log pseudolikelihood = -81.769665                 Pseudo R2       =     0.2241
```

ImpBeefDum	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
Age	.0097324	.015351	0.63	0.526	-.0203549	.0398198
Inc1	-.5368243	.3077644	-1.74	0.081	-1.140031	.0663828
Inc2	-.5553723	.2670002	-2.08	0.038	-1.078683	-.0320615
Univ_graduates	1.486068	.4259879	3.49	0.000	.6511469	2.320989
Juniorhigh_school	.2628008	.3857685	0.68	0.496	-.4932917	1.018893
Seniorhigh_school	.2302414	.3583248	0.64	0.521	-.4720624	.9325451
Tot_Fam	.1347274	.1033949	1.30	0.193	-.0679228	.3373775
Bugis	-.8263589	.380158	-2.17	0.030	-1.571455	-.0812629
Makassar	-.5943752	.3892766	-1.53	0.127	-1.357343	.1685929
officers	.4078028	.3244319	1.26	0.209	-.228072	1.043678
trader	-.062221	.2970879	-0.21	0.834	-.6445025	.5200605
_cons	-1.367999	.9832319	-1.39	0.164	-3.295098	.5591004

```
. mfx

Marginal effects after probit
      y  = Pr(ImpBeefDum) (predict)
         =  .17495919
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
Age	.0025084	.00394	0.64	0.524	-.005205	.010222	43.385
Inc1*	-.1228449	.06152	-2.00	0.046	-.243414	-.002276	.275
Inc2*	-.1305512	.05921	-2.20	0.027	-.246605	-.014497	.33
Univ_g~s*	.5077411	.14943	3.40	0.001	.214867	.800616	.14
Junior~l*	.0722249	.11253	0.64	0.521	-.148334	.292784	.225
Senior~l*	.0592615	.09212	0.64	0.520	-.121294	.239817	.505
Tot_Fam	.0347242	.02694	1.29	0.197	-.018072	.087521	3.715
Bugis*	-.1934524	.08119	-2.38	0.017	-.352579	-.034326	.38
Makassar*	-.1561859	.10435	-1.50	0.134	-.360715	.048343	.54
officers*	.1130348	.09657	1.17	0.242	-.076243	.302313	.295
trader*	-.0159804	.07592	-0.21	0.833	-.164783	.132822	.44

```
(*) dy/dx is for discrete change of dummy variable from 0 to 1

.
end of do-file
```

Appendix B. LA/AIDS analysis of offal and beef demand (STATA results)

```
  ___  ____  ____  ____  ____ (R)
 /__    /   ____/   /   ____/
___/   /   /___/   /   /___/   13.0   Copyright 1985-2013 StataCorp LP
  Statistics/Data Analysis            StataCorp
                                      4905 Lakeway Drive
                                      College Station, Texas 77845 USA
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                                      979-696-4601 (fax)

Single-user Stata license expires 13 Dec 2014:
       Serial number:  201309238914
         Licensed to:  Vidyahwati Tenrisanna
                       University of Southern Queensland

Notes:
      1.  You are running Small Stata.


. use "E:\DataOccup.dta", clear

. do "C:\Users\u1027930\AppData\Local\Temp\STD07000000.tmp"

.  //**********************GENERATING THE EXPENDITURE VARIABLE*******************************//
.  gen X= LocalOffalKg * LocOffalRp + ImpOffalKg * ImpOffalRp + LocBeefKg * LocBeefRp + ImpBeefKg
>  * ImpBeefRp

.
.  //*****************************GENERATING BUDGET SHARES***********************************//
.  gen w_locoffal=(LocalOffalKg*LocOffalRp)/X

.  gen w_impoffal=(ImpOffalKg*ImpOffalRp)/X

.  gen w_locbeef=(LocBeefKg*LocBeefRp)/X

.  gen w_impbeef=(ImpBeefKg*ImpBeefRp)/X

.
.  //*****************MEAN BUDGET SHARE*************************//
.
.  mean w_locoffal w_impoffal w_locbeef w_impbeef

Mean estimation                     Number of obs    =     200

------------------------------------------------------------------------------
             |       Mean   Std. Err.      [95% Conf. Interval]
-------------+----------------------------------------------------------------
  w_locoffal |   .4015254   .0172646      .3674804    .4355704
  w_impoffal |   .1702162   .0178736      .1349703    .2054621
   w_locbeef |   .3721491   .0184655      .3357359    .4085623
   w_impbeef |   .0561093   .0098148      .0367549    .0754637
------------------------------------------------------------------------------

.
.  gen meanw_locoffal=.4015254

.  gen meanw_impoffal=.1702162

.  gen meanw_locbeef= .3721491

.  gen meanw_impbeef= .0561093
```

```
.  gen poloc = LocOffalRp

.  gen pofim = ImpOffalRp

.  gen pbloc = LocBeefRp

.  gen pbim = ImpBeefRp

.  //*************** GENERATING LOGARITHMS OF PRICES***************************//
.  gen lnpoloc = ln(poloc)
(20 missing values generated)

.  gen lnpofim = ln(pofim)
(98 missing values generated)

.  gen lnpbloc = ln(pbloc)
(25 missing values generated)

.  gen lnpbim = ln(pbim)
(156 missing values generated)

.
.
.  //*****************ESTIMATING LASPEYRES PRICE INDEX************************//
.  gen lnpo=meanw_locoffal*lnpoloc+meanw_impoffal*lnpofim+meanw_locbeef*lnpbloc+meanw_impbeef*lnp
> bim
(185 missing values generated)

.  gen lnx=ln(X)

.  gen lnpx=lnx-lnpo
(185 missing values generated)

.
.  //************SYMMETRY AND HOMOGENEITY CONDITIONS**************************//
.  constraint define 1 [w_locoffal]lnpofim = [w_impoffal]lnpoloc

.  constraint define 2 [w_locoffal]lnpbloc = [w_locbeef]lnpoloc

.  constraint define 3 [w_impoffal]lnpbloc = [w_locbeef]lnpofim

.  constraint define 4  [w_locoffal]lnpoloc+[w_locoffal]lnpofim+[w_locoffal]lnpbloc=0

.  constrain define  5  [w_impoffal]lnpoloc+[w_impoffal]lnpofim+[w_impoffal]lnpbloc=0

.  constraint define  6 [w_locbeef]lnpoloc+[w_locbeef]lnpofim+[w_locbeef]lnpbloc=0


.  //*****************DEFINING DEMAND EQUATIONS With IMR***********************//
.  global demand1 (w_locoffal lnpoloc lnpofim lnpbloc lnpx invmills1)

.  global demand2 (w_impoffal lnpoloc lnpofim lnpbloc lnpx invmills2)

.  global demand3 (w_locbeef lnpoloc lnpofim lnpbloc lnpx invmills3)
```

```
.  //**********ESTIMATING ZELLNER'S SEEMINGLY UNRELATED REGRESSIONS*************//
.  sureg $demand1 $demand2 $demand3, cons (1 2 3 4 5 6 )isure

Iteration 1:   tolerance =   .1830394
Iteration 2:   tolerance =   .3737008
Iteration 3:   tolerance =   .3932407
Iteration 4:   tolerance =    .209622
Iteration 5:   tolerance =  .06583665
Iteration 6:   tolerance =  .01192047
Iteration 7:   tolerance =  .00449056
Iteration 8:   tolerance =  .00423092
Iteration 9:   tolerance =  .00357624
Iteration 10:   tolerance =  .00297902
Iteration 11:   tolerance =  .00247358
Iteration 12:   tolerance =  .00205163
Iteration 13:   tolerance =  .00170064
Iteration 14:   tolerance =  .00140909
Iteration 15:   tolerance =  .00116713
Iteration 16:   tolerance =  .00096647
Iteration 17:   tolerance =  .00080014
Iteration 18:   tolerance =  .00066232
Iteration 19:   tolerance =  .00054816
Iteration 20:   tolerance =  .00045363
Iteration 21:   tolerance =  .00037536
Iteration 22:   tolerance =  .00031058
Iteration 23:   tolerance =  .00025696
Iteration 24:   tolerance =  .00021259
Iteration 25:   tolerance =  .00017587
Iteration 26:   tolerance =  .00014549
Iteration 27:   tolerance =  .00012035
Iteration 28:   tolerance =  .00009956
Iteration 29:   tolerance =  .00008235
Iteration 30:   tolerance =  .00006812
Iteration 31:   tolerance =  .00005635
Iteration 32:   tolerance =  .00004661
Iteration 33:   tolerance =  .00003855
Iteration 34:   tolerance =  .00003189
Iteration 35:   tolerance =  .00002638
Iteration 36:   tolerance =  .00002182
Iteration 37:   tolerance =  .00001805
Iteration 38:   tolerance =  .00001493
Iteration 39:   tolerance =  .00001235
Iteration 40:   tolerance =  .00001021
Iteration 41:   tolerance =  8.446e-06
Iteration 42:   tolerance =  6.986e-06
Iteration 43:   tolerance =  5.778e-06
Iteration 44:   tolerance =  4.779e-06
Iteration 45:   tolerance =  3.953e-06
Iteration 46:   tolerance =  3.270e-06
Iteration 47:   tolerance =  2.704e-06
Iteration 48:   tolerance =  2.237e-06
Iteration 49:   tolerance =  1.850e-06
Iteration 50:   tolerance =  1.530e-06
Iteration 51:   tolerance =  1.266e-06
Iteration 52:   tolerance =  1.047e-06
Iteration 53:   tolerance =  8.658e-07
```

```
Seemingly unrelated regression, iterated
```

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
w_locoffal	10	4	.1345988	0.2151	80.90	0.0000
w_impoffal	10	4	.1683097	0.1064	59.45	0.0000
w_locbeef	10	4	.2301607	-0.1785	399.99	0.0000

```
 ( 1)  [w_locoffal]lnpofim - [w_impoffal]lnpoloc = 0
 ( 2)  [w_locoffal]lnpbloc - [w_locbeef]lnpoloc = 0
 ( 3)  [w_impoffal]lnpbloc - [w_locbeef]lnpofim = 0
 ( 4)  [w_locoffal]lnpoloc + [w_locoffal]lnpofim + [w_locoffal]lnpbloc = 0
 ( 5)  [w_impoffal]lnpoloc + [w_impoffal]lnpofim + [w_impoffal]lnpbloc = 0
 ( 6)  [w_locbeef]lnpoloc + [w_locbeef]lnpofim + [w_locbeef]lnpbloc = 0
```

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
w_locoffal						
lnpoloc	.2103949	.13365	1.57	0.115	-.0515543	.4723442
lnpofim	-.2202099	.0666805	-3.30	0.001	-.3509013	-.0895186
lnpbloc	.009815	.1827774	0.05	0.957	-.3484222	.3680521
lnpx	-.0593907	.0356978	-1.66	0.096	-.1293571	.0105758
invmills1	.212605	.0336745	6.31	0.000	.1466042	.2786057
_cons	.617892	.2027662	3.05	0.002	.2204777	1.015306
w_impoffal						
lnpoloc	-.2202099	.0666805	-3.30	0.001	-.3509013	-.0895186
lnpofim	-.3149211	.0425519	-7.40	0.000	-.3983213	-.2315209
lnpbloc	.5351311	.0956542	5.59	0.000	.3476523	.7226098
lnpx	-.0057224	.0441133	-0.13	0.897	-.0921829	.0807381
invmills2	.0256102	.0055636	4.60	0.000	.0147058	.0365146
_cons	.1032747	.2529777	0.41	0.683	-.3925525	.5991019
w_locbeef						
lnpoloc	.009815	.1827774	0.05	0.957	-.3484222	.3680521
lnpofim	.5351311	.0956542	5.59	0.000	.3476523	.7226098
lnpbloc	-.5449461	.2707397	-2.01	0.044	-1.075586	-.0143059
lnpx	.0892451	.0607435	1.47	0.142	-.0298098	.2083001
invmills3	1.181173	.0774192	15.26	0.000	1.029434	1.332912
_cons	-.2133967	.346418	-0.62	0.538	-.8923635	.46557

```
.
.
.
.
end of do-file
```

Appendix C. Hedonic price analysis of WTP for imported offal (STATA results)

```
.  use "E:\HedonicImpOffal.dta", clear

.
.  regress lnPrice Imp_Affordability Imp_Quality Imp_Accessibility    Inc_high Univ_graduates   a
> gemore40 Bugis  Fam2   officers
```

Source	SS	df	MS		
Model	.390446936	9	.043382993	Number of obs	= 102
Residual	1.64818795	92	.017915086	F(9, 92)	= 2.42
				Prob > F	= 0.0162
Total	2.03863488	101	.020184504	R-squared	= 0.1915
				Adj R-squared	= 0.1124
				Root MSE	= .13385

lnPrice	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Imp_Affordability	-.1594413	.0694977	-2.29	0.024	-.2974698	-.0214128
Imp_Quality	.0716937	.0634363	1.13	0.261	-.0542961	.1976836
Imp_Accessibility	-.0824178	.0487676	-1.69	0.094	-.1792744	.0144389
Inc_high	.0293478	.0305353	0.96	0.339	-.0312979	.0899936
Univ_graduates	-.0244325	.0417063	-0.59	0.559	-.1072648	.0583998
agemore40	-.0779824	.0311667	-2.50	0.014	-.1398823	-.0160826
Bugis	.0556538	.0306677	1.81	0.073	-.0052549	.1165625
Fam2	.0259027	.0305813	0.85	0.399	-.0348345	.0866398
officers	.0681627	.0364371	1.87	0.065	-.0042045	.14053
_cons	10.95917	.052224	209.85	0.000	10.85545	11.0629

```
.  ****Breusch-Pagan Test for Heteroskedasticity***********
.
.  estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnPrice

         chi2(1)      =     0.33
         Prob > chi2  =   0.5676

.  ************Test for Multicollinearity (variance inflation factors)***********
.  estat vif
```

Variable	VIF	1/VIF
Imp_Quality	3.75	0.266956
Imp_Afford~y	2.85	0.350311
Imp_Access~y	2.13	0.468503
officers	1.77	0.565937
Univ_gradu~s	1.56	0.640578
Bugis	1.33	0.749586
agemore40	1.33	0.752182
Inc_high	1.33	0.753774
Fam2	1.31	0.761762
Mean VIF	1.93	

```
.
end of do-file

.
```

Appendix D. Do files STATA 13 program for probit and LA/AIDS analyses

LAAIDSPROBIT INC.do* - Printed on 30/05/2014 11:40:48 AM

```
  1  use "E:\DataOccup.ota", clear
  2
  3  //*****************LAAIDS With IMR************************//
  4  //***probit LocOffalDum Inc_Med Inc_high Univ_graduates Secondary_school Bugis
     Makassar Tot_Fam****//
  5
  6
  7
  8  probit LocOffalDum Age Inc2 Inc1 Univ_graduates Juniorhigh_school Seniorhigh_school
     Tot_Fam Bugis Makassar officers trade,  vce(robust)
  9  mfx
 10  predict p1, xb
 11  replace p1=-p1
 12  generate phi = (1/sqrt(2*-p1))*exp(-(p1^2/2))
 13  generate capphi = normal(p1)
 14  generate invmills1 = phi/(1-capphi)
 15
 16
 17  //***probit ImpOffalDum Inc_Med Inc_high Univ_graduates Secondary_school Bugis
     Makassar Tot_Fam****//
 18  probit ImpOffalDum Age  Inc2 Inc1  Univ_graduates Juniorhigh_school
     Seniorhigh_school Tot_Fam Bugis Makassar officers trade,  vce(robust)
 19  mfx
 20  predict p1, xb
 21  replace p1=-p1
 22  generate phi = (1/sqrt(2*-p1))*exp(-(p1^2/2))
 23  generate capphi = normal(p1)
 24  generate invmills2 = phi/(1-capphi)
 25
 26  //***probit BeefLocDum Inc_Med Inc_high Univ_graduates Secondary_school Bugis
     Makassar Tot_Fam****//
 27  probit BeefLocDum Age Inc2 Inc1 Univ_graduates Juniorhigh_school Seniorhigh_school
     Tot_Fam Bugis Makassar officers trade,  vce(robust)
 28  mfx
 29  predict p1, xb
 30  replace p1=-p1
 31  generate phi = (1/sqrt(2*-p1))*exp(-(p1^2/2))
 32  generate capphi = normal(p1)
 33  generate invmills3 = phi/(1-capphi)
 34
 35  //***probit ImpBeefDum Inc_Med Inc_high Univ_graduates Secondary_school Bugis
     Makassar Tot_Fam****//
 36  probit ImpBeefDum Age Inc2 Inc1 Univ_graduates Juniorhigh_school Seniorhigh_school
     Tot_Fam Bugis Makassar officers trade, vce(robust)
 37  mfx
 38  predict p1, xb
 39  replace p1=-p1
 40  generate phi = (1/sqrt(2*-p1))*exp(-(p1^2/2))
 41  generate capphi = normal(p1)
 42  generate invmills4 = phi/(1-capphi)
 43
 44
 45
 46
 47   //**********************GENERATING THE EXPENDITURE
     VARIABLE*******************************//
 48   gen X= LocalOffalKg * LocOffalRp + ImpOffalKg * ImpOffalRp + LocBeefKg * LocBeefRp
     + ImpBeefKg * ImpBeefRp
 49
 50   //****************************GENERATING BUDGET
     SHARES*************************************//
 51   gen w_locoffal=(LocalOffalKg*LocOffalRp)/X
 52   gen w_impoffal=(ImpOffalKg*ImpOffalRp)/X
 53   gen w_locbeef=(LocBeefKg*LocBeefRp)/X
 54   gen w_impbeef=(ImpBeefKg*ImpBeefRp)/X
 55
 56   //*****************MEAN BUDGET SHARE************************//
 57
 58   mean w_locoffal w_impoffal w_locbeef w_impbeef
 59
 60   gen meanw_locoffal=.4015254
 61   gen meanw_impoffal=.1702162
 62   gen meanw_locbeef= .3721491
```

Page 1

Appendix E. Do files STATA13 program for Hedonic price WTP analysis

Hedonic.do* - Printed on 28/10/2014 11:09:34 AM

```
1   ***************************Hedonic Price Model ********************
2
3   use "E:\HedonicImpOffal.dta", clear
4
5   regress lnPrice Imp_Affordability Imp_Quality Imp_Accessibility Inc_high
6           Univ_graduates   agemore40 Bugis  Fam2   officers
7
8   ****Breusch-Pagan Test for Heteroskedasticity***********
9
10  estat hettest
11
12  ************Test for Multicollinearity (variance inflation factors)***********
13
14  estat vif
15
```

Appendix F. Research ethics approval letter

OFFICE OF RESEARCH AND HIGHER DEGREES
Ethics Committee Support Officer
PHONE (07) 4631 2690 | FAX (07) 4631 1995
EMAIL ethics@usq.edu.au

Dear Vidyahwati

The Chair of the USQ Human Research Ethics Committee (HREC) recently reviewed your responses to the HREC's conditions placed upon the ethical approval for the below project. Your proposal now meets the requirements of the *National Statement on Ethical Conduct in Human Research (2007)* and full ethics approval has been granted.

Project Title	Offal Cattle Demand in Indonesia and Australian Trade Prospects (A case study for Makassar)
Approval no.	**H12REA186**
Expiry date	**05 February 2013**
Acting Chair Decision	**Approved**

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete 05/02/2013
(f) advise in writing if the project has been discontinued.

For (c) to (e) forms are available on the USQ ethics website: http://www.usq.edu.au/research/ethicsbio/human

Please note that failure to comply with the conditions of approval and the *National Statement (2007)* may result in withdrawal of approval for the project.

You may now commence your project. I wish you all the best for the conduct of the project.

Leah Baldwin

Ethics Committee Support Officer

Office of Research and Higher Degrees

The Ethics Chair has recently reviewed your application for amendments to approved project H12REA186 Offal cattle demand in Indonesia and Australian trade prospects (A case study for Makassar). The requested amendments have been endorsed and full ethics approval has been granted.

Your amendment approval number is H12REA186.1

Ethics approval for the project expires on 30 June 2014.

The standard conditions of this approval are:

(a) conduct the project strictly in accordance with the proposal submitted and granted ethics approval, including any amendments made to the proposal required by the HREC
(b) advise (email: ethics@usq.edu.au) immediately of any complaints or other issues in relation to the project which may warrant review of the ethical approval of the project
(c) make submission for approval of amendments to the approved project before implementing such changes
(d) provide a 'progress report' for every year of approval
(e) provide a 'final report' when the project is complete
(f) advise in writing if the project has been discontinued.

For (c) to (e) proformas are available on the USQ ethics website: http://www.usq.edu.au/research/ethicsbio/human For (d) and (e) please diarise the applicable dates now.

Please note that failure to comply with the conditions of approval and the *National Statement on Ethical Conduct in Human Research (2007)* may result in withdrawal of approval for the project.

You may now implement the amendments. I wish you all the best for the conduct of the project.

Melissa McKain
Manager, Research Integrity & Governance
Office of Research & Higher Degrees
University of Southern Qld
Ph +61 7 46312214
Fax +61 7 46311995
Email melissa.mckain@usq.edu.au

=

Appendix G. Participant information sheet

University of Southern Queensland

The University of Southern Queensland

Participant Information Sheet

HREC Approval Number:

TO: Participants

Full Project Title: **Offal Cattle Demand in Indonesia and Australian Trade Prospects (A case study for Makassar)**

Principal Researcher: Vidyahwati Tenrisanna

I am Vidyahwati Tenrisanna, PhD student in the Faculty of Business and Law, University of Southern Queensland, Australia. My research project will look into the Makassar's demand for local offal and imported offal and how Australia can play a role in meeting the high demand for offal in Makassar. I would like to invite you to take part in this research project.

Please read this statement carefully. The purpose is to explain to you as openly and clearly as possible all the procedures involved so that you can make a fully informed decision as to whether you are going to participate. Feel free to ask questions about any information in the document.

Once you understand what the project is about and if you agree to take part in it, it is asked that you sign the Consent Form. By signing the Consent Form, you indicate that you understand the information and that you give your consent to participate in the research project.

1. Procedures

Participation in this project will involve

- ***I will do face to face interview with all participants. Each participant will be interviewed only once. I will audio record the interview for exporter participants only. It will take you around 20-30 minutes for the interview.***
- ***The research project will be monitored by the researcher's supervisors (Dr Mafiz Rahman and Dr Rasheda Khanam) and the University of Southern Queensland (Human Ethics and Research Integrity Officer, Office of Research and Higher Degrees).***
- ***I will use a structured questionnaire for the survey. The information collected will include your expenditures on offal (local and imported), offal prices and types. I will also ask about your income, age, level of education, and ethnic origin. The interview will also identify the opportunities and problems that you may have in the offal supply chain.***
- ***Although this study will not benefit you directly, the results of the research project will provide recommendations to the Indonesian government and offal traders whether to increase local offal production or to increase the number of imported offal and to improve the supply.***
- ***No potential risks to the participants are expected.***

- ***Any and all information received will be kept strictly confidential and will be seen only by the principal researcher. Data will be stored for five years and then destroyed.***
- ***In any publication, information will be provided in such a way that you cannot be identified.***

2. Voluntary Participation

Participation is entirely voluntary. **If you do not wish to take part you are not obliged to.** If you decide to take part and later change your mind, you are free to withdraw from the project at any stage. Any information already obtained from you will be destroyed.

Your decision whether to take part or not to take part, or to take part and then withdraw, will not affect your ***relationship with*** the University of Southern Queensland.

Before you make you decision, I will be available to answer any questions you have about the research project. You can ask for any information you want. Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

Please notify the researcher if you decide to withdraw from this project.

Should you have any queries regarding the progress or conduct of this research, you can contact the principal researcher:

Vidyahwati Tenrisanna
Faculty of Business and Law, School of Accounting, Economics and Finance
West Street, Toowoomba 4350, Queensland, Australia
Ph: +61 7 4631 5465 and Mobile: +61 413743168 (after hours)

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ***ethics@usq.edu.au***

Appendix H. Consent form for participants

University of Southern Queensland

The University of Southern Queensland

Consent Form

HREC Approval Number:

TO: Participants

Full Project Title: Offal Cattle Demand in Indonesia and Australian Trade Prospects (A case study for Makassar)

Student Researcher: Vidyahwati Tenrisanna

- I have read the Participant Information Sheet and the nature and purpose of the research project has been explained to me. I understand and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I confirm that I am over 18 years of age.
- I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.
- I understand that the tape will be retained for a period 5 years. The tape will be stored in a secured place and only the principal researcher will have access to it (exporters only).
- I understand that I will be audio taped during the study (exporters only). The researcher will use to clarifying information on the questionnaire and for better understanding of responses.

Name of participant…….....

Signed……**Date**…….

If you have any ethical concerns with how the research is being conducted or any queries about your rights as a participant please feel free to contact the University of Southern Queensland Ethics Officer on the following details.

Ethics and Research Integrity Officer
Office of Research and Higher Degrees
University of Southern Queensland
West Street, Toowoomba 4350
Ph: +61 7 4631 2690
Email: ***ethics@usq.edu.au***

Appendix I. Research questionnaire

OFFAL CATTLE DEMAND IN INDONESIA AND AUSTRALIAN TRADE PROSPECTS
(A CASE STUDY FOR MAKASSAR)

Respondent :
Age :
Gender :
Occupation :

1. What is your monthly total household income?
   - □ Less than Rp.2,000,000,- (AUS$200)
   - □ Rp.2,000,000 – Rp.5,000,000 (AUS$100-AUS$300)
   - □ Rp.5,000,000 – Rp.6,999,999 (AUS$500 – AUS$700)
   - □ Rp.7,000,000 or more (AUS$700 or more)
2. What is the highest degree or level of education you have completed?
   - □ Less than high school
   - □ High school graduate (includes equivalency)
   - □ Some college, no degree
   - □ Bachelor degree
   - □ Master's degree
   - □ PhD degree
   - □ Professional degree
3. What is the size of your household?
   - □ 1 or 2 members
   - □ 3 or 4 members
   - □ 5 or more
4. What is your ethnicity?
   - □ Bugis-Makassar (local ethnic)
   - □ Other? .....
5. What type of offal have you bought in the last 3 months?
   - □ liver
   - □ heart
   - □ tongue
   - □ kidney
   - □ tripe
   - □ spleen
   - □ intestines

- □ lungs

6. In terms of offal sources, where did the offal you purchased come from?
   - □ local
   - □ imported (fresh)
   - □ imported (frozen)
   - □ all
7. What were the prices of the product (beef and offal) you bought (list all)?
   .....
   .....
8. How often do you buy offal and where?
   - □ once a month
   - □ twice a month
   - □ three times a month
   - □ four times a month or more
9. Which one do you prefer? Local or offal imported from Australia? Why?
   (a) Affordability (yes/no)
   (b) Quality (yes/no)
   (c) Easy to get (yes/no)
   (d) Other reasons: .....
10. Are there any problems in accessing offal products?
    ……
    ……
    ……
11. Do you agree there should be more imported offal in the market? (yes/no)
    why?.....
    .....
    .....