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Australian Beef and Sheep meat edible offal market review 2012

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1 Abstract

At current pricing, the potential value of beef offal is about $60 per head from a 275 kg steer, about $7.8 per head from sheep and about $8 from lamb. Exporters typically pack 18 to 24 items of beef offal and 5 to 9 items of sheep offal. Another 5 items of beef offal may be recovered from time-to time. Domestic producers supply about 7 to 8 items of beef and sheep offal.

Apart from seasonal demand, prices paid for offal depends on market access and packaging style. For some offal, particularly tongue, rumen pillar and tripe, brand or establishment recognition affect pricing. This recognition is based on consistent application of trimming and processing specifications.

Premium pricing is available for chilled offal but only about 4% of exported offal is in chilled form.

Increased financial returns from offal are available from widening market access and increasing yield of offal items and recovery rates. Packaging methods that provide extended shelf life and attractive presentation should increase demand at premium prices in the domestic and export markets.

2 Executive summary

Edible offal contributes about 7% of the total revenue available from the all products derived from cattle and sheep slaughtered for human consumption. All meat processors recover offal items for human consumption but the range of offal recovered and recovery rates for offal items vary between establishments. To understand the range of offal collected for human consumption and methods of processing and packing eleven offal rooms were visited at export tier 1 and tier 2 and domestic abattoirs.

The range offal recovered depends in part on market access. For example the main demand for tripe is in Hong Kong and this market is only open to tier 2 abattoirs. There has to be a consistent market and domestic and tier 1 establishment may not have a consistent market and do not usually recover tripe. Similarly the demand for small and large intestine and rumen pillar is in Japan and Korea and these items are not collected unless an establishment has access to these markets.

Domestic abattoirs tend to recover a limited range of offal, mainly heart, liver, kidney, tail and cheek meat.

Some establishments choose not to collect a full range of offal because the price of items is low, processing costs may be high and alternative outlets such as pet food and rendering can offer equal or better returns.

Most offal is exported frozen with a shelf-life of about 12 months. There is also export of chilled offal both by air freight and sea freight. About 4% of exports of both beef and sheep offal are in chilled form. The demand for chilled beef offal is mainly in Japan and applies to tongue and thick and thin skirt from grain-fed cattle. The premium for these items in chilled form is $1 to $2 per kg and additional processing costs are about 25 to 50 cents per kg. The demand for chilled sheep offal is mainly in the Middle East, particularly the UAE.

Chilled (or fresh) offal is the main form of distribution in the domestic market.

Chilled offal may be vacuum packed in chamber evacuation machines and is also packed in thermo-form films and in the Darfresh packing system. It is also bulk-packed as chilled offal for domestic distribution and some export air-freight distribution.

A wide range of treatments is used to prepare offal. Some offals are packed with very little treatment or trimming e.g. heart, liver, kidney, while others require more extensive trimming or labour to remove them from the carcase e.g. tongue, thick and thin skirt, cheek meat, tendons. Intestinal offals including tripe, rumen pillar, honeycomb, omasum, abomasum, large intestine, small intestine require extensive trimming and treatment to prepare them for sale. All edible offal must comply with refrigeration index criteria. To achieve this some offal, particularly liver and heart may be pre-cooed in water or ice before they are packed. Vacuum-packed chilled offal may be pre-chilled to improve presentation in the vacuum pack.

Export offal are trimmed and packed according to detailed specification. For some items, particularly tongue and rumen pillar, compliance with specification affects brand recognition and pricing. Pricing is also affected by packaging method and destination market. For example, premium prices for liver are available from Russia during the peak season and Malaysia pays a premium for Halal offal in demand periods. Obtaining premium pricing usually comes at a cost of lower yield due to more extensive trimming, cost in achieving and maintaining market access for example to Malaysia and risks of rejection for example for high cadmium levels in product exported to Russia.

The main concerns about offal marketing relate to achieving and maintaining market access and maximising yield and recovery. Markets and customers are well established and exporters do not place much emphasis on finding new customers and market opportunities. However, most offal producers and traders agree that there are opportunities in the domestic and export markets for sales of chilled offal at premium prices, if suitable packaging that provide reliable shelf life and attractive presentation are available. An example of the success of this type of packing is cheek meat packed in Darfresh packaging system supplied to Aldi stores with a shelf life of 40 days.

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3 Background

MLA has conducted a range of projects related to recovery and preparation of offal. These projects include market studies, investigations of the disposition of offal at post-mortem inspection, yield and recovery investigations and processing techniques. Some of these projects have resulted in improved recovery of offal for human consumption. A project on the recovery of tripe from burst paunches resulted in an increase in the amount of tripe that can be recovered. Projects on methods of processing offal resulted in opening new markets and sales for offal items and establishments sold product as a result. These sales have not necessarily continued.

This project was undertaken to identify the current range of Australian beef and sheep offal in both domestic and export markets. It also examined market drivers to assist the direction of future science and technology and supply chain opportunities to increase demand for and profitability of offal production.

4 Project objectives

1. Identify the current beef and sheep meat processors in Australia – with both domestic and export tier 1 and 2 accreditations and product offer.
2. Identify current market channels and supply chain logistical models for Australian beef and sheep meat edible offal – by type and volume.
3. Describe pre-packaging treatments/processes undertaken and typical offal yields.
4. Describe packaging and distribution formats/processes for edible offal.
5. Define the typical edible offal price points – domestic and export markets – include cost impost/benefit presented in #3 & #4 (i.e. Halal slaughtering, extra trimming, chilling cooking, retail ready packing, etc).
6. Determine from the processors'/traders' perspective the value differences for offal – include branding, quality, trading terms.
7. Discuss the opportunities and constraints for further processing edible offal and indentifying new market opportunities/ market access.

5 Methodology

Offal packing rooms at eleven abattoirs were inspected to determine the range of offals being packed; methods of packing; pre and post-packaging treatments and markets. The offal rooms inspected are listed in Appendix 1. The inspections included nine tier 2, and one tier 1 export offal rooms. One domestic offal room was inspected. Two of the export offal rooms also packed offal for the domestic market. The inspections included four sheep offal packing rooms and ten beef offal packing rooms (three establishments packed both sheep and beef offal).

Telephone interviews were conducted with 19 people responsible for marketing offal products in export and domestic markets.

Statistics about exports of offal products were obtained from the Australian Bureau of Statistics (ABS) and from MLA.

This project is being conducted by Kurrajong Meat Technology alongside the MLA Co-products Monitor which reports monthly surveys of offal pricing and markets. The Co-products Monitor report has provided the information on offal pricing.

6 Results and discussion

6.1 Processors and edible offal range

Processors who were visited or interviewed as part of the project are listed in Appendix 1.

From the yield data and prices shown in Tables 6, 7 and 8, the value of edible offal from cattle and sheep slaughtered for human consumption is about $61 per head in the case of a 275 kg steer, about $7.8 per head in the case of a 24 kg sheep and $8 per head from a 20 kg lamb. These values assume that a wide range of offal is recovered but include an allowance for condemned material. In practice the total values shown in Tables 6, 7 and 8 are probably not realised because establishments do not necessarily collect all the potentially edible offal. Values are based on April 2013 prices reported in the MLA Co-products Monitor.

These values represent about 7 % of the gross returns from all products (including meat, hides, skins and rendered products) of cattle and sheep slaughtered for human consumption. In view of the contribution to revenue available from edible offal it can be assumed that all cattle and sheep processors collect and market edible offal.

The offal items on offer depend, in part, on what markets an establishment has access to. Some markets have demand for specific items and access to these markets may determine what edible offal items are saved.

Tier 2 export abattoirs can potentially access all export markets although specific approvals are required for the important offal markets of China, Russia, Mexico, Malaysia and USA. Many bovine and ovine tier 2 export abattoirs are listed to supply these markets. For example approximately 68 ovine/bovine slaughter establishments are approved to export to the USA, 62 are approved for Mexico; 50 are approved for China; 41 bovine and 20 ovine are approved for Russia. Malaysia is more restrictive and about 29 establishments are approved to export bovine and ovine products to Malaysia.

As an example of how market access affects the range of offal collected, in the peak season Russia is the main market for liver and pays a premium. Establishments that do not have access to Russia may find recovery of liver as edible product to be less profitable then other outlets such as pet food or rendering. One establishment that does not have access to Russia has indicated that liver recovery as an edible product is marginal and usually consigns livers to pet food.

Obviously Halal certification is required to access the Halal markets. The main Halal markets are Saudi Arabia and other Middle East countries, Malaysia, Singapore and Indonesia. Tier 1 export abattoirs can access offal markets in most Middle East countries but not the important market of Saudi Arabia. They can access other offal markets in PNG; Fiji, other Pacific islands; Indonesia and Jamaica. They cannot access the important markets of Japan, Korea, Hong Kong, China, Russia and South Africa and this limits the range of products recovered. For example tier 1 establishments do not usually offer rumen pillars or other intestinal offal including tripe, omasum, and honeycomb unless they have domestic sales.

Domestic establishments recover a smaller range of offal items than tier 1 and tier 2 establishments because of the limited demand in the domestic market.

Table 1 lists the major beef offal items on offer to export markets and indicates whether the items are collected regularly. The table also summarises the constraints that inhibit collection, the pre-treatments and methods of packaging and the principle markets.
Table 2 provides similar information about sheep offal.

Table 3 lists offal items offal on offer to the domestic market.

Table 1: Beef offal items on offer from Australian processors

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
Stomach offal items	Requires green offal room where paunches are opened. Processors may have a separate paunch opening and tripe trimming/cooking room. There must be a separate room (from tripe opening) for trimming and packing cooked product.			
Abomasum	Rarely collected	The market demand is small and prices fluctuate. Price does not justify collection costs when price is low. Grain-fed and Wagyu product is preferred.	Split open, washed, layer packed and frozen.	Japan.
Omasum (bible)	Commonly collected at tier 2 export establishments.	Requires equipment for cleaning and scalding omasum. China does not permit direct import from Australia.	Cut in half for processing, washed, scrubbed and scalded. Multi-wrapped with two pieces per bag. May be bulk-packed. Frozen.	Hong Kong; Thailand; Taiwan.
Honeycomb	Commonly collected at tier 2 export establishments.	Requires equipment for cleaning and scalding honeycomb.	Trimmed from paunch, washed and scalded. Layer packed and frozen.	Taiwan; Hong Kong.
Mountain chain (rumen pillars)	Commonly collected at tier 2 export establishments.	Price depends on weight ranges. Grain-fed cattle have small rumen pillars that are below the acceptable weight range.	Trimmed from rumen, individually wrapped (I.W.) packed according to weight ranges >500g; 500 to 700g and >700g. Frozen	Japan; Korea.

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
Tripe pieces	Commonly collected at tier 2 export establishments.	Requires equipment for cleaning and scalding tripe. China does not permit direct import from Australia.	Trimmed from rumen after removal of pillars, scrubbed, scalded and cooled. Multi-wrapped in 4 to 6 kg bags. Packed in 12 to 23 kg cartons. Frozen.	Hong Kong for on-shipment to China. Malaysia; Korea.
Head offals	Mostly recovered on slaughter floor and packed in offal room with minor trimming and inspection.			
Cheek meat	Commonly collected at all establishments.	No constraints.	Trimmed to fat specification. May be tested for chemical lean. Bulk–packed or I.W. 2 or 6 per bag. Frozen. Grain-fed may be chilled after vacuum-packing 4 per bag. May be chilled and bulk-packed for domestic distribution	Frozen product mainly exported to Korea. Small amount of chilled product to Japan. Also a wide range of smaller export markets. Chilled product distributed to domestic market.
Lips	Commonly collected at tier 2 export establishments.	No constraints.	May be scrubbed and washed in Frilec (tripe processing) machine. Bulk-packed and frozen.	Mexico for premium price. South Africa. Indonesia and Singapore for Halal products. (Halal market is currently

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
				weak).
Head meat	Collected by most but not all export processors	Collection is labour intensive and yield is low.	May be CL tested. Bulk-packed frozen	Korea, Indonesia, Philippines
Tongue	Commonly collected at all procesors. Mostly swiss cut but also swiss cut special trim. Short cut and long cut not collected for export.	No constraints.	Trimmed; I.W. in cling wrap packed in weight ranges (<900g & >900g) and frozen. Wagyu, grain-fed and selected grass fed may be vacuum-packed and chilled.	Japan
Tongue root meat	Collected at most but not all export processors.	Collection is labour intensive and price is low.	Bulk-packed or in 9 kg bags in cartons. Frozen.	PNG; South Africa; Indonesia; Fiji, Singapore.
Tongue root fillet	Collected at some but not all tier 2 processors.	Yield is low and some processors leave tongue root fillet with tongue root meat to reduce labour and get a better price for the tongue root meat.	Packed in 9 kg bags and frozen in cartons.	Japan
Thoracic offal	Collected, trimmed and inspected on slaughter floor. May be minor trimming and cooling in water in offal packing room			
Heart	Commonly collected at all establishments.	No constraints.	Cut open, trimmed bulk-packed and frozen	Russia; PNG; Indonesia, South

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
				Africa, Singapore
Liver	Commonly collected at all establishments.	Pricing is according to market access and liver may be consigned to pet food if price is low (<$0.7 per kg). Pet food price may be higher than the edible price (e.g. $0.75 for frozen pet food and packaging costs are lower but the pet food market is limited in the volume it takes).	I.W. one per bag; Middle East label included if required. Frozen	Russia; South Africa, Middle East, Indonesia, Malaysia
Lung	Not commonly collected	Price is low. Usually needs Halal certification. Can be included in pet food as an alternative to edible use.	Bulk packed; Frozen	Malaysia; Singapore
Heart aorta	Collected by most but not all tier 2 processors.	Yield is low and may not justify labour. Needs China access.	Usually split open; may be scrubbed and washed in Frilec machine if left as whole tube. Bulk-packed frozen.	China
Spleen	Not commonly collected	Price is low	I.W. one or two per bag. Frozen	Thailand; Malaysia; Hong Kong.
Weasand meat	Only collected at one	Price and yield is low but	Layer-packed; frozen.	Japan (very small

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
	establishment inspected.	requires labour.		volume).
Thick skirt (hanging tender)	Commonly collected at all establishments.	No constraints.	Membrane removed. Layer packed and frozen. Wagyu, grain fed and selected grass fed may be vacuum-packed 2 per bag and chilled	Japan; Korea.
Thin skirt	Commonly collected at all establishments.	No constraints.	Membrane may be removed, fat trimmed; Bulk-packed and frozen. Wagyu, grain fed and selected grass fed may be vacuum-packed 2 per pack and chilled. May be necessary to pre-chill before vacuum packing to maintain shape.	Japan; Korea; USA
Membrane	Commonly collected at tier 2 export establishments.	No constraints	Bulk packed and frozen.	China; Japan
Intestine	Needs collection room with specialised equipment			
Small intestine	Not commonly collected unless grain-fed cattle are processed.	Labour intensive and requires specialised equipment. Demand and prices fluctuate. Demand is	Flushed and split open for Japan. Flushed and left whole for Korea. Cut to length. May	Korea; Japan.

Offal item	Frequency of collection	Constraints to collection	Pre-packing treatments and packing style	Principle markets (countries listed in descending order of import volume)
		for product from grain-fed cattle only.	be cooked. Layer packed and frozen.	
Large intestine	Not commonly collected unless grain-fed cattle are processed	Labour intensive and requires specialised equipment. Demand and prices fluctuate. Demand is for product from grain-fed cattle.	Flushed, trimmed but plenty of fat left on; may be split or turned inside out. Layer packed and frozen.	Japan; Korea
Other				
Tendons	Collected by most but not all processors.	Labour cost and low yield may not justify recovery. Hindquarter yield may be very low depending on slaughter floor procedures.	May be scrubbed and washed in Frilec machine. Layer packed HQ and FQ combined or separate. Frozen.	Mainly Taiwan and Korea; also China and Japan. Also domestic sales.
Tail	Commonly collected.	No constraints.	Trimmed; I.W. and frozen. Wagyu and grain fed may be vacuum packed and chilled Chilled and bulk-packed for domestic market.	Korea; Malaysia; Singapore, Caribbean, South Africa; Japan. Domestic market.
Paddywhack (ligamentum nuchae)	Collected by a few processors (two out of eight beef plants inspected).	Weak demand. Needs china access	Packed in boning room; bulk-packed frozen.	China

Offal item	**Frequency of collection**	**Constraints to collection**	**Pre-packing treatments and packing style**	**Principle markets (countries listed in descending order of import volume)**
Occasionally recovered items				
Pizzle	Not currently collected except for pet food.	Weak demand	Frozen	China
Pericardium	Not currently collected.	Weak demand	May be recovered by contractor.	Unknown
Trachea	No current collection identified.	Low price and labour intensive preparation.	Trimmed on spray nozzle and split open.	China; domestic.
Spinal cord	No current collection.	Weak demand. BSE.	One kg bags and frozen in cartons.	China
Testes	No current collection identified.	Weak demand	Frozen	China

Table 2: Sheep offal items on offer from Australian processors

Offal item	Frequency of collection	Constraints to collection	Packing style	Principle markets
Brain	Not collected by many processors. Three collectors have been identified.	Necessity to prepare heads for inspection. Labour intensive. Specialised collection equipment to split skulls required.	Individually packed in compartments in trays and frozen	Saudi Arabia and UAE
Tongue (long cut and short cut)	Collected by about half sheep meat processors.	Necessity to prepare of heads for inspection. Hygiene issues from ingesta contamination.	I.W. and frozen	PNG; Hong Kong long cut. Short cut domestic.
Heart	Commonly collected.	No constraints	Bulk packed and frozen.	South Africa; PNG, Jordan; Thailand
Liver	Commonly collected.	No constraints	I.W. one per bag. Saudi Arabia label included in bag. Frozen.	Saudi Arabia and other Middle East; South Africa.
Kidney	Commonly collected.	No constraints	I kg bags and 25 bags per carton. Frozen	China; Hong Kong; Saudi Arabia; UAE.
Spleen	Not commonly collected.	Low price and low yield.	In bags and frozen in cartons.	Jordan
Pluck	Not commonly collected.	Weak demand; Low price	Not observed	Singapore
Lung	Not commonly collected.	Weak demand; Low price	Not observed	Brunei
Tripe scalded	Commonly collected.	Requires equipment for cleaning and scalding tripe. China does not permit direct import	Full paunch including rumen and reticulum (honeycomb). Washed and scalded with hot	Hong Kong; India; Saudi Arabia.

Offal item	Frequency of collection	Constraints to collection	Packing style	Principle markets
		from Australia.	and cold water. Bulk packed and frozen.	
Tripe raw	Not commonly collected	Weak demand.	Not observed.	India

Table 3: Principle offal items on offer to the Australian domestic market

Beef offal	**Lamb offal**
Heart	Brain
Tongue	Liver
Tail	Tongue
Kidney	Heart
Tendon	Kidney
Cheek meat	Pluck
Veal sweetbread	Lung
	Sweetbread

Appendix 2 shows the major export destinations for edible offal in 2012. From Tables 10 and 11 in Appendix 2 it is clear that certain beef offal items are directed to particular countries. For example:

- Japan takes 90.3% of tongues;
- Thick skirts go to Japan (60.6%) and Korea (38.2%);
- Korea takes 87.4% of cheek meat;
- Korea takes 63.3% of small intestine;
- Tripe goes mainly to Hong Kong (70%) and also Malaysia (13%); Korea (10%) and Thailand ((5%);
- Tail goes to Korea (40.9%) and USA (19.5%);
- Heart goes to Russia (28.9%), PNG (25.4%), Indonesia (14.8%) and southern Africa (10.4%);
- Liver goes to Russia (50.3%), southern Africa (19.6%), and the Middle East (17.1%);
- Beef lips go to southern Africa (40.9%) and Mexico (32.1%);
- Kidney is exported mainly to Southern Africa (86.4%)

Sales of other offal of smaller total volume are also dominated by specific markets. For example:

- Head meat is mainly exported to Korea (58%), Indonesia (9.7%) and Philippines (6.8%);
- Rumen pillar (mountain chain) is exported to Japan (87.6%) and Korea (12.2%);
- Honeycomb is exported mainly to Taiwan (61.4%) and Hong Kong (25%);
- Lung is exported mainly to Malaysia (62.0%) and Singapore (35.5%);
- Tendon is exported to Korea (43.2%); Taiwan (24.8%) and China (15.3%).

Tables 12 and 13 in Appendix 2 summarises export destinations for sheep offals. Total sheep offal exports are 25,000 tonnes compared with 130,000 tonnes of beef offal

The available export markets may affect the offal on offer and certainly affects pricing. Appendix 1 shows the countries that Tier 1 export abattoirs have access to. Some of these countries are important offal markets, particularly the Middle East countries of Bahrain, Egypt, Oman, Qatar and UAE. Tier 1 establishments also have access to Fiji and PNG.

6.2 Pricing and processor/trader perspectives

Apart from seasonal market conditions that vary from month to month, the price of individual offal items can depend on;

- which market the product is directed to;
- brand recognition;
- trim details;
- packing style

Some examples of what affects pricing are:

Halal offal generally attracts a premium compared with non-Halal. Since permits to import into Indonesia have become very difficult to obtain, premiums for Halal product has been greatly reduced. Halal offal exported to Malaysia may attract a premium, typically 10 to 20 cents per kg for tripe. Halal liver to the Middle East also usually has a 10 cent per kg premium compared with non-Halal product, except when liver is demand in Russia. There are costs associated with Halal product including a per kg cost for use of Halal labels on individual items or cartons and Malaysian access requires a full-time Halal supervisor that could cost $1,500 per week over a range of products. Halal premiums cannot be relied on as they depend on demand. Some Halal markets such as Singapore offer very little premium.

Beef lip prices vary according to market destination. Mexico is the premium market and South Africa the secondary market. The March average price was $1.45 per kg with a 40 cent range between the high price to Mexico and the lower price to South Africa. Beef lips have attracted a substantial premium e.g. 50 cents per kg if exported to Halal markets. Since Indonesia has ceased issuing import permits for offal, demand for Halal lips has diminished and there is very little Halal premium. Malaysia and Singapore are still options for Halal product but pay similar prices to Mexico.

Liver prices have two levels, one for Russia and one for South Africa. The price difference is about 50 cents per kg. Halal markets are the Middle East and Singapore but volumes are low. There is a Halal premium compared with South Africa but Halal product is discounted compared with Russia in the Russian peak season (summer months). The premium associated with sales of liver to Russia is associated with unfavourable terms of trade and risks of rejection for high cadmium levels.

In contrast, heart prices have a small range. The average price was $1.14 per kg in March with a range of 20 cents per kg and Halal heart was an average price of $1.13 per kg with a range of 5 cents. There is a small price range for heart because the product is being exported to the low value markets of South Africa and PNG. These markets do not discern between degrees of trim or other quality factors. As with lips the Halal premium has disappeared since Indonesia stopped issuing import permits.

Tongue prices have a price spread of about $1.5 to $2 per kg. Virtually all exported tongues (99%) goes to Japan and the price spread is surprising considering that

there is a single destination. The price spread is usually explained by brand recognition. From the prices reported to the MLA Co-products monitor in the last six months of 2012, it appeared that some processors consistently achieved prices at the top end of the range. Teys Australia and JBS Australia consistently report prices at the high end of the range. Brand recognition and justification of premium pricing is due to consistent compliance with specifications. Compliance with specifications results in more saleable yield for the customer.

Rumen pillar (mountain chain) also exhibit a wide price range of about $2 per kg. There is a similar spread in all weight ranges. Rumen pillars are exported mainly to Japan but also to Korea. The price range relates to brand recognition and compliance with specifications.

Tongue and rumen pillar prices depend on weight ranges. Tongues must be >900g to attract the premium price. Examples of rumen pillars pricing are $9 per kg for >500g pillars and $15 per kg for >700g pillars (April 2013 prices).

Tongue, thick skirt and thin skirt may be exported vacuum-packed and chilled. Japan is the main market but Korea also takes some chilled thick and thin skirt. Generally the market for these items is for tongues and skirts from Wagyu and other grain-fed cattle but product from grass-fed cattle is also vacuum packed and exported chilled. Exporters have indicated that cheek meat and tails may occasionally be vacuum-packed and exported chilled.

Pricing is affected by packing style with bulk-packed frozen product at the low end of the price range followed by individually wrapped frozen product followed by vacuum-packed and chilled. Each packing style is associated with costs and premium pricing must at least cover the additional costs. Indications of costs are that the difference between bulk packed and I.W. is about 8 to 10 cents per kg. An additional 10 to 15 cents for packaging and 20 cents for labour applies to vacuum-packed chilled products. A premium of at least $1 per kg is sought for vacuum-packed chilled products.

One exporter has reported that vacuum-packed chilled tongues from grain-fed cattle attract a premium of at least $1 per pound ($2.2 per kg) compared with the same category of product packed I.W. frozen. Chilled thick and thin skirts have at least $0.8 per pound ($1.75 per kg) premium compared with the same product exported frozen. In this case the additional cost of vacuum packing compared with frozen is about 25 cents per kg. This cost applies to packing through a thermo-form machine which is lest costly than packing in pouches in vacuum-chamber machines.

For sheep offal, pricing is usually consistent i.e. prices are in a small range, except for kidney. Mutton kidney is exported to Saudi Arabia and lamb kidney is exported to China. China has a limit on cadmium levels and there is a high risk of exceeding the cadmium limit in mutton kidney. One exporter has reported that the price of mutton kidney is about $4 per kg for export to the Saudi Arabia market and can be up to $5.6 per kg for lamb kidney exported to China.

Meat processors stress the effects of brand recognition on offal pricing but traders have not stressed brand recognition. It is clear that brand recognition applies to pricing of certain items, particularly tongue and rumen pillars exported to Japan, and tripe, honeycomb and bible exported to Hong Kong. Brand recognition is earned through customer relations, reliable supply and consistent quality but for the items mentioned it also relates to yield and usability from the customer point of view.

In the case of tripe, honeycomb and bible to Hong Kong, it is reported that all exporting establishments are ranked according to the quality of product and the price paid for an establishment's product is according to ranking. Tripe quality relates to how well the product is trimmed e.g. if any rumen portion of the tripe is left on the honeycomb; how well the products are cleaned and how well they are cooked. Tripe is further processed by customers by washing and bleaching. Customers expect some weight gains in this process. Cooking (or scalding) by the Australian packer affects how much the tripe will gain weight (swell) in later processing and affects establishment ranking and pricing. Price differences according to rankings may not be noticeable when there is firm demand but it is more difficult to sell product from low-ranking establishments when demand is low.

Packers and non-packer exporters have stressed the balance between quality and yield from the packers' point of view. Trimming strictly to specification produces product that give the customer a product with better useable yield. Less stringent trimming gives the packer better yield. This applies in particular to tongue and rumen pillars. Brand recognition and pricing in Japan relates to trimming and adherence to specification to give the customer maximum yield of usable product.

Details of domestic prices of offal have not been examined closely but domestic producers and exporters who also sell product domestically have reported that for those offal items that are sold on the domestic market (see Table 3), pricing is similar to export pricing with the exception of tongues. These comments apply to fresh offal sold to butchers or food service customers. Surplus offal from domestic abattoirs that is not sold as fresh-chilled is frozen for sale through wholesalers and this product is more likely to be discounted compared with export pricing. Some export processors report that they may sell product on the domestic market when there is domestic demand and a price premium. Tails and cheek meat may experience increased seasonal demand in the domestic market and attract premiums compared with export prices. For example one exporter reported that there is a market for chilled cheek meat to food service customers at $7-8 per kg. Others have pointed out that high premiums in the domestic (and export markets) are usually as a result of a high degree of trimming and presentation and prices should not be compared export prices.

Traders have pointed out that terms of trade can be an important aspect of pricing. Prices paid to packers may take into account that a trader provides credit to the customer and accepts financial and other risks associated with export. Traders also point out the cost of these services may be offset by a trader's ability to negotiate favourable shipping rates

6.3 Market channels

Offal may be sold and exported direct by meat processors or through non-packer exporters (traders). The larger companies tend to market and sell direct to customers and the smaller companies tend to use the services of traders. Some meat companies make all their export offal sales through traders but in reality, most companies use a mix of marketing and sales direct to end-users and sales through traders. One explanation provided for selling through trading companies is that terms of trade are better when selling to a trading company. The packer receives prompt and reliable payment from the trader while the trader extends credit to the importer.

Meat companies that sell direct and traders have both reported that in general they deal with the same customers. They negotiate pricing and volume on a monthly basis. Exporters will sell forward three months if the customers want to commit to

forward purchases. Comments from traders indicate that the trading companies are more active in seeking new customers and markets than packing companies.

Although packer-exporters report that they generally deal with the same customers there are times when markets contract or even disappear due to market access issues. In this case new customers have to be found. Meat companies and traders use local agents to help find new customers when required.

Exporters have reported that they regularly receive enquires from new potential customers, particularly from China, but generally do not pursue these enquiries. However, new customers are regularly identified at trade fairs such as anuga.

The majority of export offal is frozen and shipped by sea freight. In general the shelf life of the frozen offal is said to be 12 months. The bulk items that are used for manufacturing e.g. heart and liver are preferred as single lots in containers. If these items are exported in mixed loads there is likely to be a discount. For other items there is not necessarily a discount for mixed loads.

Chilled offal is exported in several formats. The majority is vacuum-packed and shipped sea freight to Japan. This applies particularly to tongues and thick and thin skirt. Exporters that are close to air terminal facilities report that they export chilled offal to Japan by air freight. The air-freighted chilled offal may be vacuum-packed or fresh and individually wrapped.

It is also reported that there is trade in chilled air-freight lamb carcases with corresponding offal to UAE countries. In this case the chilled offal is bulk-packed in cartons and accompanies the chilled carcases.

Exporters reported that the shelf life of chilled offal in vacuum packs is not reliable compared with boneless beef. Some packers apply a shelf life of 35 days to vacuum packed chilled offal although the AUS-MEAT standard is 52 days.

Tables 4 and 5 show the volumes of chilled offal exported and the major destinations. The tables also show the volume frozen offal exported for comparison purposes.

Table 4: Volumes of chilled and frozen beef offal exported financial year 2011/2012

Destination	Volume of chilled offal (tonnes)
Japan	2,574
Indonesia	1,022
Chile	734
Korea	305
All Middle East	196
Singapore	167
Hong Kong	149

Total exports of chilled offal	5,381
Total exports of frozen offal	132,559

Source: Australian Bureau of Statistics

Table 5: Volumes of chilled and frozen sheep offal exported financial year 2011/2012

Destination	Volume of chilled offal (tonnes)
UAE	502
Saudi Arabia	210
Jordan	100
All Middle East	813
China	314
Total exports of chilled offal	1,215
Total exports of frozen offal	30,279

Source: Australian Bureau of Statistics

Japan is the main destination for chilled vacuum-packed offal. Offal items that are exported chilled are principally tongue and thick and thin skirts from grain-fed or Wagyu cattle

Domestic sales are mostly in the form of chilled product bulk-packed in cartons. As with export product, sales are mostly to regular customers, mainly retail butcher shops. In the case of service kills butchers take the offal from the animals that have been slaughtered on their behalf.

Domestic sales are also made to wholesalers. This sales route applies to specialty items such as tendons which may be in demand for sale through retail butchers who specialise in sales to ethnic groups. It also applies to product that cannot be sold as fresh offal and is frozen for subsequent sale.

The major supermarkets take a portion of the offal from livestock slaughtered on their behalf. In the case of Coles, abattoirs that slaughter Coles' livestock own the offal and sell a portion of it back to the supermarket. In the case of Woolworths, the offal is owned by Woolworths. The abattoir packs what is required for Woolworth and buys back the remainder. Coles and Woolworths offal is limited to heart, liver, kidney, tail and cheek meat. It is vacuum-packed either on-site at the abattoir or at a distribution centre in retail-ready thermo-form packs.

The amount of offal taken by the supermarkets depends on seasonal demand. Coles takes about 10% of hearts and 20% of liver from cattle killed on their behalf. They take up to 100% of kidney in the winter season down to 25% in the summer season. They take about 60% of tails in the winter season and 30% in summer. They take about 80% of cheek meat in the winter season.

6.4 Pre and post-packaging treatments

Tables 1 and 2 summarise the pre-packaging treatments applied to offal items. Meat companies that export offal have extensive documented specifications that include details of trimming required, packaging, treatments such as cleaning and scalding tripe products and visual or chemical lean requirements if required. In general, specifications follow the AUSMEAT Handbook of Australian Meat. Most offal items are recovered to a finished state, or close to finished state on the slaughter floor. They are transferred to the offal room for washing, if required, trimming and cooling, if necessary, prior to packing.

All offal items must be cooled quickly enough to comply with refrigeration index criteria. Large items such as liver and heart may be cooled in water or ice before they are packed to ensure that the cooling rate is sufficient to meet refrigeration index criteria.

Vacuum-packed chilled offal may be chilled naked in air before it is packed. Vacuum-packed offal is pre-chilled primarily to improve the appearance in the pack. Pre-chilling of vacuum-packed offal is particularly important for thin skirt but at least two packers pre-chill all vacuum-packed items. Packers have indicated that there 2% weight loss from offal that is pre-chilled naked.

Rumen pillars may receive the unusual pre-treatment of being bashed with a mallet before they are wrapped and packed.

Offal from the intestinal tract receives more extensive pre-treatment. Weasand meat from the oesophagus is collected on the slaughter floor (weasand is rarely collected) and the intestinal tract is delivered to the paunch room where the paunch is separated from the small intestine. The small and large intestine are delivered to a separate processing room if they are being saved, otherwise they are consigned to rendering.

The omasum (bible) is cut off the paunch and the rumen and reticulum portion of the paunch is cut open to release the contents. The paunch is washed over an umbrella spray. The washed rumen and reticulum is hung from a hook and trimmed to separate out the rumen pillars (mountain chain) reticulum (honeycomb) and remaining rumen (tripe pieces). Honeycomb and tripe pieces are scalded and cooled in machines that clean and abrade the surfaces of the product. Omasum is cut open and is processed in the same type of machine but is usually kept separate from tripe and honeycomb

Large and small intestines are flushed out, cleaned, trimmed, split or turned inside out and cut to length. This treatment is done with a high degree of manual input in some offal rooms and by machine at other establishments.

6.5 Yields

The yield of offal items recovered from carcases depends on the weight of offal per body, the amount of offal that is considered not suitable for human consumption at post-mortem inspection and the recovery of available offal. Recovery rates are affected by availability of labour, efficiency of collection and processing facilities and whether orders have been accepted from customers.

An MLA study of offal yields was conducted in 2008 and the report of project A.COP.0037 “Best Practice for Offal Collection” contains data on the weight of offal per body and recovery rates[1].

Tables 6, 7 and 8 show typical yields per head and recovery rates from sheep and cattle. The yields in Tables 6, 7 and 8 are derived from the report of project A.COP.0037 and have been verified and augmented with data collected during the inspections of offal rooms in the course of this project.

Table 6: Beef offal yields and recovery from 275 kg steer

Offal item	Weight per body (kg)	Typical recovery	Recovered for edible (kg)	Price (April 2013 $ per kg)	Value ($ per head)
Aorta	0.23	0.86	0.20	3.83	0.76
Cheek	0.90	0.91	0.82	3.38	2.77
Head meat	0.50	0.84	0.42	2.66	1.12
Heart	1.80	0.86	1.55	1.15	1.78
Kidney (2)	1.03	0.80	0.82	0.90	0.74
Lips	0.70	0.89	0.62	1.41	0.87
Liver	5.60	0.75	4.20	0.90	3.78
Lung	2.37	0.75	1.78	0.87	1.55
Skirt membrane	0.40	0.92	0.37	3.69	1.36
Thin skirt	0.90	0.86	0.77	4.47	3.46
Thick skirt	0.83	0.84	0.70	4.44	3.10
Tail	1.10	0.78	0.86	5.08	4.36
Tendon	0.50	0.76	0.38	3.95	1.50
Tongue root	0.30	0.84	0.25		0.00
Tongue root fillet (2)	0.17	0.84	0.14	2.72	0.38
Tongue SW	1.30	0.90	1.17	7.04	8.24
Weasand	0.13	0.83	0.11	2.30	0.25
Spleen	0.60	0.75	0.45	0.87	0.39
HC tripe	0.53	0.83	0.44	3.63	1.60
Rumen pillars	0.60	0.79	0.47	12.87	6.10
Tripe pcs.	3.50	0.87	3.05	2.76	8.40
Small intestine	3.00	0.83	2.49	1.30	3.24
Large intestine	2.40	0.83	1.99	1.30	2.59
Omasum	0.70	0.83	0.58	3.75	2.18
Abomasum	0.34	0.83	0.28	2.38	0.67
Ligamentum	0.15	0.90	0.14	1.89	0.26
Feet	5.30		0.00		0.00
Testes	0.90		0.00		0.00
Pizzle	0.80		0.00		0.00
Trachea	2.70		0.00		0.00
Spinal cord	0.18		0.00		0.00
				Total	61.43

[1] Report A.COP.0037 Best Practice for Offal Collection. MLA, February 2008

Table 7: Lamb offal yields and recovery from 20 kg carcase

Offal item	Weight per body (kg)	Typical recovery	Recovered for edible (kg)	Price (April 2013 $ per kg)	Value ($ per head)
Heart	0.17	0.9	0.15	1.24	0.19
Liver	0.57	0.99	0.56	1.53	0.869
Kidney (2)	0.12	0.99	0.12	5.2	0.62
Thick skirt	0.13	0.85	0.11	4.8	0.53
Spleen	0.6		0		0
Tripe	0.37	0.98	0.36	3.37	1.22
Brain	0.1	0.85	0.085	4.8	0.41
Tongue s.c.	0.095	0	0	3.9	0
Tongue l.c.	0.15	0.85	0.13	3.18	0.41
Runner		0.67	0.67	5.7	3.82
					8.06

Table 8: Sheep offal yields and recovery from 24 kg carcase

Offal item	Weight per body (kg)	Typical recovery	Recovered for edible (kg)	Price (April 2013 $ per kg)	Value ($ per head)
Heart	0.25	0.8	0.2	1.24	0.25
Liver	0.7	0.9	0.63	1.51	0.95
Kidney (2)	0.14	0.9	0.13	4.5	0.57
Thick skirt	0.14	0.76	0.11	4.8	0.51
Spleen	0.11		0		0
Tripe	0.57	0.9	0.51	3.08	1.58
Brain	0.11	0.85	0.09	4.8	0.45
Tongue s.c.	0.11	0	0	3.9	0
Tongue l.c.	0.17	0.85	0.14	3.18	0.46
Runner		0.64	0.64	4.55	2.9
					7.68

6.6 Constraints and opportunities

Current constraints to production and marketing of offal are summarised in Tables 1 and 2. These constraints relate to specific markets. In general, the issues for offal marketing that packers and traders have identified are about market access, yield and recovery.

The main market access issue is the exclusion of tripe from mainland China. Obviously DAFF has put considerable effort into re-opening the market but the Chinese AQSIQ is intransigent. Australian tripe is consumed in China but enters through the so-called grey channels via Hong Kong and sometimes Vietnam. There are additional costs associated with this supply route and these costs are discounted from the price available to Australian exporters. In addition there are times when product cannot flow through to China via Hong Kong. At these times the price of tripe is seriously affected and alternative markets have to be found. It has been suggested that the main priority for offal marketing is for MLA to assist DAFF secure access for tripe in China.

Yield and recovery of offal depends on:

- the disposition of offal at post-mortem inspection i.e. how much offal is condemned as not for human consumption;

- the facilities and staff that allow the offal recovery rate to keep up with the rate of carcase production;
- the extent of trimming of some offal items.

The impact of inspection and condemnations has been examined several times by MLA. For example a project identified causes of condemnation of sheep offal[2]. This project concluded that condemnation and damage resulted in $3.5 million of lost potential revenue per year from sheep offal. Another project looked at rates of condemnation of beef liver and kidney and assessed the accuracy of dispositions made at post-mortem inspection[3]. This report concluded that unnecessary downgrading of liver and kidney cost the industry about $27 million per year of potential revenue. A project examined the recovery of edible offal at beef and lamb processors[4]. The report includes data on the effect of condemnation of offal recovery. A project examined the recovery of products from burst paunches[5]. As a result of this report burst paunches that would otherwise be condemned are now used to produce edible products.

Apart from these projects there is a general belief that if the industry keeps track of the causes of downgrading of offal, this information could be used to identify primary producers that produce livestock with poor records of offal condemnation. These producers could be encouraged to improve the quality of offal derived from their stock or could simply be penalised.

In view of recent changes to meat inspection with the introduction of authorised officers employed by meat processing establishments, the rate of condemnation of offal may have changed. There is probably no justification for investigating the effect of changes in inspection on the disposition of offal at post-mortem inspection. However, Inspection and disposition of offal remains a concern for meat processors. No specific project work has been suggested but there is a strong likelihood of pay-back for projects that are aimed at reducing condemnation of offal.

While meat companies do not have control (and should not have control) over the disposition of offal, they obviously control the rate of recovery of available edible offal. This point is discussed in the report of A.COP.0037 and an outcome of this project is a spreadsheet to assist tracking and control offal recovery. Meat processors can be encouraged to understand and control their offal recovery rates but there is no suggestion that project work is needed to help establishments to improve offal recovery.

The third aspect of how much edible offal is packed is the yield of individual items as influenced by trimming and method of collection. Meat processors are undoubtedly interested in maximising yields and regularly benchmark yields in comparison with other establishments within the same company. Examples of investigations of yield improvement were observed during the project. In one case carcase dressing procedures were being modified in order to improve the yield of hindquarter tendon

[2] Report PRCOP.029 Risk analysis of sheep meat processors for improved recovery of offal and other co-products. MLA, June 2001.
[3] Report COPR.09 Offal Pathology: an analysis of meat inspection procedures. MLA, November 1998.
[4] Report A.COP.0037 Best practice for offal collection. MLA, February 2008.
[5] John C. Bensink, Boris Dobrenov, Mwatte P. Mulenga, Zuhara S. Bensink, Jeff J. McKee (2002) The microbiological quality of beef tripe using different processing techniques. Meat Science, 62, 85-92.

and in another case , the use of a mechanical jaw breaker was being investigated to improve the yield of head meat and cheek meat.

There may be opportunities to develop equipment to assist in offal collection and yield improvement. There is already a range of commercial and home-made technology and equipment to aid offal recovery, particularly for cleaning and preparing intestines and processing of tripe, omasum and honeycomb. MLA has also supported projects to develop or assess equipment to help offal processing. Examples are:

- A project to investigate methods of collecting sheep tongue and brain hygienically and methods of maintaining correlation between the offal items and carcases until carcase inspection is complete[6]. The establishment concerned exported tongues and brains as a result of the project but has since discontinued due to excessive loss of product due to condemnations.

  Only about three sheep processors recover brains. A few more recover tongue but some avoid recovering both tongue and brain because of the risk of contamination and condemnation. A project to assess best practice for recovery of sheep tongues and brains could help to expand recovery of these items although the work has been done to some extent in project PIP.015B.

- A project to investigate equipment to dehair beef feet and to optimise the process[7]. The establishment concerned sold beef feet to Korea but has since discontinued because it could not compete with local production in Korea.

It is said that all establishments, not just brands, are ranked in respect of tripe quality in the Hong Kong market and product is priced accordingly. In this case, quality relates to trimming and cooking or scalding tripe. There is a potential project to look at how tripe is used by the customers and what is best-practice for trimming and cooking to produce tripe that justifies high ranking and price.

It is understood that MLA has recognised opportunities for chilled offal in Saudi Arabia. Major exporters of beef and sheep offal have been asked if they believe that there are opportunities for chilled offal in the Middle East but have reported no obvious opportunities. About 800 tonnes per year of chilled sheep offal and about 200 tonnes of beef offal are exported to the Middle East (see Table 4 and 5). A major sheep processor has reported that there is no major market for chilled sheep offal in the Middle East. However, some there is some export of chilled sheep offal to the Middle East. Other exporters have indicated that while they have not identified specific opportunities for export of chilled offal to the Middle East, they believe that there are opportunities for chilled offal in general in both domestic and export markets.

There are several methods of preparing chilled offal including conventional vacuum packing with about 35 to 52-day shelf life, thermo-form packing and chilling for domestic distribution and export with 14-day shelf life, Darfresh vacuum-packing with 40-day shelf life and fresh-chilled offal bulk packed in cartons for both domestic and air-freight export with about 5-day shelf life. The range of methods of distribution

[6] Report PIP.015B An alternative procedure for the recovery of brain and tongue from lambs fit for human consumption. MLA, January 2005.
[7] Report PSHIP.169 Dehairing of cattle and sheep heads and hooves – Pilot technology evaluation. MLA, July 2008.

indicates that producers of export and domestic offal have invested in packaging systems to service demand for chilled offal.

The main outlet for chilled beef offal is tongues and thick and thin skirts to Japan, mainly from grain-fed cattle. One exporter has indicated that the only growth in chilled offal he has noticed is thin skirt to Korea. Another has indicated that exports of chilled tongue to Japan are limited by a particular need for frozen tongues. Tongues are more easily skinned from a semi-frozen state and this supports demand for frozen tongue compared with chilled.

Other comments have supported the development of packaging system to provide longer shelf life and attractive presentation for domestic distribution. The example of retail-ready Darfresh packaging of cheek meat for distribution through Aldi stores has been cited as an attractive product with 40 day shelf life. Coles and Woolworths offal is packed in retail-ready thermo-form packaging which gives limited shelf-life extension and somewhat improved presentation. Domestic-chilled offal distributed through butcher shops is said to attract premium prices but the product is mostly distributed fresh-chilled i.e. no packaging to extend shelf life, and it was reported that there is considerable wastage at butcher shops because of the short shelf-life of the offal.

One comment is that in conjunction with improved presentation and shelf life, there are opportunities for improving domestic sales of offal, particularly tongues and cheek meat, at premium prices during the winter seasonal-demand period.

In general, exporters and domestic distributors support investigation of packaging options for chilled offal but do not necessarily connect additional packaging options with sales to the Middle East.

7 Conclusion

Recovery of edible offal at export and domestic establishments and marketing of offal items is well established. New opportunities to expand markets or increase prices are not obvious although there is no doubt that markets change over the years and exporters find new markets as required.

Packers have been concerned for many years about the loss of potentially edible offal due to incorrect disposition at post-mortem inspection. MLA has investigated this issue on several occasions. Packers are also concerned about costs of collection of offal and yields although no specific suggestions for reducing costs or improving yields have been offered.

There is general agreement that packaging technologies that offer improved shelf life and attractive presentation of chilled offal could result in marketing opportunities at premium prices. Specific opportunities have not been identified except that sales at premium prices could be achieved for tail and cheek meat in the domestic market in periods of peak seasonal demand.

8 Appendix 1

Table 9: Offal rooms inspected during the project

Establishment	Export eligibility
Wingham Beef Exports	Tier 2
Northern Co-operative Meat Company	Tier 2
JBS Australia, Beef City	Tier 2
JBS Australia, Rockhampton	Tier 2
JBS Australia, Townsville	Tier 2
Kilcoy Pastoral Company	Tier 2
Teys Australia Southern, Wagga Wagga	Tier 2
JBS Australia, Longford	Tier 2
JBS Australia, Devonport	Domestic only
Southern Meats, Goulburn	Tier 2
G.M. Scott, Cootamundra	Tier 1

8.1 Countries that accept product from tier 1 establishments

Algeria
Bahrain
Cuba
East Timor
Egypt
Fiji
Ghana
Indonesia
Jamaica
Jordan
Kuwait
Mozambique
New Zealand
Oman
Papua New Guinea
Qatar
Solomon Islands
Sri Lanka
Tonga
Tunisia
Tuvalu
United Arab Emirates
Vietnam

9 Appendix 2: Export destinations for offal

Table 10: Top ten export destinations for beef offal by volume

Offal Item	Tonnes of offal in calendar year 2012									
	Japan	Korea	Hong Kong	Russia	Southern Africa	Malaysia	Middle East	Indonesia	Singapore	PNG
Cheek meat	496	6102	60	8	4	20	15	17	74	
Head meat		889			69			149	87	47
Heart				3150	1136	24	217	1614	911	2767
Kidney					2759					
Lips	13				1542	81	159	475	412	
Liver	321			12211	4627	562	4141	897	433	
Lung						1339			762	
Thin skirt	4228	1882						21	9	
Thick skirt	3188	2010	10					9	13	
Tail	263	2874	14		266	704	44	421	395	16
Tendon	194	1939	69			93			63	
Tongue root					789			414	181	798
Tongue trimmings	24				4			280	73	
Tongue root meat	566				75					
Tongue root fillet	614								26	
Tongue*	7801						11	33		
Weasand	78	3								
Spleen			93			306			12	
HC tripe	236		491						13	
Rumen pillars	2337	325							3	
Small intestine	2405	4260				30			2	
Large intestine	733	237							3	
Tripe	57	2591	18288		244	1877			165	
Total**	23863	23165	19319	15369	11546	5044	5025	4337	3654	3633

* Tongue includes tongue swiss cut, tongue swiss cut D trim, tongue blade swiss cut. *Source: MLA*

Table11: Second ten export destinations for beef offal volume

Offal Item	Tonnes of offal in calendar 2012									
	Thailand	USA	Taiwan	China	Mexico	Fiji	Philippines	India	Caribbean	Chile
Cheek meat	25		118			16		5		
Head meat			63			94	104			
Heart	436		2	2		285	281	5	7	
Kidney	8			246					19	
Lips	31	259			1335					244
Liver	402	9		23			7	30	6	
Lung	14									
Thin skirt		1407	5	158						5
Thick skirt	3	8	2	8						
Tail	8	1371	8	63			40		317	
Tendon			1136	987						
Tongue root	11					282	23			
Tongue root fillet										
Tongue*			37							
Weasand	78									
Spleen	444									
HC tripe	5		1195							
Small intestine			1							
Large intestine			3							
Tripe	1717		223					325		
Total**	3110	3064	2806	1492	1335	677	485	365	350	249

**Totals in Tables10 and 11 are the total volumes for each destination. They may not match the sum of the individual offal items because not all offal items are shown in the tables. The total volume of all offal exported to all destinations in 2012 was 129,767 tonnes.
Source: MLA

Table 12: Destinations for exports of lamb offal

Offal Item	Tonnes of offal in calendar 2012									
	Hong Kong	Saudi Arabia	China	Jordan	UAE	Southern Africa	Belgium	Mauritius	PNG	Total
Heart		6		71	27	177		46	46	478
Liver		1012		118	174	7		41		1441
Kidney	120	9	629	16	25					804
Pluck							97			155
Thick skirt										
Spleen				22		2				24
Tripe	1248	4								1264
Brain		18		7	6					31
Tongue blade		3		19						21
Tongue sc				3					17	25
Tongue l.c.				3					13	17
Total	1368	1052	629	263	233	187	97	87	76	4263

Source: MLA

Table 13: Destinations for mutton offal

Offal Item	Tonnes of offal in calendar 2012											
	Saudi Arabia	Hong Kong	Southern Africa	India	PNG	Jordan	UAE	China	Yemen	Kuwait	Caribbean	Total
Heart	12		1244		551	110	76	95		78		2424
Liver	6304		303			464	446		252	117		8332
Kidney	131	263	2	8			148	149		35		805
Spleen						205	2					210
Tripe	381	6291		1048			26					8073
Brain	88		1			12	48					162
Tongue blade						43	11			4		
Tongue sc	13						3			3		39
Tongue l.c.	13				488	30	26			11	230	875
Tail								108				109
Total	6942	6560	1559	1056	1043	880	788	356	252	249	230	21100

Source: MLA