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Rabobank International

**Food & Agribusiness
Research and Advisory**

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The Return of Animal By-Products

Is the Carcass Valuation in the Meat Industry Reversing?

Animal by-products are returning to centre stage in the global meat industry. Over the last few years, the valuation of the animal carcass has shifted from prime cuts to processing cuts and fifth quarter products, driven by changing consumer preference for processed products, fast rising economic welfare and preference for animal by-products in Asia, new applications for animal by-products and lower availability of sow meat. Rabobank believes that this trend will be permanent and will impact the business models of almost all players in the global meat industry, with different effects for the various actors. Slaughterhouses will become increasingly active in processing fifth quarter products. Further processors could be forced to change or even secure their raw material supply, while dedicated by-products processors will need to strengthen their position in the value chain as a result of the rising competition.

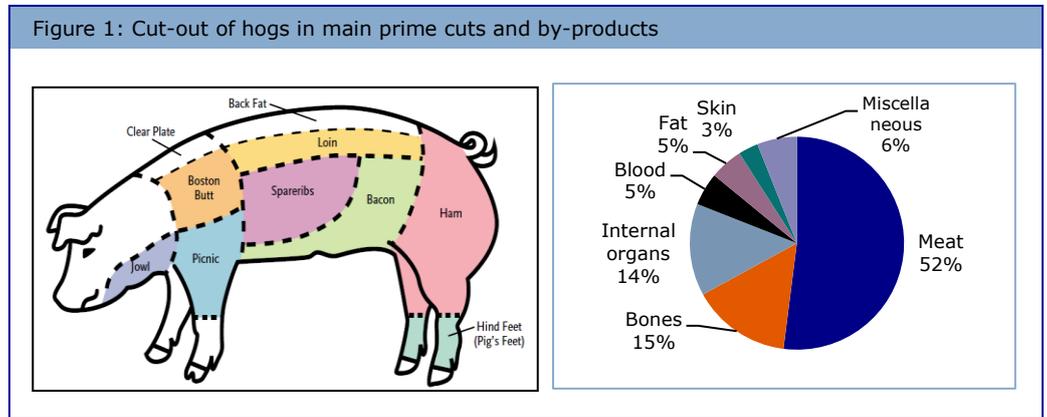
Introduction

From ancient times right up to the present, mankind has endeavoured to use all parts of the animal carcass. Besides the main applications of providing food and clothing, other parts of the animal have been used in furniture, equipment, and even weapons. With the intensification of animal production and the introduction of rendering and other processes, the use of the animal carcass has further evolved into many other applications in the pharmaceutical, cosmetic, household and industrial industries. The possible applications of the 'fifth quarter' seem endless and continue to offer opportunities to increase the value of the total carcass. Moreover, the fast rising economic welfare in developing countries, mainly China, which have a clear preference for fifth quarter products, further increases the demand for and value of these products.

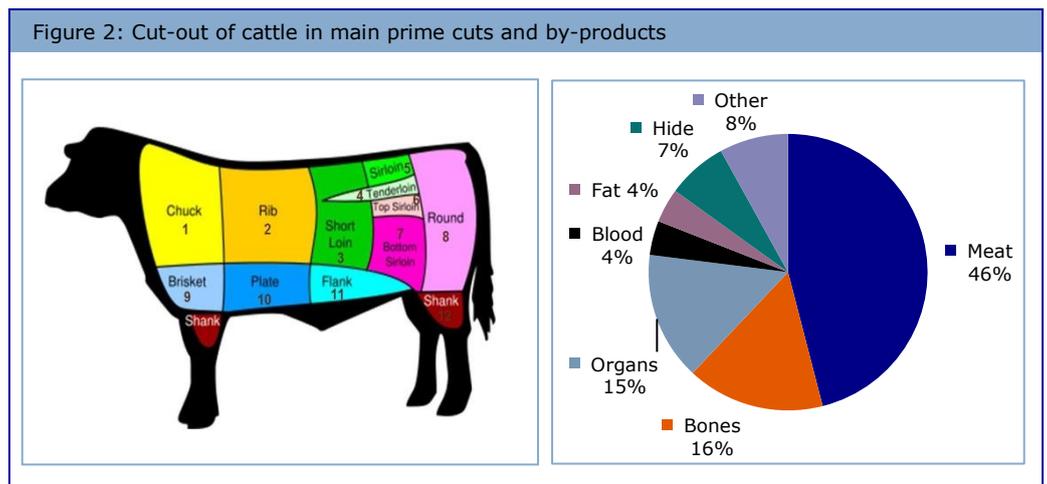
In addition, consumer demand for processed meat products has been rising in developed countries due to preferences for convenience and consumers trading down to less expensive processed meats. As a result, value within the carcass is shifting from the prime meat cuts to the processing cuts and fifth quarter products. We believe this shift is structural, creating both opportunities and consequences for meat processors.

Optimising the valuation of the carcass, the challenge for the meat industry

An animal enters the slaughterhouse in one piece and is disassembled into four quarters, which together are known as the dressed carcass, and contain the main cuts of both prime (e.g., loin, ham, belly and rib) and processing (e.g., shoulder, picnics, chuck and plate) meat. The dressed carcass, or the meat and the skeleton of an animal, makes up about 60 percent of the live cattle weight and around two-thirds of the live weight for pigs (see *Figures 1 and 2*).



Source: Rabobank, 2012



Source: Rabobank, 2012

The remainder of the live weight of an animal can be divided into the following product groups: hides and skin, blood, bones, intestines/casings, fat and offal. These products are known as by-products or the fifth quarter and are increasing in value.

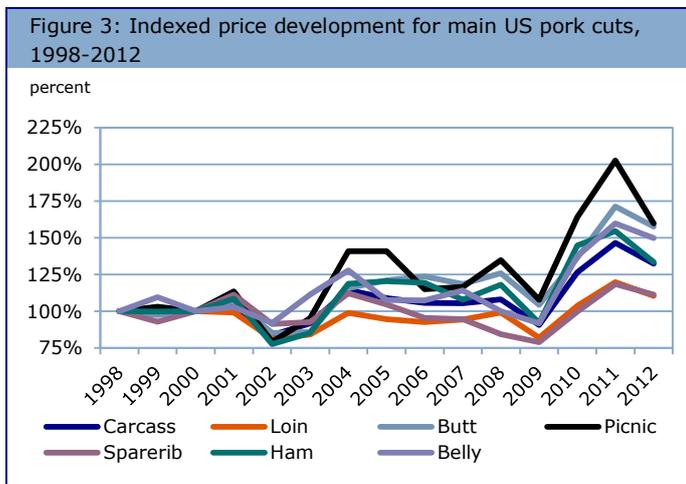
The importance of the prime cuts, processing cuts and fifth quarter products may differ between countries depending on traditions, culture, religion, and wealth. For example, in France and Ireland by-products account for an important part of the total meat consumption (about 8 kg per head), while many fifth quarter products (e.g., noses, feet and brains) are considered a delicacies in many Asian countries but are no longer consumed in most developing countries. The differences in value of these products amongst countries create trading arbitrage opportunities.

The challenge for a slaughterhouse is to optimise the value of all different products (i.e., the total carcass valuation). To make things more complicated, the value of the different cuts varies, sometimes due to seasonal factors. In addition, slaughterhouses have the opportunity to further cut out/process the different cuts up to pre-packed, ready-to-eat products, which increases the sales value but also requires investments in both machinery and labour.

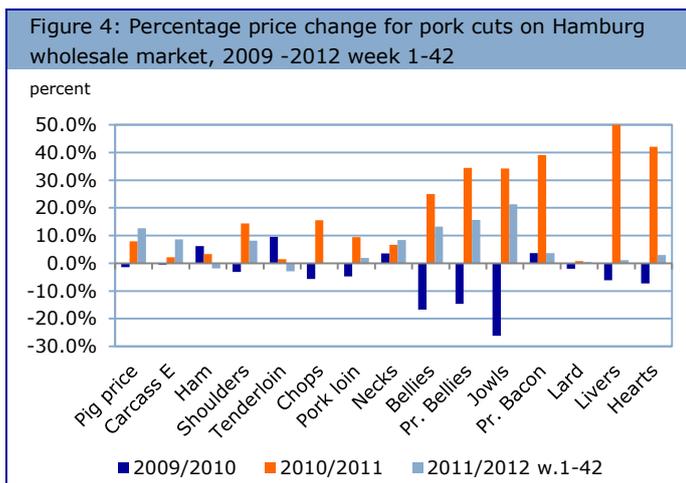
Is the carcass valuation reversing?

The value of a slaughtered animal is the combined sales price of all the meat cuts and fifth quarter products, most of which have different markets with their own characteristics. Due to their relatively high share of total weight, the prime meat cuts (e.g., loin, ham, belly and rib), which are mainly intended for fresh meat sales or further processing into high quality products, have the highest sales prices and value. For example, ham (~20 kg), belly (~16 kg) and loin (~15 kg) sum up to about 45 percent of the live weight of a hog. In contrast, the cuts mainly intended for further processing (e.g., shoulder, picnics, chuck and plate) and the fifth quarter (e.g., jowls, head, liver and shanks) have a clearly lower share of the total carcass valuation, because of their lower contribution to the total weight of the carcass and their perceived lower quality in many countries.

However, this general division of the animal carcass began to slowly change in the first few years of this century, although the change became more apparent from 2009 onwards in both the United States (US) and the European Union (EU; see Figures 3 and 4). From that time onwards, prices of the less important pork cuts in the total carcass valuation (e.g., the butt and picnic in the US, and the belly, jowls, liver and heart in the EU) rose faster than the average carcass value, while the prices for the prime cuts underperformed compared with the carcass prices.

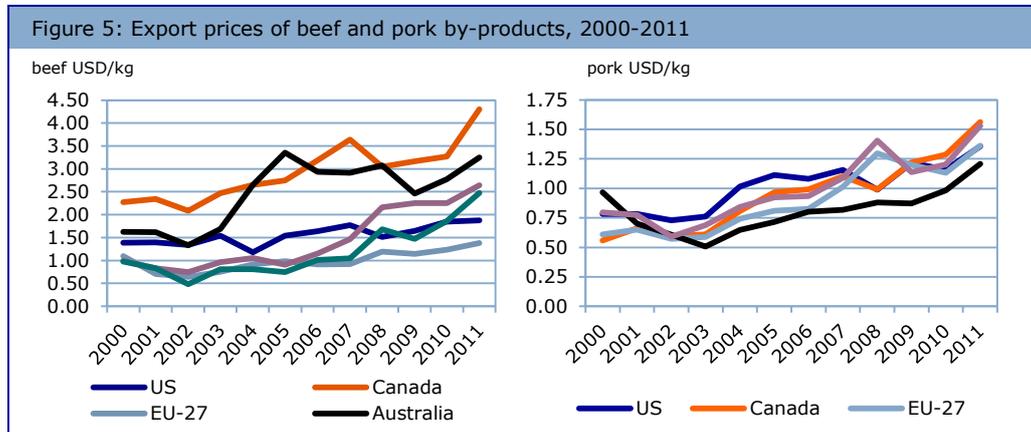


Source: USDA, Rabobank, 2012



Source: AMI, Rabobank, 2012

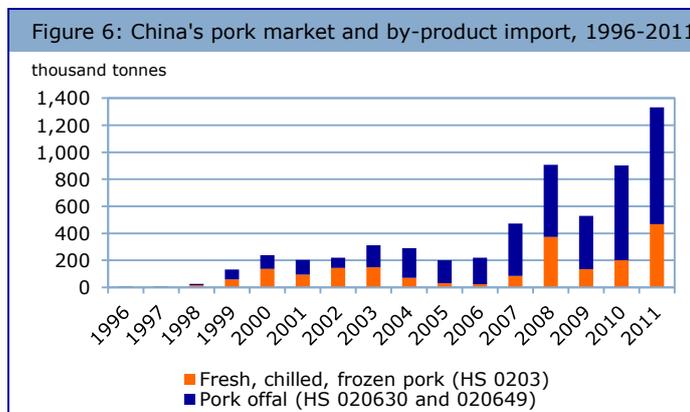
This development is also clear from the change in value of the by-products. In all important beef and pork exporting countries, the export price per kilogramme of by-products has risen significantly since 2000, and especially in more recent years (see Figure 5). This is especially apparent for pork, where by-product prices doubled between 2003 and 2011. For beef, the impact of the economic crisis on the value of the hides slowed the increase in 2009. This was followed by an upswing from 2010 onwards on the back of strong demand for luxury cars with leather seats in Asia and declining global availability of cattle ready for slaughter.



Source: UNComtrade, Rabobank, 2012

The rising prices of processing cuts and by-products of cattle and hogs show that the animal carcass valuation has been shifting since 2009. This reversal is due to five main developments: growing economies in developing countries including the opening of the Chinese market for imports; the economic crisis; the growth of convenience products; the growing number of applications for animal by-products; and the decline in the sow herd in both the US and the EU.

Firstly, many traditional Asian dishes require strong-tasting fifth quarter products. Prime cuts are considered to be low in taste by many Asian consumers. For example, in Japan, beef tongue is considered a delicacy, but is hardly consumed at all in the US and the EU. The Japanese pay accordingly for this delicacy, with beef tongue being traded for prices comparable to high-quality beef cuts in the US. In China, price differences are even sharper, with liver, kidney and tail prices approximately five times higher than in the US in 2011. With fast growing economic welfare in many Asian countries, including many consumers moving from a grain-based diet to an animal protein-based diet, the demand for animal by-products is growing rapidly. This can be observed by China's fast growing imports of fifth quarter pork products since its market has been partially and occasionally opening to imports (see Figure 6).



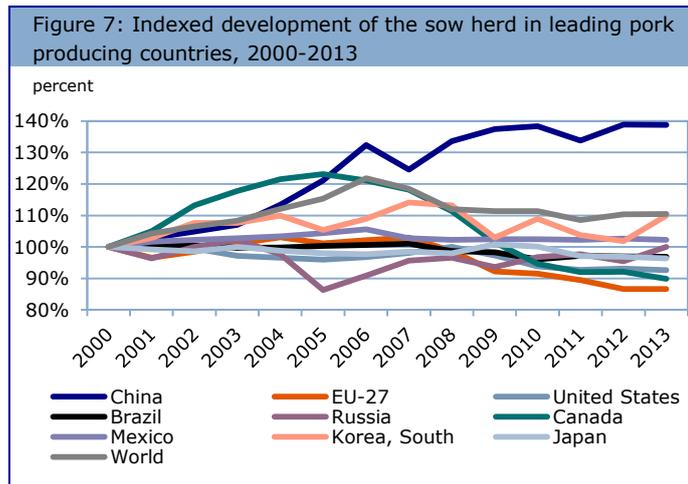
Source: China Customs, 2011

Secondly, the global economic slowdown that began in 2008 is still impacting on the global economy. This has caused consumers to trade down to cheaper products, including processed products and proteins. For example, fresh pork consumption fell by 7.2 percent in Western Europe between 2006 and 2011, while the consumption of processed products increased by 0.8% during the same period. Consumers perceive that processed products offer better value, which has resulted in upward pressure on the prices of processing cuts and by-products that go into their production.

Thirdly, the higher demand for processing meat cuts is further strengthened by the ongoing demand for convenience products. Growth in this category is generally driven by the same characteristics across the globe, with more women entering the workforce, consumers having less time to cook, increased grazing during the day and the introduction of specific fast food products from different cuisines. Examples are the introduction of kebab, pizza and shawarma but also the growing popularity of pre-cooked bacon, due to its taste, in sandwiches and fast food dishes in many countries.

Fourthly, improved technological capabilities combined with rising knowledge regarding the benefits of (parts of) animal by-products is contributing to the increase in potential uses of fifth quarter products. For example, the growing popularity of heparin, a product produced from the mucus collected from the inside of intestines and used in blood diluters. With an ageing population globally, demand for this product has been growing. With further research and development, many other valuable products could come from animal by-products.

Lastly, sow populations have been declining in part due to cyclical factors but also due to productivity gains (see Figure 7). Sow meat—due to its higher fat content—is mainly used in processed products such as sausages. The declining number of slaughtered sows has caused processed meat producers to increasingly source their raw material from market hogs, resulting in both higher demand and prices for the cuts with higher fat content.



Source: USDA, 2012

Is the shift in carcass value permanent?

Historically, the direct consumption of animal by-products has declined in line with increasing wealth due to consumer ability to afford higher priced prime meat cuts. This implies that the proportion of fifth quarter products for direct human consumption in countries with a high GDP per capita is lower than in countries with a lower GDP per capita and has a lower share in the total carcass valuation. In emerging economies, consumers generally cannot afford the more expensive prime cuts, resulting in increased demand for less expensive cuts, which are treated as by-products and processed among other products in the rendering industry. Based on this general theory, consumption of animal by-products in Asia should start to slow somewhere in the coming decade, followed by a further decline in the years thereafter. When combined with the expected 'trading-up' once the economic crisis begins to fade, hopefully in the near future, this should lead to declining consumption of animal by-products.

However, the earlier examples of the popularity of beef tongue in Japan and the high consumption of by-products in France—both highly developed countries with very high GDP per capita—show that due to consumer preferences, animal by-products will hold their share on consumer plates. In contrast with most other developed countries where by-products are consumed because prime meat cuts are not affordable, in Japan and France, certain by-products are considered a delicacy and will be consumed regardless. Most animal by-products are considered a delicacy in Asia, which will support continued strong demand for these products in the long term, further supporting the shift in carcass valuation.

Rabobank believes that consumer preference for animal by-products in Asia will result in continued strong demand. This demand will be further strengthened by the growing number of applications for fifth quarter products. In addition, prices for processing cuts will remain elevated due to the ongoing demand for convenience products, while availability of these cuts will remain pressured resulting from the decline in the sow herd. Therefore, we believe the shift in carcass valuation will be permanent, thus affecting the business models of almost all players active in the meat industry.

This shift has already attracted the attention of many fast growing, independent companies that are active in the collection and procurement of fifth quarter products. Until a few years ago, most companies only collected one or a few of the offered by-products. This has rapidly changed in the last few years, with most companies increasing the number of products collected in the gut room up to all available products.

Options for the meat industry

The impact of the shift in carcass valuation will be different for slaughterhouses, the further processing industry and dedicated companies active in the different parts of the by-product industry. For slaughterhouses, the focus will increasingly move towards capturing the value of fifth quarter products, which might lead to forward integration in these activities. The further processing industry could be forced to change their raw material sourcing to other products or enter into long-term supplier contracts to safeguard supply. For the dedicated processors of by-products, competition will increase, which might urge these players to strengthen their positions in the value chain.

Forward integration is the best option for slaughter industry

For the slaughter industry, the shift in carcass valuation will increasingly move attention to the gut room, the place where most fifth quarter products are collected, cleaned, selected and preserved before shipping. Optimising the process and reducing the losses could easily increase the value of fifth quarter products. With improved selection and focus, a significant amount of category 3 products and edible products can leave the slaughterhouse as category 1 by-products, thus generating a profit instead of a cost (see *Box 1*). This has been demonstrated by an effort in Scotland between 2008 and 2010, which focused on increasing the value of fifth quarter products for 36 slaughterhouses. Due to the increased focus on collection and selection of fifth quarter products, the volume available for human consumption has increased. This increase in production combined with rising export demand and higher prices for these products has reduced costs and increased profitability, which has culminated in an annualised benefit to the Scottish meat industry of approximately GBP 15.5 million (almost USD 25 million).

In addition to increasing focus on the collection of by-products, slaughterhouses can forward integrate in the processing of animal by-products. Possible options would be to further cut and process the variety meats or expand activities in rendering, casings, gelatine or products highly demanded in the pharmaceutical or cosmetic industries, for example. This could also be accomplished via a partnership with companies already active in these industries.

Increasing the processing of variety meats can usually fit in the normal routine of slaughterhouses (e.g., cutting out pig heads into jowls, which are in high demand in the further processing industry, as well as noses and ears, which are a delicacy in China).

From the other possible activities, the best opportunities are in rendering or new product creation. The rendering market has potential as it is still relatively fragmented in many countries, especially in Asia's rapidly modernising meat industry. In addition, the average value of rendered by-products is estimated to have grown by a CAGR of about 10 percent in the last decade.

Starting up activities in the other main applications (i.e., gelatine and casing) will be more challenging. Both markets are global, and especially in the case of gelatine, are consolidating and require relatively high investments.

Securing raw material supply is increasingly important for the further processors

Rising competition and rising prices for processing meat cuts and animal by-products are having an impact on the sourcing positions of further processors. In addition to challenges from higher prices, these companies might be forced to source alternative cuts, which have different characteristics and qualities. If substitution of the raw material is not possible because of the impact on the quality of the final product, these companies can enter into long-term supplier contracts or build up dedicated supply chains. Other possible options are teaming up (e.g., through a partnership or merger) with the suppliers or backwards integrating into specific processors active in the collection of the raw material.

Dedicated processors of animal by-products to strengthen position

The growing importance of animal by-products is also clear from the growing attention of dedicated animal by-products companies. Until a few years ago, most companies only collected one or a few of the products offered in the gut room. However, attracted by the good returns, this has changed in the last couple of years, with most of these players increasing the number of products they collect to all available products. In line with this development, the first M&A transactions have emerged, enabling companies to capture a higher share of fifth quarter products. This development is expected to continue in the coming years. In addition, competition in the gut room will further increase due to forward integrating slaughterhouses.

Dedicated animal by-product processors, still active in just one or a few products, should look for opportunities to increase their foothold, independently or through a joint venture with either another dedicated processor or slaughterhouse, to strengthen their position. This can range from a joint investment up to total integration of both companies.

Box 8: Animal by-product categorisation in the EU

Animal by-products are divided into categories in the EU, which influences the range of uses for the products. The categories are based on the quality and safety of the product.

Category 1 animal by-products are risky to human health as they come from animals suspected of being infected with a transmissible spongiform encephalopathy (TSE), or from animals in which TSE was found. The products in this category are not allowed into the human or the animal food chain, and until 2011, could only be used for energy production or landfill in the EU. In 2011, EU policies regarding the use of animal by-products from category 1 were eased, allowing category 1 animal fats to be used as raw material in the oleo-chemical industry. However, fat derivatives obtained from category 1 material still cannot be used in cosmetics and medicines.

Category 2 material includes manure and the content of the digestive tract as well as animals that have not died because of slaughtering for human consumption. Animals that have been eradicated to avoid the spread of an epizootic disease are also included in this category. By-products in this category can be used for soil enhancement and for all uses for which category 1 material can be used. In several countries, including Germany, the Netherlands and the UK, category 2 material is not collected separately. If this is the case, all category 1 and 2 products must be treated as category 1 products.

Category 3 animal by-products are derived from animals which are fit for human consumption under EU legislation, but for commercial reasons are not intended for human consumption. Products rendered from category 3 materials can be used in animal feed, cosmetics and medicines.

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