

Uruguay's beef industry

An Assessment of WTO Disciplines on Market Access in Agriculture

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Executive Summary

- Uruguay is a traditional producer of beef, currently exporting about 5% of world's total volume of traded beef. Its beef cattle herd is composed of 12 million head, mostly of British breeds, such as Hereford and Aberdeen Angus. Beef production has remained stagnant around 1 million tons live-weight for the last eight years, after a period of growth that started in the early '90s.
- Uruguay is classified on export markets as being free of foot and mouth disease (FMD) with vaccination. The Directorate of Livestock Services (DGSG) of the Ministry of Livestock, Agriculture and Fisheries (MGAP), is in charge of controlling all sanitary issues and the safety of the food chain.
- The National Institute of Meats (INAC), a public-private partnership, has some regulatory powers at the processing plant level, controlling for quality and safety of the products. INAC is responsible for promoting Uruguayan beef in international markets and manages a large database of production and exports of different meats.
- Uruguay has in place a mandatory traceability system. Since 2010, the entire herd of the country is individually identified with electronic devices inserted in ear tags. The system is administered by the National System of Cattle Information (SNIG), which monitors all movements of cattle in and out of premises, registers the newborns and the animals that die.
- Cattle farms in Uruguay are market oriented. There are about 44,000 production units with cattle, with a medium size herd comprised of 261 head per farm. Uruguay produces mostly grass-fed cattle, although there is a small proportion of animals finished on a grain based diet. The number of animals slaughtered by year has been stabilized around 2-2.1 million for the last seven years. About 98% of marketed animals go to officially inspected facilities for processing. Seventy percent of fresh beef is exported.
- There are 39 licensed meat packing plants around the country, with a total capacity of about 3.5 million head per year. Larger slaughterhouses operate in both domestic and export markets. The meatpacking industry has undergone a process of concentration with an increasing participation of foreign firms, especially Brazilian. The cost structure of the meat packing industry shows that cattle purchases (with 80%) and cost of labor (11%) are the two major items. Net profits of the meat packing industry have been tight lately.

- In the last three years, Uruguay's exports of fresh beef and other products have been around 1.6 billion US dollars per year. With the exception of Japan, Uruguay has access to all relevant beef markets of the world. In 2013 Uruguay exported 355 thousand tons of beef, plus 115 thousand tons of byproducts and offal. Ninety percent of all fresh beef is exported without bones, of which 75% is frozen beef and 15% chilled beef. On average, chilled beef is sold at a price 88% higher than frozen beef.
- Current main export markets are the European Union (EU), China, Russian Federation, NAFTA, Israel, Brazil and Chile. Due to the access to high quality beef quotas, such as Hilton and 481, the highest price Uruguay exporters can obtain is within the EU. However, China is becoming now the main destination.
- Excluding fat and bones, the average export value of a carcass is US\$ 1,052. On a 50-50 base of forequarters and hindquarters, 55% of the value comes from hindquarter cuts, 41% from forequarters, and 4% from trimmings. Given that the 2013 average price of a live steer, at the slaughter house, was about US\$1,007, each animal yielded a margin of \$ 45, only on beef. Additionally, there is the value of offal, byproducts, and hides.
- Official veterinary inspectors of the MGAP are in charge of enforcing current sanitary regulations on cattle transportation and slaughter, carcass manipulation, and beef processing, storage, and transportation. Veterinary inspections and controls have an annual budget of US\$ 42 million (not including loans and special projects funded by international organizations like IDB, World Bank), which is equivalent to 2.6% of the value of beef exports.
- The official Veterinary Labs (DILAVE), with an annual budget of about US\$ 5-6 million, does the quality and sanitary controls, and audits the private laboratories. It runs programs on diagnostics, prevention and control of animal diseases and zoonosis; safety controls on food of animal origin; and quality control of veterinary medicines. The lab does a number of analyses on a regular basis, most under the National Program of Residues Control. Official veterinary services are partly funded by a 1% sanitary inspection fee charged on the FOB value of cattle and beef exported.
- The DILAVE guarantees that only one standard in sanitary and food safety control is followed, regardless of the destination market. It has long been considered a matter of public policy to meet the most demanding international standards, because of the strategic importance of beef export for the country's economy.
- Although there are not official figures on the annual cost of SPS compliance, our estimates are that, all things considered, the cost amounts to approximately US\$ 114 million, which is equivalent to 8% of total beef exports.

- Three independent audits of the quality of industrial process have been conducted. The second one (the third is not finished yet to this date) estimated that more than US\$ 65 million are lost per year due to cattle management practices during loading, transportation, and unloading, which affect the quality of the carcass. This is equivalent to 4% of the value of beef exports in 2013.

1. Introduction

This report contains a general description of the Uruguayan beef industry. The focus has been placed on beef quality issues, as well as sanitary regulations as they relate to export markets.

The report contains a general overview of the industry, from production to processing; an assessment of export markets and prices; and a review of relevant issues regarding traceability, sanitary regulations, and quality control.

2. Overview

Uruguay is a traditional producer of beef and, despite being a small country, it has been one of the main worldwide exporters of beef since early the 20th century, currently exporting about 5% of world's total volume of traded beef.¹ Located between Argentina and Brazil, Uruguay primarily produces grass fed beef thanks to an extensive endowment of natural grasslands well suited for beef production. Uruguay's beef cattle herd is the largest in the world in terms of animals per inhabitant (about 40 per capita). It is composed of 12 million head, mostly of British breeds, such as Hereford and Aberdeen Angus.

Beef production has remained stagnant around 1 million tons liveweight for the last eight years, after a period of growth that started in the early '90s (Figure 1). About 98% of marketed animals go to inspected facilities for processing. On average, steers are slaughtered weighing 500-510 kg and with 3.5 years of age. With a 54% yield, that animal would produce a carcass of about 272kg. In the last ten years, 68% of fresh beef has been exported annually on average, whereas 32% has been consumed domestically. Uruguay has one of the largest per capita consumption of beef in the world, about 50 kg per person per year.

Uruguay is classified on export markets as being free of foot and mouth disease (FMD) with vaccination, which entitles it to market access to all markets except Japan that require the export of meat derived from FMD-free animals that are not vaccinated. The last FMD outbreak happened in 2001, six years after the country had stopped vaccinating and had received an FMD free status (without vaccination) from the International Organization of Epizooties (OIE). After this outbreak and taking into account the risks posed by the region (there are regions in South America where the virus is still active and not well controlled), the government decided to return to a regime of regular vaccination and control (Sumner, Jarvis and Bervejillo, 2005; Suttmoller et al., 2003).

At the regulatory level, the Directorate of Livestock Services (DGSG) of the Ministry of Livestock, Agriculture and Fisheries (MGAP), is in charge of controlling all sanitary issues and the safety of the food chain (all food products of animal origin). The DGSG is in charge of animal diseases control, epidemiology surveillance, disease prevention, cure and eradication, and to ensure food safety. The DGSG controls diseases and disease-vectors such as FMD, brucellosis, tuberculosis, ticks, salmonella, residues, Newcastle disease, avian influenza, among other health risks, by enforcing regulations at the farm and the slaughterhouse levels. It has an inspection body of 850 professionals, technicians, and specialized personnel, assigned to laboratories, field operations and processing plant inspections. At the farm level, licensed private veterinaries are responsible for guaranteeing the

¹ Excluding India, which exports buffalo meat, a completely different type of product.

sanitary regulations. In 2013, the DGSG total staff was 1,061 employees, 55% of the entire personnel of the MGAP. The DGSG's total budget for 2013 was US\$ 42 million² (not including loans and special projects funded by international organizations like IDB, World Bank), which is equivalent to 38% of the entire MGAP budget, or 3% of beef exports.

The National Institute of Meats (INAC) is a public-private partnership funded by a tax of 0.6% on the FOB value of beef exports, and also has some regulatory powers at the processing plant level, controlling for quality and safety of the products, as well as at the distribution and the retail sales levels. INAC is also responsible for promoting Uruguayan beef in international markets and manages a large database of production and exports of different meats. INAC contributes to the development of the meat value chain by promoting quality and market access, and developing technologies to improve the efficiency of the industry. INAC conducts market analysis, trade promotion, protocol development, information systems development, and public-private articulation.

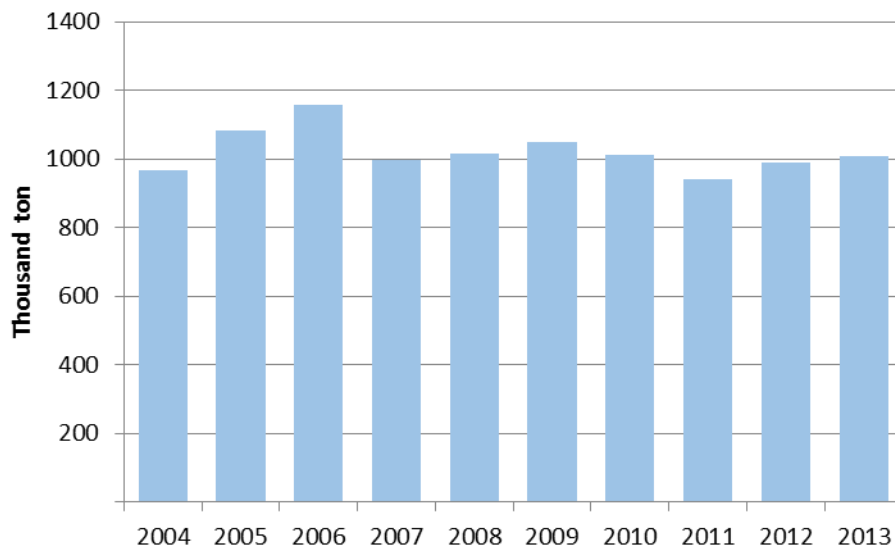
Since 2010, the entire herd of the country is individually identified with electronic devices inserted in ear tags. The National System of Cattle Information (SNIG) administers a data center that receives information of every movement of cattle, whether in and out of the premises, and on every newborn and diseased animal. Annually, around 2.8 million calves are ear-tagged and information about their breed, sex, month of birth and location is added to the data base. Farmers cannot move a calf out of the farm before identifying and registering it with the SNIG. Farmers are expected to apply the ear tags before an animal is 6 months of age. Once an individual farmer puts an order — over the phone or on the internet— for ear-tags, these are delivered at no extra cost from the SNIG to the farmer via mail. The farmer puts the ear-tags on the calves and fills up a form that contains information on breed, sex and month or season of birth. The form can be sent in paper or using an electronic form via the internet. The system can provide up to date information of how many animals are in a particular location or have moved from one place to another in a given period of time.

² The National General Accounting Office (Contaduría General de la Nación). Data available at: http://www.cgn.gub.uy/innovaportal/v/574/5/innova.front/ejecucion_presupuestal.html

3. Beef Production

During the 2012/13 agricultural year, beef production in Uruguay was 1.1 million metric tons liveweight,³ 6% higher than during the 2011/12 season, but still 3% below the historic record of 2005/06. Production is expected to increase during this year of 2014 due to increased stocks and a larger breeding quantity that reached a record of 3 million calves. Two consecutive years of good weather and favorable prices for calves led to an increase in the number of breeding cows up to a record of 4.5 million, which in turn delivered an increased number of calves.

Figure 1. Uruguay's beef production (annual slaughter, thousand ton liveweight)



Source: based on INAC data (www.inac.gub.uy)

Cattle farms in Uruguay are market oriented. There are about 23,000 cattle farms (those that have beef cattle as a major source of income, according to the 2011 Ag-Census), most of which are family owned and run. Accounting for all units of production with cattle, regardless of which is the main source of income, there are 44,000 production units, with a medium size herd comprised of 261 head per farm, while the median size of a farm is 28 head.

Uruguay produces mostly grass-fed cattle, although in recent years, partly as a result of the new “high-quality beef” European tariff quota, the use of grain, as a complement of pastures, has increased. According to SNIG data, there are more than 100 registered feedlots. However, local feedlots are not to be compared with

³ Production results from adding up slaughter count, live cattle exports, and inventory changes.

those in the US, for instance, since Uruguay's feedlots are for finishing animals (mostly steers) during only the last 100-120 days before slaughter, without the use of growth promoters. Animals entering the feedlot are normally 2-year old grass fed steers, weighing 350-380 kg. These animals are grain-fed for 3 to 4 months and sent to the processing plant weighing 525-540kg. Many registered feedlots do not run all year round, but only during the winter season. Current installed instant capacity is estimated at about 200,000 head, but in the recent past this capacity has never been reached. During the last two years, feedlot capacity has been used at an average of 30% monthly. If used at 100% capacity, the feedlot industry could account for about 50% of all steers slaughtered per year, or 500 thousand head.⁴ Net margins of the feedlot operations have been tight, which partly explains the low use of installed capacity. In addition to these feedlots operations, it is a widespread practice now to supplement grass fed cattle with the use of silage, hay and grains (maize, sorghum), particularly during winter months. Still, natural grasslands account for 85% of the cattle area.

The grass-fed systems of production can be categorized in three groups: cow-calf operations that sell calves and discarded cows to other producers; full cycle, that covers the entire cycle of an animal from birth to finish; and finishing operations that specialize in buying young steers (age: 1-2) and selling them fattened (age 3). Cow-calf operations are found in regions with poor soils and natural pastures of low productivity. Finishing operations were traditionally located in the western part of the country, but since crop production in that region has expanded rapidly in the last ten years, there has been some displacement of finishing operations to less productive regions.

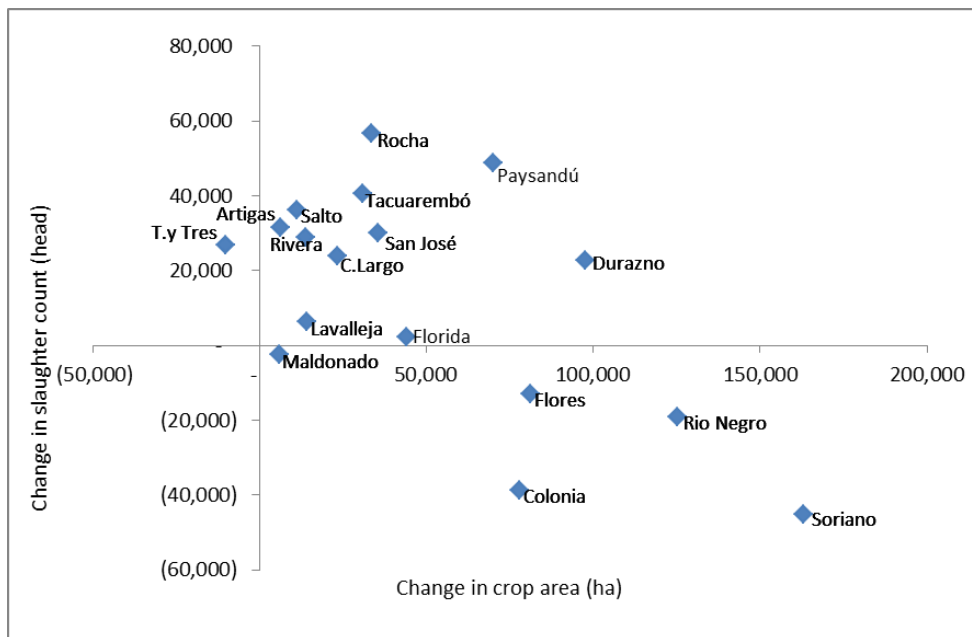
Figure 3 illustrates these changes. The departments (municipalities) where crop production has increased the most during the last 10 years, such as Soriano, Colonia, or Rio Negro, are also the ones with major negative changes in slaughter numbers. For instance, in Soriano there are 160 thousand hectares more of crop area in 2011 with respect to 2000, and at the same time, the number of animals slaughtered per year decreased by 45,000. See also Figure 2 as a reference.

⁴ The National System of Cattle Information (SNIG) keeps records of animals on feed, and movements in and out of feedlots.

Figure 2. Uruguay. Administrative map



Figure 3. Change in number of cattle slaughtered vs. change in crop area, by municipality (*), last ten years.



Source: own calculations based on Ag-Census data (2011 vs. 2000) and INAC data (2013 vs. 2003).

(*) The territory of Uruguay is divided in 19 departments, or municipalities. The metropolitan area of Montevideo and the municipality of Canelones are not shown.

In the last 20 years, another important change has been the reduction in sheep production. Sheep numbers decreased from 26 million in 1990 to the current level of 8 million. And since sheep and cattle would graze the same pasture, there has been a process of substitution of one species for the other, with implications on the dynamics of the pasture and the farm organization.

Stock cattle can be sold directly from one producer to another, with or without consignment, or via public auction. Direct sale is the most common way, with more than 60% of all sales. Auctions, with 38% of all transactions, take place in a sale yard (two thirds) or via the internet and TV (“video auctions”, one third). Sale yards are the main outlet for small farmers that only move a few animals at a time. Video auctions are most used by farmers who want to sell/buy by large numbers.

Finished cattle are sold to the slaughterhouses directly by the producer, with or without consignment. Tradition and trust are key factors in explaining why farmers tend to sell their animals always to the same slaughterhouse, contracting the same consignee. Also, in some parts of the country, a slaughterhouse may have certain (local) monopsony power, because other plants will not be interested in buying cattle from too far away. On average, cattle travel 190 km to get to the slaughterhouse (Souto et al., 2013), which usually takes care of the cost of transportation and the logistics.

The number of animals slaughtered by year reached a record in 2006, with 2.6 million. Since then, the numbers have stabilized around 2-2.1 million. 2013 was a particularly poor year in terms of slaughter, with increasing inventories. A much larger off-take rate is expected during 2014. Steers of —on average— 3.2 years of age, account for a little more than 50% of the total. Cows account for 45% of all, and the rest are calves and bulls

4. Beef processing

About 98% of marketed animals go to inspected facilities for processing. The remaining 2% are slaughtered in farms or by local butchers, for local or in farm consumption. In the last ten years, 68% of fresh beef has been exported annually on average, whereas 32% has been consumed domestically.

There are 39 licensed slaughter plants⁵ around the country, with a total capacity of about 3.5 million head per year. Total capacity has increased by 14% since 2008, according to INAC estimates. Larger slaughterhouses operate in both domestic and export markets. The meatpacking industry has undergone a process of concentration with an increasing participation of foreign firms, especially Brazilian (Marfrig, JBS, Minerva). Breeders & Packers (BPU), a new plant inaugurated in 2010, belongs to British investors. San Jacinto belongs to an Argentine firm. Currently, the top 4 firms account for 48% of total slaughter, and the top 8 firms, 71%.

Table 1. Uruguay's total slaughter of cattle by firm (2013)

	Firm	Steers	Cows	TOTAL(*)	%
1	Marfrig	242,653	216,012	465,732	23.5
2	Catergroup (**)	105,553	61,337	168,880	8.5
3	JBS – Canelones	69,013	85,335	158,413	8.0
4	Minerva - PULSA	90,738	60,125	152,421	7.7
5	Las Piedras	109,677	33,060	143,302	7.2
6	San Jacinto – Nirea	63,794	56,588	121,556	6.1
7	Ontilcor (Pando)	58,034	43,848	102,773	5.2
8	Breeders&Packers-Uy	56,438	29,380	86,604	4.4
	First 8	795,900	585,685	1,399,681	70.6
	Others	273,439	286,233	582,760	29.4
	TOTAL	1,069,339	871,918	1,982,441	100.0

Source: based on INAC (www.inac.gub.uy)

(*) Total includes calves and bulls as well.

(**): At the beginning of 2014 the Brazilian firm Minerva acquired the Frigorífico Carrasco that was part of Catergroup, hence becoming the second largest firm after Marfrig.

From 2008 until 2013, fixed capital investment in the meat packing industry reached US\$ 307.4 million, equivalent to an annual average of US\$ 50 million, or 3.6% of the export value. However, this figure is biased by one single case: the new

⁵ Slaughter plants are inspected by the veterinary services of the MGAP, and given a license for exports.

plant built by Breeders & Packers, with a cost of US\$ 110 million.⁶ Excluding this case and investments on the pork and poultry sectors, the beef industry has invested about US\$180 million between 2008 and 2013, of which 53% has been on new equipment and machinery, and 45% on construction (new facilities or renovated ones). The remaining 2% corresponds to other items. Therefore, without accounting for Breeders & Packers, the annual investment on fixed capital by the beef industry has been around US\$ 30 million, equivalent to 2% of the value of exports (US\$ 1.6 billion).

Although it is not possible to establish exactly what have been the investments (what type of new equipment or new facilities, etc.), about half the funds of the projects were used to enhance the processing capacity and/or to change the existing facilities so as to be able to comply with new requirements imposed by international markets on SPS, food safety and animal welfare. According to this, the annual effort put on by the beef industry in order to keep pace with new requirements of the world market can be estimated between 1 and 2% of the export value (between 15 and 30 USD million).

Table 2 summarizes the industrial process. Starting from a 540 kg steer that loses 6% of its weight on its way to the processing plant, at slaughter it will weight 510 kg. Then, subtracting the weight of blood, intestinal content, feet, head, hide, dressing and some byproducts, a warm carcass is produced that will weight 279 kg, a 54% yield.

After halving and washing them, warm carcasses are sent to the cold chambers, where they lose 1% of the animal's live-weight. The goal of reducing quickly the temperature of the carcass is to stop microbial activity and allow the meat to start maturation. Carcasses stay in cold storage for 18-24 hours, except those that are being exported to markets that require 36 hours.

Cut preparation and deboning starts afterward. Deboning the carcass would result in about 195 kg of beef, 22 kg of fat, and 57 kg of bones. Half carcasses, before deboning, could be partitioned between the 10th and 11th rib in two ways: in two approximate equal parts, forequarters and hindquarters; or else, forequarters with flank (57%) and hindquarters "pistola" (43%). In this second case, forequarters are separated in Kosher type (48%), navel plate (3%), and rib plate with flank on (7%); while hindquarters "pistola" yields rump & loins and butt. Highly priced cuts such as rump & loins make up 11-12% of the total beef while medium to high priced cuts, 18-19 %. A complete list of cuts and their corresponding weights is shown in Table 3.

⁶ Data regarding the meat packing industry investment on fixed capital comes from the Ministry of Industry and Energy. Data available corresponds to investment projects that have been approved under the provisions of the Law of Investments Promotion of 2001, which gives some tax incentives to projects considered relevant for economic development. Data on other capital investments are not available.

Table 2. Process of transformation from live animals to beef cuts

Live animal (steer)	Kg	%
In farm weight	540	106%
Loss from farm to slaughter plant		(avg 5.5-7%)
Weight at slaughter	510	100%
Blood		3.2%
Feet, head		6.8%
Hide		7.2%
Intestine, entrails		15.0%
Dressing		10.9%
Skirt and other byproducts		3.0%
Warm carcass	279	54.0%
Cold carcass	274	53.0%

Source: Adapted from Guardia et al. (2004)

Table 3. Beef cuts individual weight (half carcass)

Forequarters Cuts	Weight (kg)*	%	Hindquarters cuts	Weight (kg)*	%
Kosher rib plate (b-less)	6.11	4.5	Rib-plate (bone in)	2.64	1.9
Neck	6.87	5.1	Flap	1.60	1.2
Chuck roll	4.87	3.6	Flank	0.70	0.5
Spencer roll	5.22	3.8	Inside skirt	0.58	0.4
Shoulder clod	4.77	3.5	Thick skirt	0.64	0.5
Blade oyster	1.97	1.4	Rose meat	1.33	1.0
Chuck tender	1.22	0.9	Tenderloin	2.26	1.7
Chuck cover	1.46	1.1	Striploin	4.61	3.4
Shin	3.12	2.3	Rump	5.45	4.0
Brisket	4.63	3.4	Tri-tip	1.29	0.9
Navel plate (bone-in)	3.44	2.5	Inside	8.17	6.0
Subtotal forequarters	43.68	32.1	Outside	7.09	5.2
			Knuckle	5.35	3.9
Trimmings	6.41	4.7	Shank	2.03	1.5
Fat	11.36	8.4	Heel muscle	2.09	1.5
Bones	28.39	20.9			
Subtotal trim., fat, bones	46.16	33.9	Subtotal hindquarters	46.06	33.9

Source: adapted from Guardia et al. (2004)

(*) Assuming a 136 kg steer half carcass.

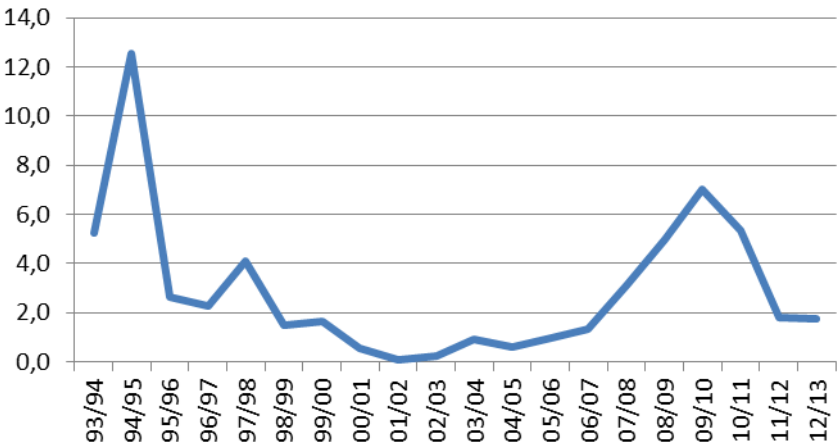
Although Table 3 shows a comprehensive list of cuts, it does not follow from there that the beef industry sells every one of these cuts separately. On the contrary, a large portion of the shipping, either for domestic consumption or for export markets comprises certain combination of these cuts. There are shipments of whole quarters, for instance, or rump & loins combined. Every market may demand a different mix of group of cuts or whole quarters. This fact put a difficulty for the next sections of the report in the sense that is not always possible to analyze the changes in markets on a per-cut basis. INAC publishes the quantity and export value of the entire list of cuts without identifying the market destination.

5. Export markets

5.1 Cattle exports

Early in the '90s Uruguay's government approved a series of new regulations that, among other things, allowed for free exports of live cattle that up to that moment were prohibited. Live cattle exports have been marginal since then, with a few years of relatively large numbers (1994/95 and 2010/11) and very little in the way of exports the rest of the time. There are two different types of businesses on live cattle exports: one that is more or less constant every year, and the other that heavily depends on relative prices. The first line consists of Holstein heifers exported to Brazil and China, targeted for milk production and genetic improvement. The second line is composed of beef cattle for stocking that has been exported mainly to Brazil, Turkey, Egypt, and Syria. At most, exports of live cattle have accounted for 12% of total cattle production, when slaughter, cattle exports, and inventory changes are all taken into account (Figure 4).

Figure 4. Uruguay's exports of live cattle as a % of total production



Source: Based on Urunet and INAC

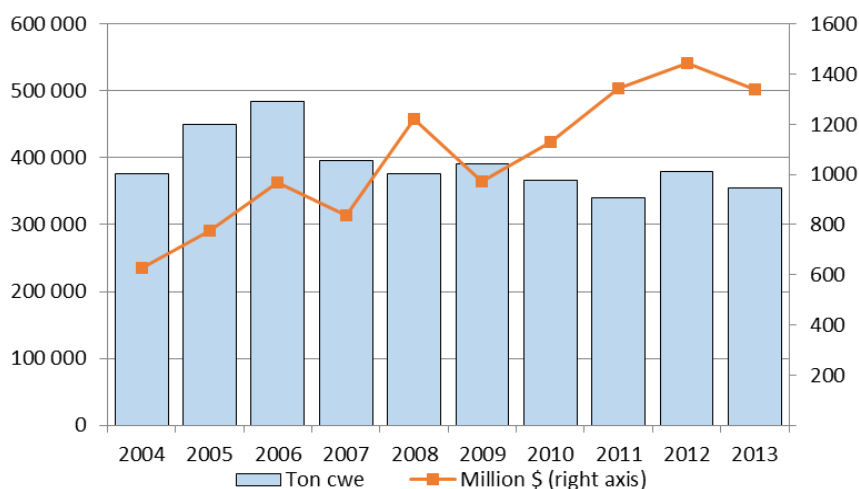
5.2 Beef exports

5.2.1 Overview

In the last three years, Uruguay's exports of fresh beef have been around 1.4 billion US dollars per year. Exports volumes reached a historic record in 2006, with near half a million tons of carcass weight equivalent (cwe), but have been below 400 thousand tons since then (Figure 5). During the 2013 calendar year, Uruguay exported 255 thousand tons of fresh beef, in terms of product weight equivalent (pwe), that is, 355 thousand tons of carcass weight.⁷ Exports of byproducts and offal added 115 thousand tons pwe.

Recently, Uruguay's beef exports have been affected by two particular events. First, there has been an emergence of the Chinese market, which increased from importing less than US\$ 50 million to US\$ 265 million in the span of one and a half years, with prospects for further growth. Second, the country gained access to the so called "high quality beef" EU 481 tariff quota. This tariff quota, currently set at 48,200 tons, is the result of the agreement between the EU and USA after the litigation regarding the use of hormones on cattle. Beef that is shipped to fulfill this quota must come from animals that are younger than 30 months of age, and have been grain-fed during at least the last 100 days.

Figure 5. Uruguay's fresh beef exports, 2004-2013 (tons cwe; current dollars, million)



Source: based on INAC data

There is an increasing complexity in the beef market, where processors disassemble the raw material themselves, selling different cuts to different consumers, domestically and internationally. The carcass of each animal has a relatively fixed

⁷ A fixed coefficient is used to convert from a product as it is shipped (boneless) to its equivalent in carcass weight, to account for the bones. The overall coefficient for fresh beef is 1.46, although it may vary depending on the cut. For instance, for frozen cuts the coefficient is 1.47, for chilled cuts, 1.39. For frozen forequarter cuts is 1.54, whereas for frozen hindquarter cuts is 1.42.

proportion of all the different parts, although the size and quality of the parts depends on factors like the animal's breed, diet, sex and age at slaughter. The different parts of a given animal, e.g., chuck roast and tenderloin are not perfect substitutes in consumption and indeed two tenderloins from two different animals can be quite different products as well. Depending on consumer preferences within each "market", the relative prices for different cuts can vary greatly across markets.

The existence of differing relative prices across markets makes trade profitable. Moreover, the greater the difference in relative prices across markets, the greater the profitability for the processor of further disassemble the carcass so as to be able to sell each part to the market with the highest price for that particular cut (Jarvis, Bervejillo and Cancino, 2005).

INAC reports around 300 different export products, including beef, offal and byproducts. Unit prices range from US\$ 300 per ton (hooves) to US\$ 93,000 per ton (fetal serum). Considering only fresh beef, unit prices go from US\$ 878 per ton (frozen fat trimmings) up to US\$ 36,000 per ton (chilled tenderloin, controlled pieces). In terms of export value, the main single product is boneless chilled rump and loins,⁸ which accounts for only 9% of the carcass, at an average price of US\$ 13,700/ton.

Ninety percent of all fresh beef is exported without bones, of which 75% is frozen beef and 15% chilled beef. Chilled beef goes mostly to regional markets (Brazil, Chile) or the highly priced European countries (the EU as well as Switzerland). Frozen cuts and quarters are destined to more distant and less priced markets. On average, chilled beef is sold at a price 88% higher than frozen beef. However, for the same product class of beef (i.e. chilled or frozen), average prices are not necessarily similar across markets, because the mix of cuts is different for each one. So for instance, in 2013, Norway paid almost US\$ 14,000 a ton of frozen boneless beef, while the average price in the Chinese market was less than 4,000.

To simplify, Table 4 shows volume, export value and implicit FOB price for each of the main group of cuts, plus offal and byproducts. Considering all exports, fresh and processed beef account for 89% of value, while offal and byproducts the remainder 11%.

⁸ This is actually a group of at least three different cuts: tenderloin, striploin, and top sirloin. According to how are they presented (chilled or frozen, chain on or off) and their size (i.e. weight), prices vary significantly.

Table 4. Uruguay exports of beef and byproducts by type, 2013 (All markets)

Product	Volume Ton pwe	% Volume	Value Thous. US\$	% Value	FOB Price US\$/ton pwe
Bone-in, frozen	5,860	2	14,646	1	2,499
Bone-in, chilled	5,122	1	16,113	1	3,146
Boneless, frozen	200,384	54	1,002,884	62	5,005
Boneless, chilled	39,243	11	368,573	23	9,392
Processed	4,486	1	39,907	3	8,896
<i>Subtotal</i>	<i>255,095</i>	<i>69</i>	<i>1,442,123</i>	<i>89</i>	<i>5,653</i>
Offal	25,666	7	78,599	5	3,062
Edible byproduct	10,239	3	10,599	1	1,035
Byproducts for industrial use	74,563	20	62,632	4	840
Industrialized byproduct	4,348	1	19,988	1	4,597
<i>Subtotal</i>	<i>114,815</i>	<i>31</i>	<i>171,817</i>	<i>11</i>	
TOTAL	369,910	100	1,613,940	100	

Source: INAC. For more details see the Appendix I

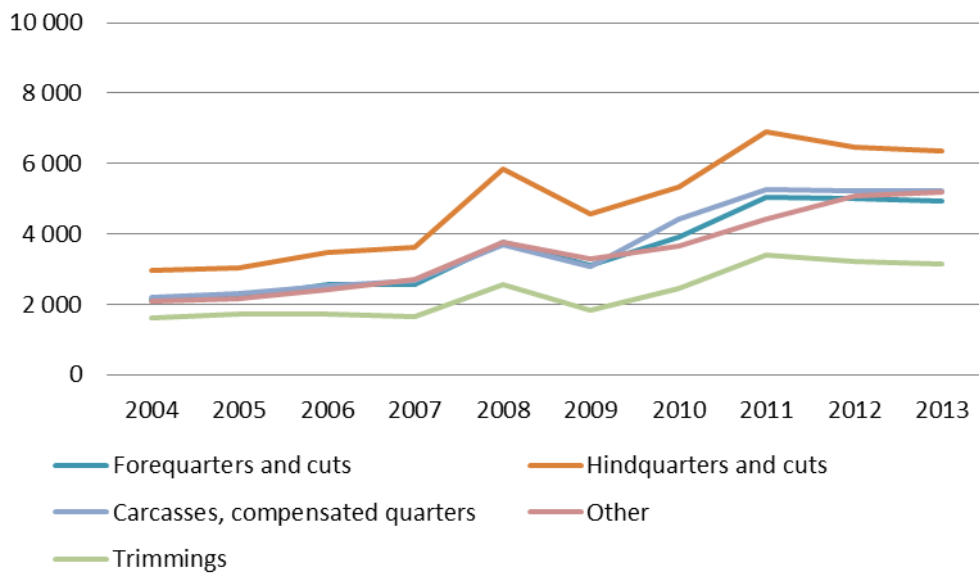
Frozen boneless cuts and quarters account for the largest portion of Uruguay's beef exports. These are a mixture of many different cuts, none of which individually make up more than 11% of the whole carcass, as is the case of chuck and blade that sells for an average price of US\$ 4,224. Chuck and blade, forequarter Kosher cuts, and trimmings account for 57% of exports of all frozen boneless beef. The average price for frozen boneless cuts was US\$ 3,925 per ton pwe in 2013. The highest price corresponds to tenderloins, above US\$ 18,000 per ton pwe.

Figure 6 shows the average price across all markets of frozen boneless group of cuts. Hindquarters have been always the most expensive group of cuts, with current prices of around US\$ 6,400 per ton. On the lowest end, trimmings sell for about US\$ 3,200 per ton.

Chilled boneless cuts are the most expensive ones, with an average of US\$ 9,392/ton, 88% higher than frozen boneless average price. Compensated chilled boneless quarters –which include a mix several cuts– account for 47% of this group of cuts, in terms of volume, with an average price of almost US\$ 8,000. Rumps and loins are the second most important product of this group, with almost 20% of the volume and an average price of US\$ 13,655 per ton pwe. Forequarter cuts sell for around US\$ 10 thousand/ton. (Figure 7)

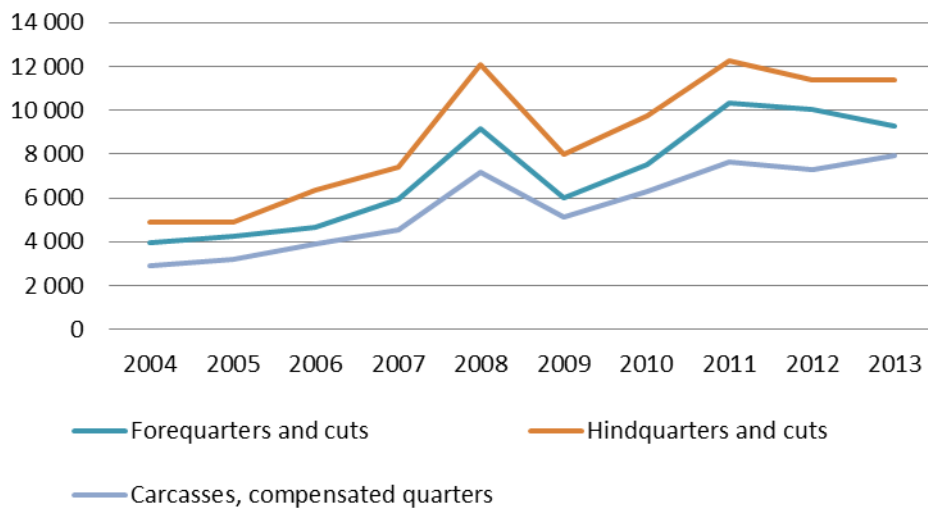
Bone-in cuts are mostly rib plate, with or without flank, and navel plate. Historically, bone-in cuts have accounted for less than 4% of export value annually. However, in 2013, thanks to China imports, this group of cuts jumped to a 9% of export value. The frozen bone-in main cuts sell for US\$ 2,482, whereas the chilled bone-in main cuts sell for US\$ 3,146 per ton pwe. This means that for a similar bone-in cut, going from frozen to chilled implies a 27% premium.

Figure 6. Price of frozen boneless beef, all markets, 2004-2013, current FOB US\$/ton.



Source: based on INAC data.

Figure 7. Price of chilled boneless beef, all markets, 2004-2013, current FOB US\$/ton.



Source: based on INAC data

5.2.2. Market access

5.2.2.1. General conditions

Conditions for market access are summarized in the following table. With the exception of Japan, Uruguay has access to all relevant beef markets of the world. The beef world market is characterized by a number of quotas and tariff rate quotas (TRQ). Some of the quotas are given to the beef exporting nation, some other to the firm importing into the market, thus affecting the way export rents are distributed.

Table 5. Market access current conditions: tariffs and quotas

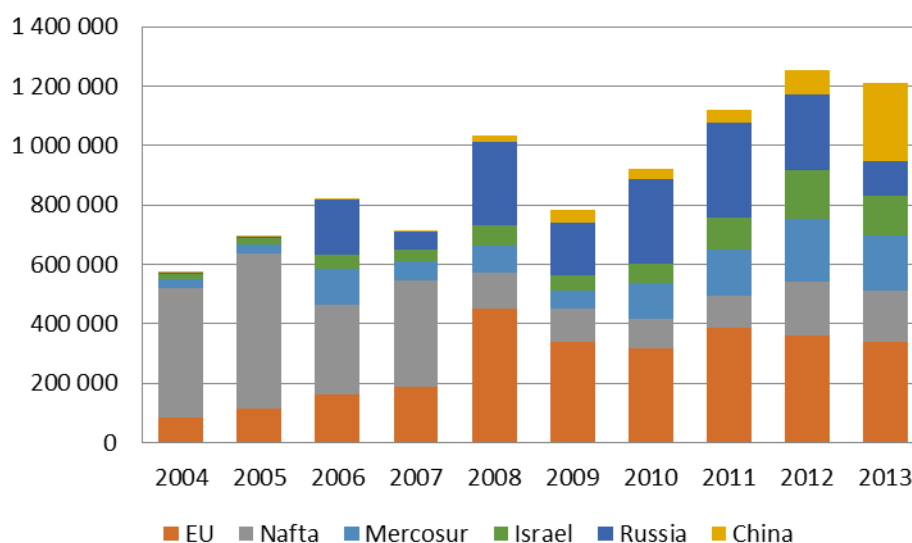
Market	General conditions	Uruguay's access
USA	TRQ: 657,000 tons, 5-10% tariff 26.4% + 44 USD/ton outside quota. 0% for Canada, Mexico and Chile	TRQ: 20,000 tons (10% tariff)
Canada	TRQ: 76,409 ton tariff 0%, Australia (35,000), New Zealand (29,600) and other countries (11,809 ton). Supplementary permissions: 130,000 tons (suspended). Outside quota: 26.5% tariff.	Uruguay gained access under the supplementary permissions, but now competes for the 11,809 segment.
Mexico	MFN 20% (0201); 25% (0202) ALADI: 16% (0201); 20% (0202) 0% for USA, Canada, Costa Rica and Chile	FTA, 7% ad valorem tariff
EU-27	TRQ1: 60,250 tons Hilton Quota 20% tariff; TRQ2: 48,200 tons High Quality Beef 481 0% tariff, TRQ3: 50,700 tons (pwe) Bilan Quota for manufacture beef, 20% tariff TRQ4: 53,000 tons Gatt Quota for frozen boneless beef, 20% tariff Out of quota: 12.8% + 1,768/3,041 €/ton (depending on the cut)	6,300 ton Hilton Quota (grass fed animals, weighting no more than 460 kg); High Quality Beef 481 (grain fed animals during the last 100 days; less than 30 months of age).
Russia	TRQ: Frozen beef: 435,000 ton (343,700 to the EU; 17,900 to USA; 3,000 to Paraguay; 70,400 tons to other countries), 15% tariff. Chilled beef: 27,800 tons (27,300 to the EU) Out of quota tariff 55 %, with minimum price of 700 €/ton chilled and 550 €/ton frozen.	Access via "other countries" segment GSP 11%
China	16% ad valorem tariff	16% ad valorem tariff
Israel	MFN 0% (0202); 190% (0201)	FTA 400 ton (0201) 0% tariff
Korea	MFN 40%	40% ad valorem tariff

NOTES: MFN: Most Favored Nation; TRQ: Tariff Rate Quota; FTA: Free Trade Agreement; GSP: General System of Preferences; ALADI: Asociación Latinoamericana de Integración; 0201: chilled beef; 0202: frozen beef.

In the last decade the importance of each market has changed (Figure 8), as exports to Nafta decreased while Russia became a new and significant destination for Uruguay's beef in 2008, and finally the appearance of China in 2013 as the most important market displacing first Russia and next year, most likely, the EU. Over the past several years, Israel has been a very stable market for frozen boneless forequarter cuts (Kosher type), while Mercosur, especially Brazil, a preferred destination for chilled bone-in forequarter cuts.

Uruguay's competitors are different according to each market. For instance, in Russia, Uruguay competes with Belarus, Brazil and Paraguay; in the EU and in Israel, with Argentina; in China, with Australia. Before the FMD crisis of 2001, Uruguay was exporting boneless beef and offal to Korea and Japan. Recently, Uruguay regained access to Korea, because this country accepted the minimum risk policy of FMD free with vaccination, the current FMD status of Uruguay. However, exports to Korea are not expected to be important in terms of volume. Uruguay considers its presence in Korea more as a marketing tool, because it gives prestige to its beef. To increase its market share in Korea, Uruguay faces two restrictions: one is the presence of big players such as Australia and the US, and another is distance, which increases costs.

Figure 8. Uruguay fresh beef exports by market, current US\$



Source: based on INAC data.

5.2.2.2. The European market

The EU market has been the most valuable for Uruguayan exporters, in part because of the so called "Hilton" quota, which amounts to 6,300 tons of highly priced cuts (rump and loins). The European Hilton quota is given to the beef exporting nation who in turn, decides on how to allocate the volume among national exporting firms. In Uruguay, INAC administers the quota allocation among

exporting firms, based on an average export performance over a three-year period.⁹ There are 17 plants participating in the Hilton quota, out of 22 plants licensed to export beef to the EU.

In recent years the EU has become an attractive market also because of the “481” quota. The 481 quota (as well as the Canadian and the Russian quota), is given to the importer, such as a European firm, who then decides were to buy among authorized countries (Vazquez Platero, 2006). The 481 is a “first come-first served” type of quota, which means each beneficiary¹⁰ can export as much as it can, up until the quota is filled (48,200 tons).¹¹ In 2012/13, Uruguay exported 6,800 tons under the 481, surpassing the volume of exports under the Hilton quota, and in the last agricultural year 2013/14, shipments under the 481 quota reached almost 10 thousand tons (Table 6), an increase of more than 40%. There is a clear incentive to export under the 481 because it is a 0 tariff quota and the number of cuts that can be shipped is not limited, while the Hilton quota carries a 20% tariff, and the number of cuts is limited to a set of seven. Exports to the EU outside these two quotas carry a 12.8% ad valorem tariff plus a fixed amount of import duties of € 1,768 to 3,041 (depending on the cut) per ton. The FOB price under the Hilton quota usually doubles the price outside the quota.

Table 6. Uruguay exports to the EU, by quota.

Quota	2012/13			2013/14		
	Tons pwe	1,000 US\$	US\$/ton pwe	Tons pwe	1,000 US\$	US\$/ton pwe
481	6,843	61,551	8,995	9,794	88,969	9,084
Hilton	6,256	88,294	14,113	6,531	101,208	15,496
Outside quota	28,127	215,595	7,665	20,625	176,196	8,543
Total	41,227	365,440	8,864	36,950	366,373	9,916

Source: INAC

In terms of singular cuts, what is shipped to the EU Hilton is composed by 7 cuts: tenderloin, striploin, top sirloin, spencer roll, inside, outside, and eye-round. But with the 481 quota, almost any cut can be shipped to Europe. Hence the average price is lower than the Hilton mix.

⁹ The Hilton quota totals 60,250 tons of beef per year. The share of each participating country has been fixed for many years now: the U.S. has been given 19%, Argentina 46%, Australia 12%, Uruguay 10%, Brazil 8%, and New Zealand and Paraguay each 2%.

¹⁰ The 481 quota is distributed among European importing firms, who in turn, select the exporters from within the participating countries. Countries that are exporting under this quota are: the U.S., Canada, Australia, New Zealand, and Uruguay. See the Appendix III for more details.

¹¹ The 481 quota has increased from 20,000 ton in 2011/12 to 48,200 in 2012/13.

Table 7. Uruguay's exports to EU, by cut (% volume)

Cut	Hilton	Extra-quota
Rump & loin ¹²	76%	19%
Spencer roll	13%	5%
Other hindquarter cuts	11%	8%
Inside		30%
Outside		12%
Other		26%

Source: INAC

More detailed information of beef exports to European markets is shown in Table 8. This includes main European countries, (excluding Russia, which is accounted for in the next section with the non-European markets), for 2013, the volumes of each of the main group of products and the average implicit FOB price. Table 8 shows all shipments to European markets regardless of which quota applies in each case.

Chilled boneless beef account for 53% of the volume shipped to these European markets. Main group of cuts are hindquarter cuts (frozen or chilled) with 70% of the volume. Average price for a ton of boneless chilled hindquarter cut was about US\$ 12,200, with highest prices in Norway, France, Germany, Sweden and Switzerland, and minimum prices in Italy, Spain, and Portugal. This difference might be explained by the mix of cuts: when the proportion of tenderloins, top sirloins, and striploins is larger than cuts such as inside, outside, knuckle, or eye-round, the price tend to be above US\$ 10,000/ton.

¹² The expression "rump&loins" means the set of tenderloin, striploin, and top sirloin. This set accounts for about 22% of the value on 9% of the volume of a whole carcass.

Table 8. Uruguay's exports to European markets by type of product. Boneless beef, 2013.

Market	Ton pwe			Chilled			TOTAL
	Frozen Carc(1)	Foreq.	Hindq.	Carc(1)	Foreq.	Hindq.	
Netherlands	45	571	2,125	4,814	417	2,946	11,018
Germany		7	2,131	1,497	342	3,573	7,549
Italy	17	78	5,390	661	169	473	6,787
Spain	126	374	2,306	592	102	1,595	5,095
UK	184	687	2,242	165	88	1,307	4,673
Switzerland		0	633		1	1,874	2,509
Sweden		110	966	278	184	474	2,012
Norway	14	65	408	14	19	49	569
France	16	587	249	77	1	7	939
Portugal	27	27	260	86	11	86	496
TOTAL	530	2,507	16,711	8,183	1,333	12,384	41,647

	Thous. USD			Chilled			TOTAL
	Frozen Carc(1)	Foreq.	Hindq.	Carc(1)	Foreq.	Hindq.	
Netherlands	1,168	3,761	17,021	44,165	3,958	36,478	106,552
Germany		53	15,560	14,320	3,942	49,462	83,337
Italy	97	399	37,479	5,448	1,263	4,588	49,274
Spain	848	1,588	16,687	6,068	793	13,822	39,806
UK	1,492	4,624	15,221	1,434	1,060	13,862	37,693
Switzerland		0	4,578		12	24,732	29,323
Sweden		1,133	9,032	3,705	1,803	6,258	21,930
Norway	172	435	6,213	196	248	806	8,069
France	118	3,520	1,103	561	9	106	5,417
Portugal	175	189	1,914	727	109	830	3,944
TOTAL	4,071	15,702	124,807	76,623	13,197	150,945	385,345

	Implicit FOB price USD/ton			Chilled			TOTAL
	Frozen Carc(1)	Foreq.	Hindq.	Carc(1)	Foreq.	Hindq.	
Netherlands	8,080	6,585	8,010	9,175	9,502	12,380	9,671
Germany		7,661	7,303	9,567	11,533	13,845	11,040
Italy	5,717	5,129	6,954	8,244	7,464	9,707	7,260
Spain	6,707	4,246	7,236	10,253	7,794	8,665	7,812
UK	8,092	6,733	6,789	8,690	12,093	10,605	8,066
Switzerland		8,859	7,229		9,747	13,194	11,687
Sweden		10,301	9,346	13,311	9,789	13,212	10,897
Norway	12,304	6,652	15,218	14,315	13,188	16,539	14,186
France	7,226	5,993	4,420	7,278	10,000	14,487	5,772
Portugal	6,522	6,960	7,366	8,478	9,725	9,694	7,945
TOTAL	7,687	6,264	7,469	9,364	9,898	12,189	9,253

Source: based on INAC data

(1): Carcass, half carcass, compensated quarters

5.2.2.3. *The non-European market*

The Chinese market, which in the year 2013 accounted for 20% of Uruguayan exports, began demanding cuts of low quality but is expected to buy more valuable cuts in the near future. In 2007, exports of offal and byproducts to China accounted for 77% of the value of that market, selling at an average of less than US\$ 1800 per ton. In 2013, offal and byproducts were only 26% of the export value, whereas boneless frozen cuts accounted for 58%, selling at US\$ 4,200 per ton. Although the EU is still today, in terms of export value, the most important market, with 25% of all fresh beef sales, it is likely that by the end of 2014 China's imports surpass the EU's.

The next table illustrates the late changes in non-European markets, taking into consideration only three markets, the US, Russia, and China, and the set of frozen boneless cuts. In 2007, 45% of Uruguay's exports of fresh beef went to the US, and the mix was 41% forequarters cuts, 20% hindquarters cuts, 13% compensated quarters, and 18% trimmings. In that year Russia accounted for 9% of Uruguay exports and China only 1%. China was an importer of mostly offal by that time. In 2010 the Russian market had become more important than the US, and the mix of cuts was 47% forequarters cuts, 22% hindquarters cuts, 27% trimming and a marginal fraction of compensated quarters. The US mix remained basically unchanged: mostly forequarter Kosher cuts, forequarter blocks for manufacture, flat, brisket, and trimmings. In 2013 China became the main destination in terms of volume, with 29% of all fresh beef, and a product mix of 22% forequarters cuts (rib-plate and navel plate -which are bone in cuts- flat, shin, among others), 15% hindquarters (outside, knuckle, eye-round, shank), 19% compensated quarters, and 17% trimmings. China is also importing offal and many byproducts. Russia's imports are mainly forequarter blocks for manufacture, outside, chuck and blade, knuckle, eye-round, and trimmings. While Russia has been always a market for almost only frozen boneless beef, China and the US import some amount of chilled beef as well.

Table 9. Product mix of frozen boneless beef exports to selected markets (percent of volume, pwe)

2007	Uy exports of fresh beef (%)	Fore- quarters	Hind- quarters	Carc.- Compen sated 1/4	Trimming	Fzen bless. Subtotal %
USA	45	41	20	13	18	91
Russian Fed.	9	36	41	4	19	100
China	1	31	40	3	21	96
Subtotal	56					
2010						
USA	7	40	20	3	16	80
Russian Fed.	34	47	22	4	27	100
China	5	13	16	30	29	88
Subtotal	47					
2013						
USA	10	47	12	12	16	86
Russian Fed.	13	38	20	0	39	97
China	29	22	15	19	17	73
Subtotal	52					

Source: based on INAC data

Table 10 goes into more detail for non-European markets. Frozen beef accounts for 91% of the volume shipped to these markets in 2013. Frozen forequarter cuts and trimmings are the largest group of cuts to these markets. For frozen forequarter cuts the prices vary from about US\$ 4,000 per ton (China, Russia, Canada) up to a maximum of almost US\$ 15,000 in Brazil, with a weighted average of US\$ 4,857 per ton. The extreme price in the Brazilian market applies to only a small fraction (128 tons), which might be a very specific niche market. For the case of trimmings, prices vary from a minimum of US\$ 2,671 in Brazil to a maximum of US\$ 5,324 in Venezuela. The largest volume of trimmings goes to China, Russia, and the US, with prices in the range of 3 to 5 thousand dollars a ton. There is currently an important demand from the US, as a result of the shortage of domestic supply of certain type of beef, which explains the difference in price for trimmings.

On average these non-European markets carry a price of about US\$ 4,900 per ton of boneless fresh beef (mostly frozen).

Table 10. Uruguay's exports to non-European markets by type of product. Boneless beef, 2013.

Market	Ton pwe							
	Frozen				Chilled			
	Carc (1)	Trimnings	Foreq.	Hindq.	Carc (1)	Foreq.	Hindq.	TOTAL
China	12,857	11,53	14,740	10,087	0			49,221
Israel			22,256			13		22,269
USA	2,804	3,754	11,278	2,926	1,159	133	136	22,189
Russian Fed.	118	11,851	11,542	6,269		27	71	29,878
Chile	146	514	74	1,106	8,139	251	1,215	11,443
Brazil	156	1,001	128	2,385	499	215	2,336	6,720
Venezuela	4,157	425	1,244	1,361				7,186
Canada	1,869	2,035	5,844	739	0	6	12	10,506
TOTAL	22,107	31,117	67,105	24,872	9,797	643	3,770	159,412
Thous. USD								
	Frozen				Chilled			
	Carc (1)	Trimnings	Foreq.	Hindq.	Carc (1)	Foreq.	Hindq.	TOTAL
China	62,137	33,616	59,270	52,344	2			207,368
Israel		-	132,884			77		132,961
USA	15,390	18,699	57,261	16,273	11,883	1,002	1,591	122,099
Russian Fed.	474	35,368	45,678	30,228		135	407	112,290
Chile	965	1,598	535	5,995	48,405	1,386	6,396	65,280
Brazil	1,330	2,674	1,908	21,230	5,704	2,345	24,903	60,093
Venezuela	26,460	2,261	5,534	8,215				42,469
Canada	7,305	7,051	22,878	3,974	2	58	90	41,357
TOTAL	114,061	101,267	325,947	138,258	65,995	5,003	33,386	783,918
Implicit FOB price USD/ton								
	Frozen				Chilled			
	Carc (1)	Trimnings	Foreq.	Hindq.	Carc (1)	Foreq.	Hindq.	TOTAL
China	4,833	2,914	4,021	5,189	8,300			4,213
Israel			5,971			6,100		5,971
USA	5,488	4,981	5,077	5,562	10,250	7,559	11,704	5,503
Russian Fed.	4,027	2,984	3,958	4,822		4,956	5,692	3,758
Chile	6,621	3,108	7,251	5,422	5,948	5,534	5,265	5,705
Brazil	8,510	2,671	14,921	8,903	11,425	10,928	10,660	8,943
Venezuela	6,366	5,324	4,449	6,034				5,910
Canada	3,908	3,464	3,915	5,376	11,046	9,750	7,554	3,937
TOTAL	5,160	3,254	4,857	5,559	6,736	7,776	8,855	4,918

Source: based on INAC data

6. Beef prices and margins

6.1. Prices received by farmers

The price received by farmers is shown below, based on 2013 data. Prices for cattle depend on the age, sex, weight, and the time of the year. There is some regional variation, but in general terms, the whole country can be defined as a single market. There is of course a market for finished cattle (from farm to slaughterhouse) and another one for stocking cattle. The price for a finished animal may be also affected by the degree of finishing, that is, the ratio of size and weight, which would affect the size of the cuts, the degree of marbling, and the dressing of the carcass.

The price effectively paid to the producer equals the price accorded between seller and buyer less taxes and fees: a 2% sales tax that goes to the general treasury, the 0.4% levy for the National Institute of Agricultural Research, the 0.2% rural housing fund, a fixed amount that is used in part to finance the FMD and brucellosis control programs and in part to finance the Electronic Information System for the Meat Industry (explained in section 7.1.1 of this report), and a 1% tax for the local municipality.¹³ A commission of 2.5-3.0% might be also added if there is a broker or consignee facilitating the transaction. Because the slaughterhouse takes care of the transportation costs, the price paid equals the price paid for the cattle plus the cost of transportation from the farm to the processing plant.

¹³ The 1% sales tax that goes to the local municipality returns to the farmers as a credit for social security payments.

Table 11. Net price of cattle sold to processing plants, taxes and fees (based on 2013 average prices)

	Steers	Cows	Calves	Bulls
Average liveweight kg/head	507.7	443.3	261.2	604.5
Avg. Price US\$/kg live	1.95	1.65	1.8	1.35
Avg. Price US\$/head	990.02	731.45	470.16	816.08
<i>Taxes, fees and other transaction costs:</i>				
Commission (1)	30.20	22.31	14.34	24.89
IMEBA 2% (2)	19.8	14.63	9.4	16.32
INIA 0,4% (3)	3.96	2.93	1.88	3.26
MEVIR 0,2% (4)	1.98	1.46	0.94	1.63
TCF (5)	1	1	1	1
FMD fund(6)	3.8	3.8	3.8	3.8
Brucellosis fund (7)	1	1	1	1
Municipal taxes 1%	9.9	7.31	4.7	8.16
Subtotal	71.64	54.44	37.06	60.06
Price paid to farmers US\$/head	918.38	677.01	433.10	756.02
Cost of transportation, US\$/head	17.34	15.14	8.92	20.65
Price paid by the processing plant, US\$/head	1,007.36	746.59	479.08	836.73

Source: own estimates. Data on average weight and prices are from INAC.

(1) Estimated as 2.5% plus value added tax of 22%; (2) Sales tax; (3) National Institute of Agricultural Research fund; (4) Rural Housing Construction fund; (5) Slaughter Control Fee ("Black boxes"); (6) In addition to this, the dairy sector pays US\$0.18 to the FMD fund per liter of milk sold. (7) Brucellosis Insurance Fund.

Table 11 shows that, for instance, for a finished steer of 508 kg, the processing plant would pay a total of US\$ 1,007, from which, US\$ 17.34 goes to the transportation firm, US\$ 30.20 to the commissioner (less 22% of value added tax), US\$ 41.44 to the government and other public agencies, and US\$ 918.38 to the farmer.

Table 12 shows the cost of transportation in more detail. The cost of transportation includes the cost of washing and disinfecting the truck. The average distance from the farm to slaughter plant is 190 km. For stock cattle the average distance between two farms is estimated at 146 km, and the cost per ton is 13% lower than the cost of transporting finished cattle. In the case of beef for export, the average distance is between the meat packer and the port. Table 3 shows the cost in terms of USD per ton live weight (cattle) or boxed beef. In order to get the cost per

head, as it is shown in Table 9, the cost per ton must be multiplied by the average weight (e.g. in the case of finished steers: 34.16 x 0.5 ton/head).

The cost of transportation, before cleaning the truck, equals the volume transported per km times the cost per ton-km. The volume transported per km equals the gross volume (live animals times average weight per head) times the average distance. Considering finished animals, the total slaughter of 2013 was 1,030 thousand ton liveweight, moved on average 190 km, which result in 195.7 thousand ton-km. Since the cost per ton-km is US\$ 0.176, the total cost of transportation, before cleaning and disinfecting the trucks is US\$ 34.4 million. Adding the cleaning and disinfection and dividing by volume, it ends up as US\$ 34.16 per ton.

Table 12. Cost of transportation. Live cattle and beef (2013).

	Unit	Stock cattle	Finished cattle	Beef(1)
Volume gross	Ton x 1000	823	1030	433
Average distance (2)	Km	146	190	155
Volume per km	ton-km x 1000	120,198	195,700	67,115
Cost per ton-km	US\$/ton-km	0.199	0.176	0.226
Transp. cost	Thous. US\$	23,882	34,367	15,154
Truck clean.& disinfect.	Thous. US\$	667	822	n/a
Total cost	Thous. US\$	24,549	35,189	15,154
Cost per ton	US\$/ton	29.82	34.16	35.00

Source: adapted from Souto et al. (2013) using 2013 prices

(1): weighted average between domestic and export market. A port fee of \$23 per truck of 26 tons should be added to the cost of exported beef.

(2): Average distance from farm to farm (stock cattle); from farm to slaughterhouse (finished cattle); from slaughterhouse to port (beef)

The costs of transportation are taken from the Ministry of Transportation and Public Works, which might not be exactly the charged cost of a particular freight company. These are published as reference prices for the service. The size of the trailer affects the cost. An 18 meters trailer (18t) is normally used for finished cattle, but that may vary. Smaller trucks would be used for stock cattle, especially those that go to auctions or sale yards. A truck with an 18t trailer can transport 36-37 steers weighing 500 kg.

Table 13. Costs of transportation (reference tariffs, September 2013)

Distance (km)	US\$/km Size of trailer			US\$/ton-km Size of trailer		
	18t	15t	12t	18t	15t	12t
51 a 100	4.61	4.11	4.02	0.256	0.274	0.335
101 a 140	3.57	3.34	3.07	0.198	0.223	0.256
141 a 250	3.16	2.98	2.71	0.176	0.199	0.226
251 a 350	3.16	2.98	2.71	0.176	0.199	0.226
351 a 450	3.16	2.94	2.71	0.176	0.196	0.226
More than 450	3.12	2.94	2.71	0.173	0.196	0.226
Minimum charge	259.16	230.75	226.55			

Source: Ministry of Transportation and Public Works

6.2. Processing plants gross margin: the INAC “standard steer”

INAC regularly publishes the value of a “standard steer”, which accounts for all the export value of the animal, that is, beef, offal, hide, and byproducts. For estimating this value INAC uses the price of a 480 kg steer, with a carcass of 260 dressed kg (54% yield). The estimated value is a weighted average of all markets and all final products.¹⁴ INAC uses weight prediction equations of the different cuts, offal, and byproduct in their different commercial presentations in order to get the final value of the “standard steer.” It is also a useful indicator of the industrial gross margin, by comparison of the price received by farmers vs. the export value of the entire animal. In the last three years, the price paid to farmers for a finished steer has been around 80% of the value of the INAC’s “standard steer”.

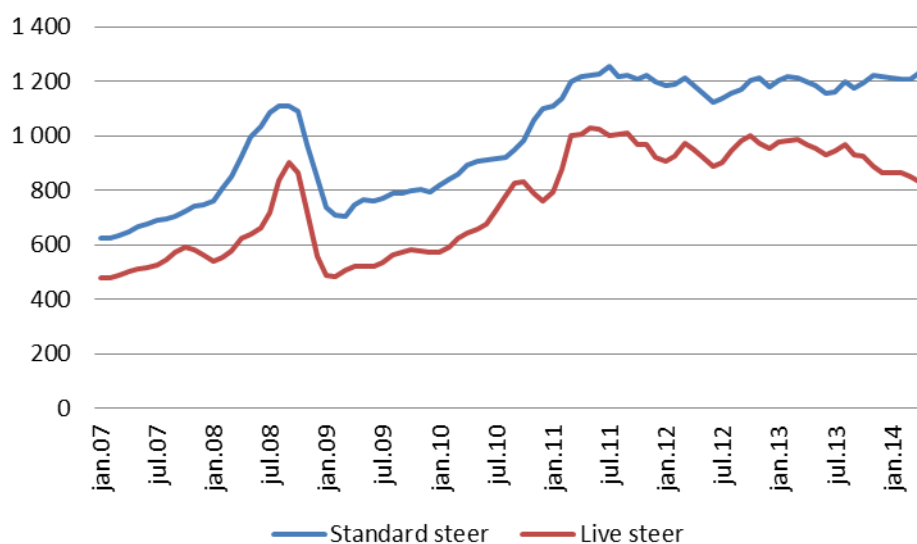
The net margin for the processing industry would be within the gap between the two lines of Figure 9. The approximate cost structure of the meat packing industry is shown in Table 14. Cattle purchases and labor are the two major items: cattle purchases account for almost 80% of the total operating expenses, as it is shown in Figure 9, and the cost of labor accounts for 9.5% (or 11% if social security payments are added).

The cost structure and the value of the “standard steer” show that the net margin of the meat packing industry is very tight. The ratio of the cost of a finished steer to the “standard steer” must be below 0.8 for the industry to realize a net positive profit; otherwise it is just covering costs. There is currently a lot of debate around this issue, because the ratio was around 0.8 for many months and cattle farmers expected this to be the long term equilibrium ratio, whereas the packing industry claims that at that level they are not making any money. In fact, during the last months, from September of 2013 to June 2014, the gap between the price received by farmers and the value of the “standard steer” increased rapidly from 20% to 32%, thus resulting in a particular moment of disequilibrium between supply and demand, given the increased inventories and the idle processing

¹⁴ NAC would not disclose the details of the calculation of the index.

capacity of the meatpackers. Also note that the ratio is based solely on the price of finished steers, but not cows, which regularly carry a price that is 15-20% lower

Figure 9. Value of a “standard steer” vs. price received by farmers for a finished steer (Current US\$/head, 2007-2014)



Source: based on INAC data

Table 14. Cost structure of the meat packing industry (as a percent of total operating expenses)

Expenses	%
Cattle purchases	79.05
Labor	9.52
Packing and containers	2.52
Export expenses	2.40
Taxes and Social Security payments	2.25
Maintenance and repairs	1.35
Commissions on transactions	0.90
Energy, water	0.61
Marketing	0.41
Transportation	0.35
Professional services	0.17
Administration	0.16
Insurance	0.08
Other costs	0.25

Source: Ministry of Finance, Economic Activities Survey, 2009.

The estimated export value of a carcass presented in Table 15 results from multiplying the weight of each individual cut as it is shown in Table 3 times a unit price. To get the values shown in Table 15, a weighted average of all export prices for each cut was used, using 2013 annual average FOB price. Weights applied are the 2013 export volume of each cut in its various presentations, regardless of market destination.¹⁵ Except for the cases of ribplate and navel plate, all the others are boneless cuts.

Table 15 shows that, excluding fat and bones, the export value of a half carcass is US\$ 526. On a 50-50 base of forequarters and hindquarters, 55% of the value comes from hindquarter cuts, 41% from forequarters, and 4% from trimmings. For a standard carcass, the average price per kg would be US\$ 3.86. The 2013 average price of a live steer was about US\$1,007; and, on a per kg basis, the price paid was US\$ 1.98 (See again Table 2). If the weighted- average price of meat is US\$ 3.86, a whole carcass would result in US\$ 1,052. Thus, each animal would yield \$ 45, only on beef. On top of this, there is the portion of offal, byproducts, and hides, which are accounted for in the INAC standard steer index.

Table 15 . Beef cuts individual piece value, weighted average export markets (half carcass)

Forequarters Cuts	Price US\$/unit	%	Hindquarters cuts	Price US\$/unit	%
Kosher rib plate (b-less)	20.54	3.9	Rib-plate (bone in)	8.61	1.6
Neck	35.57	6.8	Flap	10.36	2.0
Chuck roll	22.65	4.3	Flank	3.58	0.7
Spencer roll	54.20	10.3	Inside skirt	3.22	0.6
Shoulder clod	20.67	3.9	Thick skirt	3.85	0.7
Blade oyster	10.01	1.9	Rose meat	5.52	1.0
Chuck tender	5.91	1.1	Tenderloin	31.70	6.0
Chuck cover	9.18	1.7	Striploin	36.83	7.0
Shin	14.66	2.8	Rump	47.08	8.9
Brisket	17.19	3.3	Tri-tip	8.76	1.7
Navel plate (bone-in)	7.55	1.4	Inside	49.69	9.4
Subtotal forequarters	218.13	41.4	Outside	32.15	6.1
			Knuckle	27.38	5.2
Trimmings (as a whole)	20.19	3.8	Shank	9.12	1.7
			Heel muscle	10.12	1.9
Subtotal trimmings	20.19	3.8	Subtotal hindquarters	287.97	54.7
Total value half carcass = \$ 526.29 / Average price = US\$ 3.86 per kg					

Source: adapted from Guardia (2004) with year 2013 prices.

Assuming a 136 kg steer half carcass; 40 kg of fat and bones are not valued.

Besides, on the FOB price there are two fees that the exporter must pay: a 0.6% fee that is used to finance the INAC; and a 1% sanitary inspection fee that goes in part

¹⁵ Domestic prices are not available at that level of disaggregation. Local supermarkets and butcher shops buy whole or half carcasses rather than singular cuts.

to cover the budget of the DGSG. Hence, the price received by the exporters would be US\$ 3.86 less 1.6%, without accounting for customs clearance and other transaction costs.

In summary, the SPS associated costs for Uruguay's beef industry can be estimated as approximately US\$ 114 million (Table 16), which translates into US\$ 57 per slaughtered animal. This is the result of adding up the cost of controlling diseases such as FMD, the cost of the veterinary official inspection services, the cleaning and disinfecting the trucks used to transport cattle to the slaughter plant, and the estimated costs of updating and improving processing facilities. These numbers come from what has been shown in previous sections of this report and are only approximate.

Table 16. Uruguay's beef industry. SPS cost of compliance, annual (million US\$)

Item	Annual amount
FMD control	16.0
Brucellosis control	11.2
Sanitary Inspection	14.0
Livestock Services (DGSG) general budget	42.0
Cleaning and disinfecting trucks	0.8
Meatpackers associated investments ¹	30.0
Total (million US\$)	114.0
Total per slaughtered head (US\$)	57.0
% of head value	6.4

Source: own estimates

(1) Upper bound

The total cost was divided by 2 million, which is the number of cattle slaughtered per year regardless of the final destination. This is based on the criteria that actual costs apply to both foreign and domestic market. Of course there will be some variation for particular markets, but this result might be seen as the industry average.

7. The institutional framework

The next section contains a description of the institutional framework, with special emphasis on sanitary and food safety regulations. All over the industry, there is only one standard in sanitary and food safety regulations, adjusted according to the strictest of the protocols (usually those set by the US or the EU), and this is followed even for the domestic market. It has long been considered a matter of public policy to meet the international standards, because of the strategic importance of beef exports for the country's economy. Industry officials would not even produce a cost figure of the sanitary and food safety measures carried out by their firms, because it is considered part of the cost of doing business and the real figure is masked by other more aggregated expenses.¹⁶

In fact, the increasing requirements by the most sophisticated markets (Germany, Netherlands, and Switzerland, among others) have not had an effect of diverting commerce, because there are no alternative outlets for the specific cuts that are sold in those markets. The emergence of China, for instance, has not had any effect on what is sold to the EU; even when the Chinese are buying cuts of medium-high quality, such as knuckle, they are still not buying rump & loins. Conversely, the product mix that goes to China would not be demanded by European markets. That's the case of bone-in cuts such as rib-plate or navel-plate, and others like shank, offal and many byproducts. However, exporters would apply the same controls and the DILAVE would require the same tests for the Chinese market as for the European market, with some variation as to specific testing protocols.

7.1. Regulatory issues

7.1.1. Traceability system¹⁷

7.1.1.1. Group traceability

Traceability systems have existed in Uruguay since 1973, when the government set up a "group traceability" information system that, since then, has kept records of inventories as well as movements of cattle, sheep, pork, horses, and goats. Although the individual traceability system was put in place in 2006, the group system is still used, and is managed by the Directorate of Livestock Control (DICOSE) of the MGAP. The "group traceability" system consists of two types of documents: an annual affidavit containing information of livestock inventories ("Declaración jurada anual"), and a waybill of property and movement of livestock ("Guía de propiedad y tránsito"), which must be filled up and signed by the owner every time he moves animals from one farm to another, to a sale yard (auction), or to a slaughter plant.

¹⁶ Figures ranging from US\$ 8 to US\$ 30 per animal slaughtered were given by different officials.

¹⁷ This part relies heavily on IICA (Ed., 2009)

The information allows us to know the number of livestock owners and the number of landowners where there is cattle; the system of land tenure; the different uses (type of pastures and crops) of the land; the number of cattle and sheep, classified by category, that exist on the date of the affidavit (June 30th); the number of animals born and deceased, and the number slaughtered for in-farm consumption, during the year ending on June 30th.

Each person or firm that operates with livestock, such as producers, brokers, auctioneers, slaughter plants, and even landowners that rent out for grassing is part of the database (Cattle Registry) of DICOSE. Each one has at least one ID (“DICOSE number”) that is used to identify all cattle operations. This number consists of 9 digits: the first four indicate geographic location; the following four correspond to the owner and the ninth is a verifier. If the first two digits are letters, that means the registered firm or person owns cattle but no land. For brokers, auctioneers, and processing plants the third and fourth digits identifies the type business.

Livestock movements are recorded with the declaration of property and transit of livestock. This document is proof of ownership. It gives information on which type of operation is being performed, between who operations are performed, what type of livestock is moved, by what means of transportation, who is responsible for the transfer and when the movement will occur. The movements can be controlled at anytime and anywhere in the country by the police or by DICOSE officials.

7.1.1.2. Individual traceability

Since July 2010, 100 % of the national herd is individually traced. The Animal Identification System and Registry (SIRA) is in some way a result of an agreement between Uruguay and the European Union (EU) related to the Hilton quota. The EU had decided that from 1 January 2005 their food providers should have systems to ensure product traceability. Also, during regular audits, the EU had already observed some aspects of the DICOSE system, pointing to the need of better safeguards. Uruguay then signed an agreement with the EU by which, starting on 1 April 2010, in order to complete the Hilton quota animals slaughtered for that purpose had to be individually identified from the site of birth to the slaughter plant.

This was the basis for the creation, in 2004, of the Individual Traceability Trial Program, in parallel to the existing group traceability system of DICOSE, that was initially funded by a loan from the World Bank for US\$6 million dollars funneled to the Emergency Assistance Eradication of FMD Project, managed by the MGAP. The World Bank had already approved a US\$18.5 million loan to Uruguay’s government for the eradication of FMD immediately after the last outbreak in 2001 (more details in Appendix III). Funds were used for contracting out the operator, which was a consortium of private firms, for an initial period of 5 years, as well as for the purchasing of ear-tags and the wand readers for the Trial Project.¹⁸

Sometime after the Trial Program was established, in September 2006, the MGAP decided to expand it to a national level, installing the current mandatory

¹⁸ The loan principal is paid twice a year, beginning April 15, 2012, through October 15, 2021. See details in the Appendix III

individual traceability system. Since that time all newborns are ear-tagged with an electronic device. Each calf is identified by breed, sex, and date of birth (actually, the season or month). The system gives information of the place where each animal was born, the date of entry and exit of each site, the animals that shared the same sites, and finally the current location of the animals and those that were in contact with a particular animal. This tracking is possible because any movement or change of ownership of animals is notified by an authorized agent to the National Cattle Information System (SNIG) via the internet.¹⁹

Currently, ear tags are purchased by the government using general funds and handed out at no extra cost to the producers. Wand readers are sold freely in the market, for US\$ 700 to 1,200, depending on the model, with a quality control done by the Uruguay's Technological Labs (LATU), a division of the Ministry of Industry and Energy.

The impact of the traceability system has not been officially evaluated yet. There are no studies of the cost/benefit relationship of the program. Uruguay's government sees the traceability system as a marketing tool that in some way facilitates market access. But the real impact of the program hasn't been assessed. In fact, when Uruguay embarked on a long-term project of individual traceability the EU was the main market, China and Russia were not important destinations. Somehow, the decision to develop the traceability system was in response to what at the time was considered a threat, that is, to lose the most valuable market. But currently, China and Russia are becoming more important and none of them require anything in particular regarding traceability, although they would not see with good eyes if the system were to be dismantled.

7.1.1.3. Electronic Information System for the Meat Industry

In 2008 INAC launched the "Electronic Information System for the Meat Industry" (SEIIC in Spanish), known as the "black box" of the meat processing industry. It is a system that systematically traces all animals that arrive at a slaughter plant and go through the manufacturing process. It has been installed in all 39 cattle slaughter establishments licensed by the national veterinary authority.

The SEIIC uses 7 information points, from the living animal to the dispatch of boxed cuts. It consists of a system of scales, scanners, computers, and communications devices, installed along the processing lines of each slaughter plant. Information is received in real time, on line, by INAC. This information is stored on a local server on each processing plant and on a central server on INAC. The system captures the ear-tag number, generates a processing number called "dot number", and matches both, to guarantee the final product traceability. The identification information is contained in a bar code printed on a label and attached to the carcass, quarter or cut.

The system is funded by a 1 US\$ fee per head of cattle slaughtered ("TCF" on Table 9). Producers benefit since the information collected is published in a

¹⁹ Paper documents are still used, particularly in the case of small groups of animals, but the goal is to perform all records online.

webpage designed for consultation. By accessing this webpage, farmers are now able to know without delay all the relevant information regarding the results of their productive efforts, whereas in the past they had to rely on what the slaughterhouse reported regarding beef yield and carcass quality (or grade) with no means of checking the accuracy of the information given. The scales installed in the processing plants must be technically approved and certified by the LATU, who also inspects the plants once a year. The SEIIC was designed to increase market transparency and provide operators with a nationwide standard for commercial traceability. INAC is the organization that manages the SEIIC, which can be audited periodically by a third party. The SEIIC provides traceability mechanisms to support measures due to sanitary emergencies.

In 2010, the British Standards Institute certified that the SEIIC system complies with the operational protocols and all the slaughterhouses with the system in place are in good conditions.

7.1.2. Sanitary regulations²⁰

Official veterinary inspectors of the MGAP (IVO hereupon) are in charge of enforcing current sanitary regulations on cattle transportation and slaughter, carcass manipulation, and beef processing, storage, and transportation.

Veterinary inspectors belong to the DGSG of the MGAP. The DGSG's total budget for 2013 was US\$ 42 million (not including loans and special projects funded by international organizations like IDB, World Bank), which is equivalent to 38% of the entire MGAP budget, or 3% of the value of beef exports. This Directorate has an inspection body of 423 professionals and technicians, plus specially trained supporting personnel of 427, and 211 administrative staff. Within the DGSG, the Division on Animal Health is in charge of the monitoring, surveillance and control at the farm level, with 146 professionals and technicians. The Division of Animal Industry is responsible for the inspections at the slaughter house facilities. It has 170 professionals and technicians. The Veterinary Labs (DILAVE) with an annual budget of about US\$ 5 to 6 million, does the quality and sanitary control, and audits the private laboratories.

DILAVE works on three areas: diagnostics, prevention and control of animal diseases and zoonosis; safety controls on food of animal origin; and quality control of veterinary medicines. The lab does a number of analysis on a regular basis, most of which can be found under the National Program of Residues Control, that exists since 1987. Annual funds for the DILAVE come in part from service fees, such as veterinary products registration and sanitary inspection of live cattle exports.²¹ The main concerns of the Directorate are: surveillance on FMD, EEB, brucellosis, and

²⁰ This part follows regulation #389/983 of the MGAP Veterinary Services. This regulatory framework has been in place since 1983. The whole document is available at [http://www.mgap.gub.uy/dgsg/DIA/Decreto%20369-983%20\(Reglamento%20Oficial\)%20con%20actualizaciones.pdf](http://www.mgap.gub.uy/dgsg/DIA/Decreto%20369-983%20(Reglamento%20Oficial)%20con%20actualizaciones.pdf)

²¹ Every importing country requires a different set of lab tests for controlling the same pathogen. For live cattle sold to China, the exporter pays the cost of the test, which is estimated at 30US\$/head, plus some other vaccines and parasitic control, which adds up to a total of 50US\$/head.

tuberculosis; food safety controls; and the quality and safety of commercial veterinary products (which is related to food safety). There are also actions in other areas, such as avian flu, Newcastle disease, etc. A relatively new issue (since 2012), relates to new requirements of the European Union regarding testing for E.Coli other than the most common strain (the O157-H7). DILAVE has made some investments in new equipment and lab materials in order to respond to these new requirements. (DGSG budget allocation for new lab equipment has been around USD 200 thousand per year for the last 3 years.²²)

The main regulatory issues at the processing plant facilities are summarized next. In addition, at the farm level, there are also sanitary regulations that are mostly carried out by a number of licensed private veterinaries who are responsible for guaranteeing sanitary conditions.

Ante-mortem inspection:

The purpose of the ante-mortem inspection is to select those animals that can go into the processing line. They must not be stressed, show abnormalities, or suffer from any illness that may impede human consumption of the final product. The IVO may set aside those animals that are not suited for slaughter to prevent contamination. This includes downers. Those animals will be inspected *post-mortem* separately. A veterinary official must be present at the time the animals enter the facilities and all the documents must be in order. Animals will not be sacrificed unless the IVO gives clearance. Dead animals cannot be introduced in the premises, except for those that died during transportation from the farm or while waiting for slaughter. These animals are transported to a different place for inspection and cannot be introduced in the food processing plant. After inspection, these animals are sent to the digester. Waiting pens, where animals are placed the day before slaughter, must be clean, and animals must have access to drinkable water.

Post-mortem inspection:

The goal is to detect any abnormality or pathology on the killed animal. The IVO inspects the blood, limbs, head, mammals, intestines, spleen, liver, lungs, heart, genitals, kidneys and a general inspection of the carcass. Organs or carcasses that present any symptom of diseases or pathologies will be excluded from the food chain. Among others, the list include: carbuncle (anthrax), clostridium, tuberculosis, tetanus, hydatidosis, a general state of parasitic infection, etc. Symptoms of tuberculosis mean that meat from that animal will not be used for export. Brains and central nervous tissues are not allowed to enter the food chain at all. If during post-mortem analysis, symptoms of FMD are detected, then carcasses will not be sent for export. If FMD is in an acute stage, the whole carcass will be forfeited and destroyed. After the lot of animals where FMD was found has been slaughtered, the entire premises will be disinfected and all personnel that had been in contact must follow sanitation and disinfection procedures. The IVO may also do random inspections of samples of any product, fresh or frozen, in order to guarantee that

²² Data on DGSG and DILAVE budgets come from the government National Accounting General Office, <http://www.cgn.gub.uy/>

sanitary conditions are met at any time. IVO may take samples of water, chemicals, or any other product used inside the premises during processing. Every inspected plant must comply with specific requirements on the facilities for veterinary inspection. Slaughterhouses must also have their own trained personnel for veterinary inspection.

The MGAP also establishes that slaughterhouses must meet certain requirements in terms of location, water supply, height and quality of the fences of the facilities perimeter, plant access for trucks and vehicles, lighting and ventilation, materials used for construction, equipment, design (in terms of use for cleaning, disinfection, and inspection easiness, as well as for securing a hygienic and safe processing line), adequate facilities for veterinary inspectors, and for plant workers. Every slaughterhouse must pass an inspection of installations for water treatment, waiting pens, and an *ante-mortem* sanitary complex, which includes a pen for cattle observation, a pen for exclusion of non-approved animals, an autopsy hall, a sanitary digester, and an auxiliary slaughter box. The slaughter dock of every plant must be divided in three zones: where the animals are shocked and bled; a transition zone, where skinning and evisceration takes place; and a finishing zone, where carcasses are disassembled.

Every plant must follow an approved protocol for humanitarian sacrifice, except when preparing animals under religious rites (kosher, halal).

The IVO is responsible for testing for biological residues. The main laboratory of the MGAP (DILAVE) is responsible for the testing. It is estimated that 70% of the testing is done by DILAVE itself, and the rest must be contracted out (samples are sent to labs in Brazil, or Canada).²³ Processing plants have their own labs that are audited and licensed by the IVO. The program of residues control is run on every processing plant, regardless of the market to where the meat is going. The licensed facilities must communicate to the IVO the arrival of animals from producers with records of having violated the regulations. The carcasses obtained from such animals may only be used for export once the results from the official laboratory (DILAVE) indicate that the biological residues are below established acceptance limits. The IVO will not allow exports of meat products or byproducts if biological residues exceeding the tolerance limits have been found.

Transportation:

Trucks for cattle transportation must meet certain requirements: a) loading and unloading must be easy; b) trailers must be open to guarantee ventilation during transportation; c) the floor of the trailer must be such as to prevent gliding; d) sides must not have angles or protrusions; e) doors open must give enough room for the animals to get on and off. Previous to loading, at the farm, the following conditions must be met: a) cattle must be in a corral, without food or water, at least 6 hours before loading on the truck; b) animals with sanitary problems must not be loaded

²³ The cost of the Residues Control Program is not available in detail, because it is part of the DGSG budget. Officials at the MGAP estimate that the annual cost of contracting out testing in foreign labs is about US\$ 370/400 thousand a year.

on the truck if this is going to a slaughterhouse; c) loading ramps must be such as to not harm any animal; d) animals of different age must travel separately.

The quantity of animals that can be transported by one truck depends on the size of the truck and the size of the animals. A general rule is that for every ton of freight capacity it is possible to fit two 500 kg animals. Hence, a 18 ton capacity trailer can fit 36 steers of 500 kg, or 72 animals weighing 250 kg or 120 calves of 150 kg each.

It is the responsibility of the truck driver to regularly check for the general status of the animals transported. If there is a problem, the truck driver must communicate with the veterinary official located at the point of destination. The unloading ramp at the slaughter house must have 10m of minimum length and the slope must not be higher than 25%. The floor must be anti-gliding, water-proof, and easy to clean. Gates must be ample and smooth.

Once animals have been unloaded, trucks must be immediately washed and disinfected. This must be done at inspected facilities. Souto et al. (2013) report a cost of US\$ 15 for washing and disinfecting a truck. After cleaning and disinfected, the IVO gives the truck driver a certificate that can be requested at any moment later on. Truck drivers and truck companies must be registered in order to operate. The veterinary services of the MGAP keep a "Cattle Transportation Registry", and can impose suspensions or prohibitions in case of irregularities.

To guarantee the quality and sanitary conditions of the final product (boxed beef or whole carcasses), either for export or for domestic consumption, the MGAP also inspects and controls the trucks used. When beef is exported, the IVO also does inspection of the conditions of the trucks moving boxes to the port, the packages and labeling, the temperatures, and the general status of the transportation chambers inside the ship (temperatures and sanitary conditions).

7.1.3. Foot and Mouth Disease (FMD)

Farmers and processors in Uruguay believe that FMD eradication is one of a number of important achievements constituting the ongoing modernization of their livestock sector. For decades, the vaccine used to control production losses from FMD was costly and of low efficacy, with coverage well below 100%. The development of a new vaccine allowed producers and the government to attempt full eradication at the end of the '80s (Bervejillo and Jarvis, 2005). In April 1994 Uruguay decided to stop vaccination and the Office International des Epizooties (OIE) declared Uruguay free of FMD without vaccination, in 1995.

After certification by the OIE, Uruguay sought entry to FMD-free countries on the Pacific Rim through bilateral negotiations. Uruguay achieved access to all of the major markets that previously restricted imports of its fresh beef and offal, and by 1999, these markets accounted for almost 30 percent of its exports. Uruguay's annual exports of fresh beef to NAFTA countries increased 136% from July '99 to July '00. Even more pronounced, in relative terms, was the increase of Uruguay's exports to Japan and South Korea (from a negligible amount to more than 10000 tons/year). However, the Southern Cone (Argentina, Uruguay, Paraguay, and

Southern Brazil) region was seriously affected by several FMD outbreaks in 2000-2001.

The 2000-2001 FMD crisis in the Southern Cone was the most extended and destructive one. The two main factors that somehow concurred to enhance the effects of the outbreaks were the character of highly susceptible animal herd and a series of ineffective decisions on animal disease management gradually piling up until reaching a critical situation (Sumner, Bervejillo, and Jarvis, 2005).

According to a World Bank report, the costs of the vaccination campaigns during the years that follow the 2001 crisis were estimated at US\$18.2 million. This is without accounting for indirect costs, such as the loss of premium external markets and the disruption of other markets. The World Bank states that the “shut-down of the meat-packing industry – with financial obligations derived from processing of US\$60 million worth of products now facing marketing problems– and the scaling down of production in the medium term until new markets were opened and sales stabilized (had) serious financial and fiscal implications for the State as well as for producers, industrialists, and workers. Fiscal damages included the decline in revenues, as well as increased expenditures, due to compensation for laid-off labor workers and expenses for the containment of the epidemic” (World Bank, 2010).

Three months after the onset of the outbreak a US\$18.5 million loan was approved. One year later 100% of the epidemiological containment program’s targets had been attained: about 55 million vaccines had been purchased and immunity had reached to 99.8 percent of the national herd. Counterpart funds had covered compensation to farmers (US\$1.9 million) whose cattle were destroyed by the sanitary rifle (6,937 animals) at the beginning of the containment campaign in 2001 (World Bank, 2010).

Since 2001 Uruguay has kept the status of FMD free with vaccination. Only bovine are vaccinated, sheep are not, the virus has not been active since then within the country, but several outbreaks have been reported in Paraguay and Bolivia. Uruguay’s policy is not expected to change in this regard, mainly because it has not prevented the country for accessing almost all markets. The only one that is still closed for Uruguayan beef is Japan. Compare to other non-tariff barriers, FMD is no longer considered a main issue. For instance, after three years of negotiation, in 2006 Mexico granted access to Uruguay’s beef again (suspension was set during the 2000 FMD outbreak), but Mexican cattle lobbies are powerful enough as to prevent any significant flow of continuous trade between the two countries.

Currently, Uruguay’s FMD policy is funded in part directly by cattle farmers that pay \$3.80 per animal slaughtered or exported and by the dairy farmers, that pay \$0.18 per liter of milk sold. For the last few years, however, the funds collected have not been enough; hence the central government has covered the deficit (See Table 17). Animals are vaccinated twice a year until the age of two, then once a year for the rest of their lives. Vaccines are distributed by the Veterinary Services of the MGAP. Uruguay does not produce the vaccine, since during the nineties it was decided not to keep active virus in the veterinary labs, as it was before. Producers

are responsible for picking up the vaccines at the points of distribution and vaccinate their herds.

Table 17. FMD funds and expenses (thousand US\$)

Year	Funds collected from farmers	Cost of vaccines
2010	9,287	7,863
2011	8,757	12,478
2012	8,416	14,488
2013	7,901 (e)	15,939

Source: MGAP/DGSG. (e) estimated, live cattle exports not accounted for.

7.1.4. Other sanitary issues

Other relevant sanitary issues that are under regular monitoring by the government are brucellosis, tuberculosis, and ticks. Except for the case of brucellosis, no other case has been studied from a viewpoint of its direct and indirect costs, and the efficacy, in terms of cost-benefit analysis, of the control and eradication programs. There is no easy way of determining the costs of these programs because of the way the MGAP keeps its records.

With respect to brucellosis, Rodriguez et al. (2011) conducted a study with the goal of determining the cost of the control program. Vaccination was mandatory from 1964 to 1996, when the government decided to stop vaccination because it was considered that eradication was attainable. At present, the program's goal is to obtain the OIE recognition of country free of brucellosis. Rodriguez et al. concluded that the total annual cost of the campaign is US\$ 11.2 million per year. The public sector accounts for 57% of that (6.4 m), whereas the private sector is responsible for the rest (4.8 m). They took into account the cost of human resources, inputs, capital, lab costs, and administrative costs. Private costs include vaccination, sampling for laboratory analysis, the stamping out of infected animals, and the loss of production due to the disease. Considering that Uruguay exports US\$ 1.4 billion, the cost of the brucellosis control is equivalent to 0.8% of fresh beef exports. The study did not account for the cost on human health of population at risk (farm and processing plants workers).

The Brucellosis Control Insurance is a fund created by law in 2003 used to compensate farmers in case brucellosis is detected in their farms and animals must be sacrificed. Funds come from a fee upon each animal that enters the slaughter plant plus one on milk processed and exported, and are used only in case animals must be sacrificed. The fund does not cover all other costs of the brucellosis eradication program. Collected funds from 2004 on were such that by early 2012 the fees on milk processed were set equal to zero. Table 18 shows the flow of resources in and out of this fund.

Table 18. Brucellosis Control Insurance program (nominal thousand US\$)

Year	Funds collected			Disbursements		
	Beef cattle	Dairy	Total	Beef Cattle	Dairy	Total
2008	230	448	678	385	74	459
2009	547	410	957	466	34	500
2010	850	330	1,180	687	83	770
2011	1,183	38	1,221	601	43	644
2012	1,295	0	1,295	531	124	655

Source: MGAP-DGSG

7.2 “Natural Beef”²⁴

INAC launched the Natural Beef Certification Program (“Programa de Carne Natural Certificada del Uruguay”, PCNCU) in 2001. In 2004, it received the seal of the “USDA Process Verified” because it reached USDA requirements in terms of product quality, animal husbandry practices, and proof of origin.²⁵ This program certifies that: a) animals have been raised on pastures, with no use of hormones or antibiotics,²⁶ and no use of feedstuff of animal origin (i.e. the country must be free of “mad cow” disease),²⁷ b) there is a traceability system in place, and c) animals have been treated following accepted good practices. All this information is contained in the product label.

The program is based on a protocol that mainly establishes standards for food safety, traceability, animal welfare, and environmental sustainability. Animals are raised in open pastures and are grass-fed. Animal welfare practices are followed within the farm as well as in the means of transportation and the slaughterhouse premises. The program can be adopted voluntarily by cattle producers and beef processors. Independent agents are in charge of audits and certification. The process of certification goes from farm production up to the labeling of the cuts.

INAC allows the use of a national brand “Uruguay Natural Beef (or Lamb)” once it verifies that the protocols are followed as expected. Since 2009, the PCNCU is considered a GLOBALGAP7 verified program.

Although the program has been in place already for more than 12 years, the number of farms that formally operate under it is limited, around 100.²⁸ This is in part because the requirements are already standard procedures that most cattle

²⁴ See Appendix IV for more details.

²⁵ According to the World Bank, the “Certified Natural Meat Program of Uruguay under INAC uses the Electronic Monitoring of Natural Meat (SECAN) developed to support the certification of Uruguayan meat successfully used in the last USDA audits. The System also provides an Electronic Summary of Head (REC), which enables mapping the quantity and category of the animals slaughtered at any moment in the country or per plant.” (World Bank, 2010)

²⁶ In Uruguay, the use of hormones and growth promoters was prohibited in 1984.

²⁷ The use of protein of animal origin for feeding other animals, except for dairy products, was prohibited in 1996.

²⁸ <http://www.inac.gub.uy/innovaportal/v/1752/1/innova.net/members>

growers follow, so that there is not a clear incentive for the producer to obtain the certification. Also, among processing plants, because there is a conflict of interest between INAC, as a promoter of a “national” brand, and the private firms that try to gain market share with their own brands. This is especially critical with the foreign owned firms, which at this moment operate the largest plants.

8. Quality control of beef production

In the recent past, there have been three quality control audits of the whole beef industry. The first one took place in 2002, the second in 2007, and the third one is expected to finish by October 2014.²⁹ Audits have been conducted together by INAC and the National Institute of Agricultural Research (INIA).

The 2007 audit included surveys and technical assessments at the slaughter plants. Surveys were applied among plant managers and quality control officials, as well as cattle producers, auctioneers, brokers, exporters, butchers, supermarkets and restaurants owners.

Plant managers were asked to rank the problems from a given list. Problems at the slaughter facilities were evaluated at three critical points and at 4 degrees of incidence. The critical points are the pens, the slaughter dock, the cold chamber, and the deboning line. Degrees of incidence of each problem were classified as zero (no problem), minor, moderate, and serious problems. With a couple of exceptions, there were not serious problems detected at any critical point by the plant managers. At the waiting pens, the two problems pointed out as moderate were the presence of horn flies (*Haematobia irritans*) and animals with horns. At the slaughter dock, the two moderate problems were bruises and forfeitures of liver. Forfeitures of the lung, heart, head, tongue, and whole carcass were considered minor, as were tumors and uncleanness. At the cold chamber, lack of marbling was considered from minor to serious; fat of yellow color, lack of fat, the size of eye round too small, and carcasses with not enough weight were considered as moderate problems. Similar problems were highlighted at the deboning line.

Quality control officials were asked to list the problems themselves. They highlighted similar issues as the plant managers.

The remaining agents surveyed answered a set of 7 to 10 questions regarding the following topics: logistics and field operations; payment system; transportation; product quality; commercial relationships; and challenges and opportunities. The main conclusions from the 2007 audit are shown in Table 19.

²⁹ This part of the report follows the results of the second audit (Brito et al., 2011), since the third one is still in progress.

Table 19. Main problems along the processing chain, according to subjective opinions of participating agents

Problems	Producers	Cattle traders	Truck drivers	Slaughter plants	Distributors	Brokers	Butchers	Supermarkets	Restaurants
Product heterogeneity	X	X	X	X		X	X	X	X
Animals too old at slaughter		X		X			X		X
Unfinished animals (lack of fat covering)	X	X		X	X	X	X	X	
Yellowish fat	X	X		X	X			X	
Abscesses		X		X	X	X		X	X
Bruises	X			X				X	
Forfeitures		X		X					
Dark meat, high pH	X			X			X	X	
Lack of standards for dressing	X	X							
Cold chain problems					X	X	X	X	X
Bad roads, infrastructure	X	X	X	X					
Untrained personnel	X	X	X	X					
Too much time from farm to plant	X			X					
Too much waiting time for unload			X	X					
Too much time waiting for slaughter	X			X					
Animals with horns, stressed			X	X					
Dehydrated animals	X			X					
Scarred hides	X	X		X					
Mud and feces				X					
Packing and presentation	X	X		X	X	X	X	X	X
Lack of tender	X				X		X		X
TOTAL PROBLEMS MENTIONED	14	11	5	18	6	5	7	8	6

Source: based on Britos et al. (2011)

Clearly, the managers at the slaughter facilities see more problems than any other agent, along the chain. They mentioned 18 out of 21 types of problems, from the characteristics of the animals to the quality of the final product. Producers are the second group. They perceive problems at the farm as well as at the processing plant. Producers and processors seem to agree on most of the issues, some that depend basically on the techniques and resources managed by the farmer (unfinished animals, too old, bad management with untrained personnel), some that depend on the transportation from the farm to the plant (stressed animals, dehydration, long trips and waiting time). Truck drivers point out that there are no protocols to follow; that ramps for loading cattle are in bad shape or are not well designed; that farm workers are not well trained e.g., they get to the farm and the cattle is not ready for loading; there are long waiting lines at the slaughterhouse;

and the country roads are too bad. This means that animals that are in perfect condition at the farm when they arrive at the plant may nonetheless present bruises and symptoms of stress and dehydration. Plant managers regularly inspect the trucks, and the majority requires the truck company to follow certain guidelines, otherwise they may impose penalties. But these are not serious problems.

It is interesting to note, however, that the problems listed are almost all beyond the reach of the decisions made by the slaughterhouse. Most of them depend on how the animal was raised and finished, how it was loaded on the truck, and how it was transported and unloaded. Even considering the waiting time at the plant to unload and slaughter, plant managers can argue that they cannot take decisions that would help to solve of the problem, because the causes are beyond their reach. That is, a better coordination with the truck companies would save waiting time. Butchers, supermarket managers and restaurants owners may claim something similar, that they cannot change the attributes of the product they receive.

Another interesting issue that arises here relates to the coordination of the entire value chain. Retailers and exporters would benefit from an improvement in the quality of the final product. But producers, historically, do not see any incentive to address those problems. In fact, producers do not seem to be aware of the problems caused by the presence of animals with horns, or the abscesses that, in general, result from bad veterinary practices (shots that are not applied adequately). In a similar way, transportation agents complain about the waiting time at the plant or at the farm, but they are responsible too for stressed and dehydrated animals, with bruises, or covered with mud and feces by the time they enter the slaughter facilities. At the end, the price system should be the means to make improvements possible along the value chain. However, most of the livestock is still sold at a spot price. Contracts are not common, and a system of prizes and penalties applies only to particular arrangements between some slaughterhouse and a number of groups of farmers.

The second part of the audit was a technical evaluation of the quality problems at the processing level. It consisted of a quantitative assessment of a number of quality measures of 28,323 carcasses of animals of different breeds, sexes and ages, slaughtered in 10 different plants, during the spring of 2007 and the fall of 2008. The assessment was conducted at 6 stages along the processing line in each plant, starting immediately after the killing, and ending with the cutting stage. The results are summarized in the following tables.

Table 20 shows the percentage of each of the main breeds. Almost half the cattle is Hereford, followed by British cross breeds (Hereford x Angus), then dairy cattle (similar to Holstein). Cattle with horns account for 38% of the total, and the majority of them have long horns, which means, they were never cut. Hornless Hereford is preferred by most cattle farmers.

Table 20. Percent of animals slaughtered according to breed and presence of horns

Breed	% total	No horns	Horns <10 cm	Horns >10 cm
Hereford	46.2	61.9	8.0	30.2
Aberdeen Angus	6.9	98.0	1.3	0.7
Holstein	7.1	33.5	18.5	48.0
British cross breed	16.7	70.6	7.0	22.4
Other	23.1	56.8	8.4	34.7
TOTAL	100.0	61.9	8.4	29.7

Source: Brito et al. (2011)

The evaluation done immediately after killing and before skinning show that the almost 9% of the animals have more than 2 branding marks which is considered a serious problem since it affects the industrial quality of the hide (Table 21). Abscesses are evaluated as minor to serious in 12% of the animals. 89 percent of animals were considered clean at the time of slaughter, which somehow contrasts against the opinion of the agents interviewed, who had pointed out this as a main problem. Scarred hides were not evaluated as serious.

Table 21. Problems evaluated immediately after killing (percent of cases)

Presence of:	None	Minor	Serious
Mud, faces on body	89.3	8.1	2.6
Abscesses	88.0	10.8	1.3
Scarred hide	94.8	5.0	0.2
Branding marks (*)	59.3	32.1	8.6

Source: Brito et al. (2011). (*) in this case "none" means 1 mark; minor means 2 marks; serious means more than 2

The evaluation of the carcass showed that small bruises have no effect on the final weight of the canal, but big bruises require that some tissue must be removed, affecting the final weight. Bruises were detected on 31.8% of the cases, 17.7% were considered small and 14.1% large.

Near 14% of the females were pregnant at the time of slaughter, 2.4% were within 3 months of giving birth. The vast majority of the forfeitures were of liver (46.4%). Other forfeitures included hearts 1.6%, tongues 1.5%, and heads 1.1%. Liver forfeitures result from the presence of hydatidosis and fasciola hepatica.

The audit included an evaluation of the carcass following the grading system defined by INAC, known as "INACUR". This grading system defines "I" as an animal of large size and muscle development, with convex lines; and on the other extreme, "R" is an animal without muscles. Combined with the INACUR index, there is a scale for fat covering, that follows a scale of 0 = too little coverage or none at all, up to 4 = excessive fat.

The results of the grading are shown in table 22. The large majority of steers and cows are classified as “A” grade and “2” fat covering, which is an animal with a balanced ratio meat/bones, somewhat depressed lines, and uniformly distributed and abundant fat covering.

Table 22. Percent of steers and cows according to grading and fat covering

	I	N	A	C	U	R	4	3	2	1	0
Steers	0.0	6.1	84.6	9.0	0.3	0.0	0.0	1.5	70.7	25.9	1.9
Cows	0.0	0.9	79.3	16.1	3.2	0.5	0.0	3.6	70.6	20.7	5.1

Source: Brito et al. (2011)

Compared to the US grading system, these results translate into 13% of steers classified as Choice, 32% as Select, and 46% as Standard; whereas 13% of cows were classified as Standard, 61% as Utility, and 19% as Cutter. The finishing grade relates to marbling (Table 23). Uruguay’s cattle marbling is considered low by international standards, due to the fact that grass-fed animals do not develop the marbling typical of grain-fed ones.

Table 23. Percent of steers and cows according to marbling grade

Marbling	Steers	Cows
Traces	31.5	31.0
Slightly	49.4	48.1
Some	14.5	15.9
Modest or higher	4.6	5.0

Source: Brito et al. (2011)

Meat pH is a key issue of the quality of the final product. Once the animal is killed, a series of chemical processes develop in the muscle. As a result, the pH must be below 5.9 or 5.8, depending on the cut. A pH higher of 5.9 is considered a sign of low quality. Within this audit, 85.3% of the carcasses were below the mark of 5.8, 4.2% were between 5.8 and 5.9, and 10.2% equal or higher than 5.9.

The audit finished with an economic evaluation of the costs of all the problems detected. In summary, it was estimated that more than \$65 million were lost in the year the audit was done (2007). This was equivalent to 8% of beef exports³⁰, or 6% of the value of production. While a significant amount, this value was 28% lower than the value estimated for 2003, the year the first audit was conducted.

³⁰ The audit was done in 2007. During that year Uruguay exported \$838 million

Table 24. The cost of quality problems evaluated by the Second Audit

Item	US\$/head	Total US\$ x 1000
Bruises	10.76	23,909
Too high pH	7.69	17,080
Yellowish fat	3.51	7,808
Hides with scars	3.43	7,632
Forfeitures	2.94	6,537
Abscess	0.69	1,528
Age	0.49	1,089
Total loss	29.51	65,584

Source: INIA-INAC (2009)

9. Final comments

After a period of sustained growth, between the early nineties and a record peak in 2006, beef production growth came to a halt and even decreased somehow. Productivity also grew during the nineties and first half of 2000s, despite the FMD crisis of 2001. But since 2006, productivity growth shows no clear trend, and production has been stable around 2-2.1 million head slaughtered per year. Crop production, particularly soybeans, has displaced cattle production from the most productive soils.

Since 2010, the entire herd has been traced using ear tags with an electronic device. All new born calves must be tagged before the sixth month of age or before moving them out of the farm if that comes first. It is not possible to move an animal out of a farm without reading the ear tag and sending the information via the internet to the National System of Cattle Information, which controls and monitors all cattle movements.

With incentives coming from new opportunities in export markets, grain-fed beef production began to gain some space recently. Last year, about 12-13% of slaughtered steers came from feedlots. These animals are destined to the “high quality beef” European Union quota, known as the “481”, which has become more important than the traditional Hilton quota in the EU market.

The meat packing industry has undergone a process of modernization and its processing capacity has, in the last few years, increased faster than cattle supply. A completely new plant was inaugurated in 2010 and several others increased their installed capacity and/or went through a process of modernization. This process is in part the result of foreign direct investments, especially from Brazilian firms that now account for near 50% of total slaughter.

With its FMD free with vaccination status, and no risk of “mad cow” disease, Uruguay has access to almost all important markets. Processing plants are regularly audited by importers who have been requiring more strict controls on food safety, animal welfare and overall quality control. Beef exports have stayed stable for the last 5-6 years, with increasing prices (in nominal terms). Although the EU is still the market that carries the highest prices, at present, China has become the main destination for Uruguay’s beef. And while European imports are restricted by the different operating quotas, the Chinese market represents a virtually unlimited possibility. Russia, Israel, NAFTA, and Brazil are also important. Uruguay’s commercial strategy relies on a broad spectrum of markets and product mix.

Official veterinary inspectors of the Ministry of Livestock, Agriculture and Fisheries are in charge of enforcing current sanitary regulations on cattle transportation and slaughter, carcass manipulation, and beef processing, storage, and tran-

sportation. The official veterinary lab, DILAVE, is responsible for diagnostics, prevention and control of animal diseases and zoonosis; for safety controls on food of animal origin; and for quality control of veterinary medicines. The lab administers the National Program of Residues Control since 1987. It also audits the private labs that operate within the processing plants.

The SPS associated costs for Uruguay's beef industry can be estimated as approximately US\$ 114 million, which translates into US\$ 57 per slaughtered animal, or 8% of the export value. There is one standard in sanitary and food safety regulations, adjusted according to the strictest of the protocols (usually those set by the US or the EU), and this is followed even for the domestic market. It has long been considered a matter of public policy to meet the international standards, because of the strategic importance of beef exports for the country's economy. Diversion of commerce due to SPS costs of compliance does not seem to be an issue. Instead, industry officials stated that increasing requirements on quality and food safety are part of the unavoidable costs of doing business.

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National System of Cattle Information, SNIG:
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Urunet (customs): <http://www.urunet.com.uy/>

Appendix I

Export quantities and prices of beef cuts (2013). All markets. (Source: INAC)

PRODUCT	Tons shipped pwe	Value Thous. USD	Implicit price USD FOB/ton
FROZEN BEEF	196,706	939,999	4,779
	-	-	
BONEIN FOREQUARTER OR FOREQUARTER CUT	11,634	31,287	2,689
Navel Plate	5,982	12,956	2,166
Rib Plate	4,465	14,782	3,311
Brisket	862	2,274	2,639
Other	326	1,274	3,906
BONEIN HINDQUARTER OR HINDQUARTER CUT	420	1,433	3,415
Shank	232	611	2,630
Other	187	822	4,389
OTHER BONE IN FROZEN	6,745	24,849	3,684
Carcass, compensated quarters	5,589	20,972	3,753
Rib Plate 10/13 Rib, bone-in, w/ or w/o flank	1,156	3,877	3,352
BONELESS FOREQUARTER OR FOREQUARTER CUT	73,144	359,728	4,918
Combined forequarters cuts	25,879	107,047	4,136
Kosher std cuts	24,115	143,806	5,963
Chuck and Blade	13,613	54,549	4,007
Shoulder Clod	2,389	10,157	4,251
Cube Roll	2,241	19,185	8,560
Brisket	1,177	5,279	4,483
Chuck Roll	940	4,246	4,516
Other forequarter cuts	2,789	15,459	5,542
BONELESS HINDQUARTER OR HINDQUARTER CUT	42,974	272,995	6,353
Inside	9,484	60,317	6,360
Knuckle	7,668	38,966	5,081
Striploin	4,006	28,445	7,100
Combined cuts	3,860	25,796	6,684
Rump	2,915	23,979	8,227
Tenderloin	1,507	23,211	15,399
Flat	3,131	15,828	5,055
Eye Round	2,330	13,437	5,767
Outside	2,193	9,946	4,535
Flap & flank steak	1,117	7,054	6,315
Inside skirt	1,217	6,747	5,544

Shank	1,148	5,589	4,869
Heel muscle	885	4,279	4,833
Tri-Tip	622	4,196	6,746
Golden Coin Muscle	593	3,700	6,236
Flank	189	924	4,890
Round Hindquarter 3 Cuts	108	581	5,368
BONELESS CARCASS, SIDE, COMPENSATED			
QUARTERS, COMBINED QUARTERS	22,953	119,808	5,220
Shank - Shin bnls frozen	12,288	59,672	4,856
Other combined cuts/carcass/sides	10,664	60,136	5,639
OTHER BONELESS MEATS			
Thin Skirt	1,556	8,203	5,272
Beef Chunks	1,179	6,426	5,449
Beef Intercostale Chunks	622	3,109	5,002
Thick Skirt	368	1,597	4,336
Other	257	1,395	5,432
TRIMMINGS	34,854	109,169	3,132
CHILLED BEEF			
	40,254	360,992	8,968
BONEIN QUARTERS, CUTS			
Rib Plate	2,633	8,422	3,199
Rib Plate 10/13 Rib	669	2,014	3,013
Beef Rib Plate Flank on	461	1,487	3,225
BONELESS FOREQUARTER OR FOREQUARTER CUT			
Cube Roll	1,072	12,813	11,953
Spencer Roll Ctrl'd Slices	194	1,838	9,478
Chuck Roll	191	1,040	5,433
Other	563	3,020	5,363
BONELESS HINDQUARTER OR HINDQUARTER CUT			
Rump & Loins	6,620	88,923	13,433
Rump cap on or off	2,800	29,387	10,496
Cmb hindquarter cuts	2,396	25,018	10,443
Striploin	1,489	16,363	10,986
Tenderloin	716	13,580	18,965
Knuckle	1,113	5,970	5,364
Inside, cap on or off, eye-round	950	5,650	5,947
Flank & flap	281	1,882	6,687
Tri-Tip	43	319	7,441
Heel Muscle	9	49	5,535
Inside Skirt	1	5	5,939

BONELESS CARCASE, SIDE, COMPENSATED QUARTERS, COMBINED QUARTERS	18,044	143,151	7,934
OTHER BEEF PRODUCTS	4,922	37,389	7,597
Corned beef	3,429	20,085	5,857
Ctrl moisture (Beef jerky, salted)	803	14,884	18,540
Boneless beef w/spices	168	1,135	6,758
Beef patty, meatball, burger mix	237	970	4,093
Other	285	314	1,105

Uruguay's exports of fresh beef by selected destinations (2013)

	% boneless	Volume Tons pwe	Value Thous. US\$	FOB Price US\$/ton pwe
FROZEN	97	196,706	939,999	4,779
China	73	67,805	264,691	3,904
Israel	100	22,312	133,170	5,969
Mercosur	95	13,795	83,619	6,062
NAFTA	100	33,076	158,240	4,784
EU	100	19,308	139,039	7,201
Switzerland	100	633	4,579	7,234
Russian Fed.	100	30,597	116,151	3,796
Norway	100	488	6,819	13,973
CHILLED	88	40,254	360,992	8,968
China	0	0	0	
Israel	100	13	77	5,923
Mercosur	77	16,420	101,088	6,156
NAFTA	100	1,504	15,226	10,124
EU	100	20,081	216,443	10,778
Switzerland	100	1,876	24,745	13,190
Russian Fed.	100	99	541	5,465
Norway	100	81	1,250	15,432
Total	90.5	236,960	1,300,991	5,490

Source: INAC. For more details see the Appendix

Appendix II

The European high-quality beef 481 quota

According to the EU Regulation No 481/2012 of 7 June 2012, the requirements for goods imported under the “high-quality beef” tariff quota must comply with the following:

- “1. Beef cuts are obtained from carcasses of heifers and steers less than 30 months of age which have only been fed a diet, for at least the last 100 days before slaughter, containing not less than 62 % of concentrates and/or feed grain co-products on a dietary dry matter basis, that meets or exceeds a metabolisable energy content greater than 12.26 mega joules per one kilogram of dry matter.
- “2. The heifers and steers that are fed the diet described in point 1 shall be fed, on average, no less than 1.4 % of live body weight per day on a dry matter basis.
- “3. The carcass from which beef cuts are derived are evaluated by an evaluator employed by the national government who bases the evaluation, and a resulting classification of the carcass, on a method approved by the national government. The national government evaluation method, and its classifications, must evaluate expected carcass quality using a combination of carcass maturity and palatability traits of the beef cuts. Such an evaluation method of the carcass shall include, but not be limited to, an evaluation of the maturity characteristics of colour and texture of the longissimus dorsi muscle and bone and cartilage ossification, as well as an evaluation of expected palatability traits including a combination of the discrete specifications of intramuscular fat and firmness of the longissimus dorsi muscle.
- “4. The cuts shall be labeled in accordance with Article 13 of Regulation (EC) No 1760/2000 of the European Parliament and of the Council
- “5. The indication ‘High Quality Beef’ may be added to the information on the label.”³¹

³¹ Official Journal of the European Union, available at:
http://files.foodmate.com/2012/files_336.html

Appendix III

A) Extracts from the Loan Agreement:

“Additional Financing for the Foot and Mouth Disease Emergency Recovery Project.” International Bank for Reconstruction and Development / Government of Uruguay.

The objectives of the Project are: (a) to contain and mitigate the impact of the outbreak of FMD in the Borrower’s territory through: (i) vaccination of cattle; (ii) strengthening of the monitoring and surveillance capacity of the Borrower to prevent future outbreaks from spreading beyond the directly affected area; and (iii) identification of alternative markets for the beef produced in the Borrower’s territory in the short-run and restoring the Borrower’s presence in the premium beef market in the long-run; and (b) to prevent the introduction of other trans-boundary animal diseases of large economic importance.

The Project consists of the following parts included in the Original Project, as amended below solely for purposes of the Loan:

Part 1: Monitoring, Surveillance and Control Systems: Strengthening MGAP’s monitoring, surveillance and control systems, through:

- (a) upgrading of existing laboratories to improve their capacity for diagnosis and sample testing;
- (b) strengthening of existing sanitary barriers;
- (c) scaling-up of the PTI by upgrading it into the SIRA; and
- (d) scaling up and full decentralization of the SNIG, to consolidate its operation at the national level and upgrade its capacity to manage the additional information that will result from the implementation of a universal tracking system, and to develop an operational link with the SISA.³²

Part 2: Training, Education and Awareness:

- (a) Provision of training for veterinary professionals, working both in the public and private sector, in diagnosis of FMD, TSE, and avian flu;
- (b) organization of simulated outbreaks of FMD and avian flu to train staff and test the effectiveness of emergency plans drawn up by the Borrower, in

³² Sistema de Información de Salud Animal, Animal Health Information System

coordination with the Borrower's Ministry of Public Health and poultry producers;

- (c) organization of various events to increase the awareness among producers of the risks of potential outbreaks of transboundary diseases and of key measures to be adopted in case of an actual outbreak, with special reference to FMD and avian flu;
- (d) provision of training for MGAP staff, field operators of the SIRA and the SNIG and producers for the implementation and operation of the SIRA and the SNIG; and
- (e) carrying out of a communication and information campaign on the merits of the SIRA and the new expanded SNIG.

B) Extracts from:

IMPLEMENTATION COMPLETION AND RESULTS REPORT (IBRD-70700 IBRD-74210) ON A

LOAN IN THE AMOUNT OF US\$ 25.0 MILLION TO THE ORIENTAL REPUBLIC OF URUGUAY

FOR A FOOT AND MOUTH DISEASE EMERGENCY RECOVERY PROJECT AND ITS ADDITIONAL FINANCING

June 26, 2010

Original Total Commitment: USD 18.5M

Disbursed Amount: USD 23.2M

Revised Amount: USD 23.2M

Implementing Agencies: MGAyP

Approval: 07/31/2001 Mid-term Review: 08/02/2002

Closing: 10/31/2003 (planned); 12/31/2009 (effective)

Project Development Objectives (from Project Appraisal Document)

The project objective of the FMD-ERP is to provide technical and financial support to the GOU to help contain and mitigate the impact of the outbreak of the Foot and Mouth disease through (i) vaccination of the national herd, (ii) strengthening of the monitoring and surveillance capacity of the country to prevent eventual future outbreaks from spreading beyond the directly affected area, and (iii) identification of alternative markets for the Uruguayan beef in the short-run and restore the country's presence in the premium beef markets in the long-run.

Revised Project Development Objectives (as approved by original approving authority)

The objectives of the scaling-up of additional financing activities are in line with the original project development objectives (see above), while the inclusion of activities encompassing non-FMD diseases required the addition of a new objective: to prevent the introduction of other transboundary animal diseases of major economic importance. The formally revised project objectives are: (a) to contain and mitigate the impact of the outbreak of FMD in the Borrower's territory through: (i) vaccination of cattle; (ii) strengthening of the monitoring and surveillance capacity of the Borrower to prevent future outbreaks from spreading beyond the directly affected area; and (iii) identification of alternative markets for the beef produced in the Borrower's territory in the short-run and restoring the Borrower's presence in the premium beef market in the long-run; and (b) to prevent the introduction of other trans-boundary animal diseases of large economic importance.

Original Components (as approved)

The original ERP-FMD project (total cost of US\$24 million) would be implemented over a period of two years with the support of a US\$18.5 million IBRD loan, for the following four components:

Epidemiological Containment Program (US\$19.8 million), including: (a) four vaccination campaigns for the 10.4 million head herd of adult cattle and two campaigns for calves (estimated at 2 million head); (b) the sanitary rifle campaign, financed entirely through counterpart funding; the project would account for the compensation to farmers whose cattle were destroyed by the sanitary rifle at the beginning of the 2001 containment campaign plus the partial replenishment of the Contingency Fund implemented for that purpose and currently exhausted; and (c) purchase of portable livestock management equipment, to facilitate the vaccination and control of animals.

Strengthening of Monitoring, Surveillance and Control Systems (US\$3.1 million), including: (a) strengthening of the MGAP Livestock Comptroller Division (DICOSE) Information System to track animal movements and sales, which would include the purchase of hardware, electronic identification tags to be used on a pilot basis on calves born in 2001, updated software and technical assistance to design the improved system and train the operators; and (b) strengthening of sanitary barriers in key points in the country interior, and at the country's 21 border passes.

Training, Education and Awareness (US\$0.9 million) aiming to improve the awareness of local producers of the importance of early detection of eventual future outbreaks; to increase the information of present and potential importers about the measures adopted by Uruguay to combat the disease; and to try to recover some of the lost export markets. To this end the project would finance: (a) an Internal Awareness Program which would involve the design and implementation of training and education programs for mainly small scale livestock producers in the various regions and the public in general; and (b) an External Awareness Program which would include: i) visits by Government officials and local producers to key export markets to explain the current situation in the sector; ii) the invitation of delegations from the main export market to visit the country to see the control of the disease, and (iii) visits to, and workshops in the MERCOSUR countries, plus the preparation and publication of relevant printed material.

Project Coordinating and Management (US\$0.2 million) to be led by an existing and adequately staffed and equipped unit within the MGAP.

1.6 Revised Components

The activities to be implemented under the 2006 AF operation would contribute to the scaling-up of key activities of the original project, mainly the validation, expansion and consolidation of the on individual tracking pilot system to the entire national herd. In addition, the project also included support to strengthen Uruguay's participation in the regional animal health initiative supported by the World Bank, and to combine regional efforts in combating FMD. The first component of the original project dealing with the emergency containment of the FMD outbreak had been completed satisfactorily and was closed. For the remaining three components, in addition to the activities under the original project, the following activities would be specifically implemented under the AF operation:

Strengthening MGAP's Monitoring, Surveillance and Control System (US\$7.43 million): (i) upgrading of existing laboratories to improve their capacity for diagnosis and sample testing; (ii) upgrading and expansion of existing sanitary barriers; and (iii) support for scaling up the FMDERP successful Voluntary Pilot Plan for Individual Livestock Traceability (PPTI) into the universal and mandatory Animal Identification and Registration System (SIRA), and scaling-up and full decentralization of the National Livestock Information System (SNIG), to consolidate its operation at the national level, upgrade its capacity to manage the additional information that will result from the implementation of the universal animal tracking system, and develop an operational link with the existing National Animal Health Information System (SISA).

Training, Education and Awareness (US\$1.08 million), including: (i) training of veterinary professionals, working in the public and private sectors, in the diagnosis of FMD, BSE, and

Avian Flu; (ii) organization of simulated outbreaks of FMD and Avian Flu to train staff and test the effectiveness of emergency plans drawn up by the Government, in coordination with the Ministry of Public Health and poultry producers; (iii) organization of various events to increase the awareness among producers of

the risks of potential outbreaks of TADs and key measures to be adopted in case of an actual outbreak, with special reference to FMD and Avian Flu; (iv) training for the implementation and operation of the scaled-up PPTI and SNIG, which would benefit MGAP staff, field operators of the systems, and producers; and (v) communication and information campaign on the merits of the Animal Identification and Registration System (SIRA) and new, expanded National Livestock Information System (SNIG).

Project Coordination and Management (US\$0.45 million) for additional operation and management costs of the activities, and short-term consultants for studies and technical support.

1.7 Other significant changes

Complementing project activities, the Uruguayan Government started implementing a traceability initiative not only of beef cattle from birth to slaughter, but also of all cuts of beef back to their farm of origin. The integration of the SNIG with the Electronic Information System of the Meat Industry (SEIIC), also known as “Black Boxes”, as a follow-up phase of the project’s tracking system would allow carcasses to be tracked back beyond slaughter and would allow producers to obtain information on the performance of their cattle in terms of carcass features. In addition to identifying and tracing animals in the event of a disease outbreak or foodsafety event, producers will be able to use this information to compare the performance of their cattle with national averages.

Appendix IV

CERTIFIED NATURAL MEAT PROGRAM FROM URUGUAY³³

ORIGIN

An increasing demand for food safety, animal welfare and environmental sustainability has shaped the international markets. These aspects will definitely be the main drivers of future meat demand. Therefore, the Uruguayan Beef and Lamb Industry face the challenge of fulfilling these demand drivers through the competitive advantage of its natural production systems.

OBJECTIVE

In this context, the Certified Natural Meat Program of Uruguay was created by INAC in 2001, in order to increase consumer confidence in meat products from Uruguay, while differentiating and adding value to the meat Industry.

DEFINITION

PCNC is a quality assurance (QA) program for beef and lamb where international certification bodies certify the compliance of a protocol in both the productive and industrial phases.

BASIS OF THE PROTOCOL (see protocol)

The main issues of the protocol: food safety, traceability, animal welfare and environmental sustainability, are expressed in the program claims and considered in the certification process. The natural attributes of Uruguayan Beef and Lamb develop therefore in a ?country brand? for product identification.

CLAIMS:

1. Source verification of animals and products. All cattle can be fully traced from ranch to harvest, fabrication and packaging. Identification of animals is by means of individual plastic eartags.
2. No hormones used. No growth hormones of any kind or equivalent growth promotants have ever been administered to the animals. These are prohibited in the country by national law since 1984.
3. Not fed antibiotics. No sub-therapeutic antibiotics have been fed or administered as a supplement in feed or water for the purpose of growth promotion.

³³ <http://www.inac.gub.uy/innovaportal/v/1731/1/innova.net/program>

4. No animal proteins in feed. The animals have never been fed proteins of animal origin except maternal milk. The use of animal proteins in feed is prohibited in the country by national law since 1996.
5. Grass fed. All animals in the program have been grown, raised and fattened on a grass diet. Restricted supplementation levels are accepted to support grazing.
6. Animals never confined. Animals have never been confined to yards or feedlots at any time in their lives, and are raised grazing in open pastures year round.

HOW IT WORKS

The Program is integrated by voluntary members (farmers and packers) who wish to join the program for adding value to their products. Independent certification bodies certify that farm and packers are complying with the protocol claims. The certification process goes from production processes down to the cuts, packing and labeling. The "Country Brand" is an intellectual property of the National Meat Institute (INAC) and its use is granted subject to endorsement of the accredited international certifying firm. Such use of the brand doesn't pursue profit.

SUMMARY

The Certified Natural Meat Program follows a strict production and processing scheme, accredited by independent international certifying agencies, to produce top quality beef with all the sanitary guarantees, and traceability from the origin, offering thus the safest meat. Uruguay's Certified Natural Meat Program certifies the whole process that renders the meat product all the way through packing and libeling.

USDA Process Verified

Since August 2004, the Certified Natural Meat Program from Uruguay has been officially recognized by the US Department of Agriculture (USDA) as complying with the requirements of the USDA Process Verified Program.

The USDA Audit Review and Compliance (ARC) Branch has reviewed the results of the recent audit of the PCNCU, arriving to the conclusion that it has successfully achieved the requirements for being approved.

The information related to the status of the approval is available at the following web site: <http://processverified.usda.gov>

Uruguayan suppliers met the USDA program requirements in meat quality, animal handling and source verification. Therefore, they became the first international state to enjoy the USDA premium label and join just 16 U.S. companies with a Process Verified certification.(see USDA Certificate)

This certification allows Uruguay to send beef products to the U.S. specially marked as Process Verified and enables the country to make a detailed listing of its

meat's attributes such as antibiotic and hormone free, not fed with animal proteins with ethically treated animals and a traceability system.

It was a very important step in differentiation their brand of beef among other imports to U.S. consumers.

This recognition is the consequence of a hard work that started in May 2003 when negotiations for integrating the Certified Natural Meat Program to a certification program validated by the USDA began.

On May 2004, Uruguay received the visit of U.S. auditors. Four beef farms and two slaughterhouses were successfully audited. After this audit, the USDA made an evaluation of the program and finally



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