

# Market Opportunities for Green Upgrading and Innovation

Sustainability Demand Analysis for the Beef, Soy, Dairy and Tourism Industries





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## SUSTAINABILITY DEMAND ANALYSIS FOR THE BEEF, SOY, DAIRY AND TOURISM INDUSTRIES

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## ACRONYMS AND UNITS

AEOS	Agro-environmental Operational Plan 2010
APEJ	Asia and Pacific Excluding Japan
B	Billion
BRIC	Brazil, Russia, India, China
BSE	Bovine spongiform encephalopathy
CAGR	Compound Annual Growth Rate
CIF	Cost, Insurance and Freight
EC	European Commission
EFSA	European Food Safety Authority
EPA	Environmental Protection Agency of the United States
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
FDA	Food & Drug Administration of the United States
FIBL	Research Institute of Organic Agriculture
FMI	Future Market Insights
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLAS	Green, Low-carbon, Agri-environment Scheme (GLAS)
GM/GMO	Genetically Modified Organism
GRSB	Global Roundtable for Sustainable Beef
HACCP	Hazard Analysis and Critical Control Points
IDB	Interamerican Development Bank
iNDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
ICT	Information, Communication Technology
IP Certification	Identity Preservation Certification
K	Thousand
LCI	Low carbon Initiative
LULUCF	Land use, land-use change, and forestry
M	Million
MT	Metric Ton(s)
OECD	Organization for Economic Co-operation and Development
OIA	International Agricultural Organization
REPS	Rural Environment Protection Scheme
SAI	Sustainable Agriculture Initiative
SCD	Systematic Country Diagnostic of Uruguay
Teagasc	Agriculture and Food Development Authority
UNFCCC	United Nations Framework Convention on Climate Change



UNWTO	United Nations World Tourism Organization
USDA	United States Department of Agriculture
US	United States
WTTC	World Travel and Tourism Council

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## EXECUTIVE SUMMARY

Uruguay is emerging as a green growth champion worldwide. The country's successful growth model is rooted in the country's rich natural asset base. Currently, about 30 percent of jobs are linked to the export sector, which is in turn highly dependent on soils, forests, water and landscapes. Uruguay has already made important strides in green growth, particularly through the implementation of forward looking environmental policies and programs, and has already used sustainable practices as a key driver of trade competitiveness. Greater integration in global (and regional) value chains, and specifically the identification of higher-value-added activities in sustainable segments, will be a critical priority as the country's limited size prevents it from benefitting from large economies of scale.

The report presents a demand analysis of green international market segments of key conventional Uruguayan exports (beef, dairy, soy and tourism) from an economic perspective. These sectors were chosen because of their large share of exports (over 50 percent of total value in 2014) and their intensive use of Uruguay's natural assets. Greener products may help to diversify exports into higher value-added niches, at the same time favoring investments in skills and boosting the adoption of new technologies and practices.

This analysis is based on a literature review of specialized publications on beef, soybean, dairy, and sustainable tourism, consultations with relevant industry specialists, and compilation of available data sources, including the commissioning of two technical market reports on sustainable beef and organic milk powder, as well as three reports of the Food and Agriculture Organization of the United Nations on the environmental benefits of these "green" commodities.

The report touches upon "green" and "sustainable" beef, which refers to several labels (naturally raised, organic, grass-fed) that are also used to identify quality attributes and can go from less to more environmental-friendly practices, thus implying less or more stringent requirements. The report digs deep in the differences between these labels. In terms of green soy, the report specifically addresses the potential of non-genetically modified soybeans, as they bring long term environmental benefits by using fewer agrochemicals (herbicides), and promote integrated conservation agriculture (i.e. minimum tillage). In terms of dairy, this report focuses on organic dairy, due to the significant economic premiums associated with organic labels and requires no agrochemicals, no antibiotics supplied to the animals, animals eating feed that better suit their nature. The analysis of these markets, in terms of geography, puts emphasis on Uruguay's key export destinations, such as the European Union, United States and Asia, including China. Sustainable tourism is an approach to management of tourism and involves several types of tourism. Focus is given to adventure tourism and ecotourism.

The report finds that there are important growth prospects and attractive price margins in the segments of sustainable beef, non-genetically modified (non-GM) soy, and organic dairy, and a potential to strengthen Uruguay's international offer of sustainable tourism. The analysis shows that there is a strong demand for these green products, expected to grow between 6 (sustainable beef) and 40 (adventure tourism) per cent per year in the next five years (11 per cent for organic dairy, 16 per cent for non-GM soy). The forecasts value wise (volume wise) for 2021 are: US\$11.2 billion (1.8 million metric tons) for sustainable beef, US\$31 billion for organic dairy, US\$11.5 billion (10 million metric tons) for soy, US\$ 3.7 trillion for sustainable tourism, along with higher markups and environmental benefits when compared to conventional products.

In addition to the economic benefits of a green growth international integration strategy, there are important environmental co-benefits associated with the sustainable production and processing practices of "green" value chains. For example, the introduction of sustainable practices for beef could help reduce greenhouse gases emission in Uruguay by up to 43 percent and increase production in live weight terms by up to 200 percent. Similarly, the introduction of non-GM soy associated with sustainable crop and soil management practices can lead to a significant reduction of the use of pesticides and herbicides. Organic cattle production, as part of the organic dairy value chain, represents a farming practice able to preserve soil health, while reducing environmental pollution from nutrient runoff and from potentially polluting compounds, such as pesticides, and minimizing antibiotics resistance amongst cattle.

Overall, this report sheds light on strong demand niches that could provide new opportunities to Uruguay and provides recommendations for further work. Among the four sectors analyzed, sustainable beef is a low hanging fruit that further analysis could focus on. Uruguayan beef production methods are already consistent with existing labels and the country has already been certified by some high-standards certifications (e.g. Never Ever 3 - cattle that have not received antibiotics, hormones or proteins of animal origin), thus further certification could be explored to adopt an export “Organic+” strategy to the US. This strategy could involve, for high quality cuts, a combination of environmentally-friendly farming practices that promote low greenhouse gasses emission with organic and grass-fed certifications. For non-premium cuts, producers could explore the opportunity to provide both sustainability and quality assurance to food service industries at a premium compared to conventional beef.

Additionally, Uruguay could potentially look at attractive segments in the other sectors analyzed, particularly in the organic dairy and sustainable tourism markets. Uruguay could explore the organic milk powder niche to take advantage of a 5-times markup compared to conventional milk powder. Organic production requirements are extensive and time consuming (i.e. 2-3 years of transition for pastures), but overall production could be adjusted without significant obstacles considering Uruguay already fulfills the Never Ever 3 requirements. The implications of organic production practices in production efficiency is analyzed. To fully take advantage of growing opportunities in the tourism market, a different strategy to pursue a more niche and differentiated market beyond improving the existing offerings, particularly centered on “beach and sun”, is needed. Uruguay already has the potential assets to attract more tourists sensitive to sustainability issues. However, regarding the fourth sector analyzed, soy, preliminary results indicate that shifting soy production in Uruguay to non-GM would present significant costs in terms of logistics and production practices. All these compelling findings should be complemented with a further supply-side and gap analysis, which will help formulating actionable recommendations for Uruguayan firms to be able to compete in the identified green market segments.

## 1. INTRODUCTION

**Tackling climate change is a key element of the focus on environmental sustainability under Green Growth.** Although its own carbon footprint is small, at 60 percent of the average emissions per capita in the Latin America region and one third of the global average, Uruguay has a long history of concern and action in dealing with issues related to global warming, and in September 2015 submitted its Intended Nationally Determined Contribution (iNDC) to the UN Framework Convention on Climate Change (UNFCCC) ahead of the UN Climate Conference in Paris. This included targets for the reduction of the methane and nitrous oxide emissions intensities of beef, targets for carbon sequestration principally through afforestation, and carbon dioxide emissions intensity targets for the energy sector (Oriental Republic of Uruguay, 2017).<sup>1</sup> These targets correspond closely with the Low Carbon Initiatives (LCIs) identified in the Low Emissions Growth Options for Uruguay Report produced by the World Bank in 2014, in which the agriculture, forest and energy sectors account for 90 percent of the total potential identified for GHG emissions reductions (World Bank, 2016).

**This report aims to identify key demand trends on international markets, quantify consumption patterns of sustainable beef, soy, dairy and tourism, and present relevant regulatory frameworks to access key export markets.** The focus on green and sustainable opportunities is intended to enable producers and processors in resource-based value chains to better understand market dynamics in international markets, and eventually inform farmers and firms on how to further invest in eco-friendly and sustainability upgrading. Fostering deeper integration into global markets is one of key objective for Uruguay's economic growth and will require a multipronged strategy that targets increased sophistication of the productive structure and diversification into specialized, high-value, modern service-exports (World Bank, 2015). Sustainable intensification of resource use is a Government priority, and the low carbon economy has been a source of significant innovation and productivity for the country (The World Bank, 2016). With tourism, agricultural and forest products constituting the top six export sectors, together accounting for 57 percent of the total value of exports, the imperative is to ensure that natural assets continue to provide the resources and environmental services on which the economy is based. Such a global integration strategy would focus on sustained growth in value added and sophistication in resource-based agricultural chains.

**Uruguay could strengthen its commodity production by increasing Uruguay's participation in faster growing and higher value-added segments.** Greater integration in global (and regional) value chains and specifically the identification of higher-value-added activities in sustainable segments will be a critical priority for Uruguay as its limited size prevents it from benefitting from large economies of scale (Criscuolo, Onugha, Varela, & Santoni, Integration into Global Value Chains. The Dairy Industry and the ICT Industry, 2017). Such a strategy might focus on sustained growth in value added and sophistication in upstream phases of production in resource-based agricultural chains, selectively upgrading toward downstream phases of the chain, and further diversifying the primary products export mix (World Bank, 2016; Criscuolo, Onugha, Varela, & Santoni, Integration into Global Value Chains. The Dairy Industry and the ICT Industry, 2017). Secondly, Uruguay's major export commodities<sup>2</sup> remain confined in slow-growth markets, forecasted by the OECD/FAO between 1 and 3 percent per year, with most of the growth coming from developing countries and BRICS (Organisation for Economic Co-operation and Development; Food and Agriculture Organization of the United Nations, 2016). While sustained growth is expected in the soybean sector fueled by increasing demand for feed globally and food uses in China, the beef and dairy sectors will suffer from a stagnant growth. Even best performers will grow between 2 percent-3 percent per year in the beef sector and 3 percent-4 percent per year in the dairy sector. "Green" or environmentally friendly commodities, as seen in the next paragraphs, are likely to provide much higher growth potential.

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<sup>1</sup> Uruguay climate change mitigation objectives emphasize both mitigation and adaptation actions, and represent ambitious sectoral mitigation targets to be achieved by 2030. The country's emission profile is strongly marked by food production as 74 percent of total emissions origin from agriculture, and 50 percent of total emissions correspond to beef production. Specific objectives related to Food Production (beef) and Land Use, Land-Use Change and Forestry (LULUCF) were developed to address GHG emissions from agriculture and livestock. These objectives cover 99.4 percent of the GHG emissions of the National Greenhouse Gases Emissions Inventory.

<sup>2</sup> Beef, soybean, wood, dairy, rice and wheat & malt were the largest exported commodities and accounted for 62 percent of the value (US\$4.8 billion) in 2015. Beef, soybean and dairy together accounted for US\$3.6 billion or 47 percent of the total value.

**Consistently fast-growing performances of the sustainable and organic sector suggest that green commodities can provide more attractive opportunities for niche markets.** Low growth expectations of conventional markets are confronted by a fast growing “green” segment. The organic packaged food segment is expected to grow by 7 percent per year in the EU and 8 percent per year in US between 2016 and 2021, reaching a total of US\$38 billion by 2021 (US\$19.5 billion in the US and US\$18.7 billion in the EU). Consultations with industry leaders and certification agencies suggest that demand for GMO-free soybean is rapidly increasing, and will grow by 11.7 percent per year between 2016 and 2021. In the same fashion, demand for organic dairy is expected to grow by 11.9 percent per year between 2016 and 2021. Despite the lack of global quantifiable estimates, the National Geographic and GlobeScan claimed in their 2014 Greendex<sup>3</sup> report that stronger growth is expected for beef consumption in “countries where consumers estimate the environmental footprint of beef is lower”. In the US market, the retail value of fresh Grass-fed and Organic Grass-fed beef experienced a growth of 96 -100 percent per year between 2012 and 2016, as opposed to 7 percent per year for conventional beef and 18 percent for organic beef.

**There is evidence that consumers are willing to pay more for organic and locally produced food.** In their 2014 Greendex report the National Geographic and GlobeScan wrote: “Half of global consumers agree that it is worth paying more for locally or organically produced foods, and consumers are increasingly likely to recognize the value of this type of food. In eight of the 18 countries surveyed consumers have become more likely to say local or organic food is worth the extra cost.” In addition, more than 50 percent of respondents in 12 of the 18 countries agreed with this statement, including developed countries like Germany and Sweden but also Brazil, China, India Mexico, Russia. According to BoardBia, the Irish food board, 92 percent of the Chinese consumers believe that healthier foods are always more expensive than others and are willing to pay more for healthy food (Board Bia, 2015).

**In 2015, around 66 percent of global consumers are willing to pay more for “products from companies committed to positive social and environmental impact” (Nielsen, 2015).<sup>4</sup>** While it is more difficult to influence consumers in developed countries to pay more based on sustainability claims, consumers “in Latin America, Asia, Middle East, and Africa are 23 percent-29 percent more willing to pay a premium.” (Nielsen, 2015) Board Bia (2015) found that between 70 and 94 percent of consumers in Germany (94 percent), the Netherlands (91 percent), China (90 percent), Spain (87 percent), France (77 percent) and the US (70 percent) are largely aware of sustainable produced food, while this awareness halves for the UK (48 percent) and Ireland (42 percent). In addition, of these eight countries, 98 percent of consumers in China<sup>5</sup>, 82 percent Spain and 79 percent France are most likely to check for symbols of quality labels, at least sometimes. Board Bia (2015) also found that locally produced food is particularly relevant in France, Spain and Ireland. 70 percent-75 percent of Chinese consumers and 73 percent of Americans claim to be more conscious of environmental issues and state that their preference is to buy from companies that are aware of the impact of environmental issues. About half of Americans admit to being more conscious of environmental issues in the choice of products, and prefer to buy from environmentally sensitive companies. In this population, younger females and students are typically more concerned (Board Bia, 2015).

**Drivers for this fast growth are increasing health awareness, rising incomes in developing countries and downstream industry demand in developed countries.** Nielsen (2015) reported that health and wellness, as resulting from natural and organic ingredients, are two top drivers for global respondents (59 and 57 percent) in their choices, and this influence is particularly strong for those willing to pay more (70 and 69 percent). Board Bia found that “healthy eating and the impact of healthy food continues to be a key trend across the 2015 research (Board Bia, 2015). This trend is particularly strong among Chinese consumers, of whom over 75 percent rate added vitamins/minerals, GMO-free and high protein content as very/fairly important reasons for their food purchases. Healthiness is the most important factor for Chinese adult population when eating/preparing food at home, and only 35 percent of the population state that they “eat for enjoyment and not for health reasons.” In the same fashion, it appears that also in

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<sup>3</sup> Greendex is an index National Geographic/GlobeScan Consumer index of actual consumer behavior and material lifestyles based on a quantitative study based on a survey of 18,000 consumers in 18 countries.

<sup>4</sup> Comparatively, in 2013 this figure was 50 percent in 2013. The study is based on an online survey involving 30 thousand,000 consumers in 60 countries.

<sup>5</sup> Although, only 36 percent say that they would either sometimes/actively/always buy “sustainably produced” food.

the US healthiness is a major driver for shopping, although specific reasons differ: the top three drivers for 60-65 percent of consumers are high protein content, low/reduced sugar and reduced salt (GMO-free is important only for 51 percent of the population). In 2017, USDA found that organic consumers are becoming increasingly mainstream in the US, adding that: “[US] Consumers prefer organically produced food because of their concerns regarding health, the environment, and animal welfare, and they show a willingness to pay the price premiums established in the marketplace.” (United States Department of Agriculture, 2017) USDA also estimates a premium on wholesale prices for selected fruits and vegetables products between 17 and 223 percent for vegetables, and 11 and 107 percent for fruits in 2013 (United States Department of Agriculture, 2017; United States Department of Agriculture, 2016)<sup>6</sup>.

**This report is based on a literature review of specialized publications on beef, soybean, dairy,** and sustainable tourism, consultations with relevant industry specialists, as well as the aggregation and elaboration of available data sources<sup>7</sup>. This report dedicates a section of Chapter 2 to the analysis of market demand for each of the chosen. For each commodity, the same structure will be used, presenting the context and definition of the market, market demand estimates, an overview of the value chain, regulation with specific identified markets (either national or regional) and recommendations. It is important to emphasize that the report only aims to provide estimates for the demand of these commodities. A supply side analysis will need to be performed in a separate follow up study.

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<sup>6</sup> For the complete list of vegetables and fruits, please see <https://www.ers.usda.gov/data-products/organic-prices/organic-prices/#Current> Tables. These figures should be taken as an indication only of price premium because they're from 2013.

<sup>7</sup> Given the scarce availability of publicly available data, and the difficulty of accessing proprietary data, this report is based on proprietary data procured by the authors, and on estimates, either performed by the other sources or the authors. When dealing with estimates, this report uses conservative estimates built on historical data and, when available, forecasts.

## 2. COMMODITIES MARKET DEMAND

### 2.1. SUSTAINABLE BEEF

**The concept of sustainable beef is still fledgling and has not been systematically differentiated from quality-based certifications.** Industry efforts to develop sustainable standards are still ongoing and at a high level of concept, to be further defined in each country (Global Roundtable for Sustainable Beef, 2014). The existing quality-based certifications are most commonly natural raised, grass-fed, organic, among others, and they can be defined differently depending on the certification agency. These certifications can go from less to more environmental-friendly practices, thus implying less or more stringent requirements. In this report, “sustainable” refers to adopting environmentally sustainable practices as defined in Table 6 and the definitions of Naturally Raised and Grass-Fed labels are provided in footnote below<sup>8</sup>.

#### 2.1.1. CONTEXT: RISING CONSUMER ATTENTION AND RESPONSE FROM INDUSTRY

**Rising consumer attention to sustainability has brought beef GHG emissions under scrutiny.** Animal production is a significant source of greenhouse gas (GHG) emissions worldwide and estimates by various sources (Intergovernmental Panel on Climate Change (IPCC), Food & Agriculture Organization of the United Nations (FAO), Environmental Protection Agency (EPA) or others) place livestock contribution to global anthropogenic GHG emissions at between 7 and 18 percent. In recent years, consumer attention and demand for sustainable products has been rising, particularly for beef (Food and Agriculture Organization of the United Nations, 2013).<sup>9</sup> The main drivers behind sustainable beef consumption are its health benefits compared to conventional beef, followed by concern for animal welfare and the environment. Health is by far the most important driver of grass-fed beef consumption (National Geographic, GlobeScan, 2014).

**Consumers in country with high consumptions are less sensitive to environmental issues.** According to Greendex (National Geographic, GlobeScan, 2014), of the top 8 countries where beef is perceived as having a negative environmental impact, four are Europeans (Sweden, Germany, Hungary, France) together with China, Mexico, Brazil and India. Of these countries, Sweden, Germany, Hungary, India, France and China have a “low consumption”. Amongst the countries where beef is most frequently consumed, there seems to be a low degree of elasticity associated with environmental concerns. Consumers in four (Argentina, Brazil, South Africa and the US) out of the five countries<sup>10</sup> that consume beef most often retained a high consumption of beef even after learning about its negative the environmental impact. Out of the 4 countries, among the 18 surveyed by Greendex, that most reduced beef consumption, 3 are in the EU: France, Germany and Spain (National Geographic, GlobeScan, 2014).

**Producers’ associations, large multinational companies and food processors have been looking to define a sustainable standard for beef together with civil society organizations (Board Bia, 2015).** In the context of a falling meat consumption in developed markets<sup>11</sup>, key beef producers and processors (such as Cargill or JBS), producers’ associations, food service providers (i.e. McDonald’s, Ahold Delhaize, etc.) and civil society organizations (for example, the World Wildlife Fund) formed the Global Roundtable for Sustainable Beef (GRSB) in 2012 to develop a concept of sustainable beef on a global scale. The GRSB defines sustainable beef as a socially responsible, environmentally sound and economically viable product that prioritizes “Planet, People; Animals; and Progress (relevant principles:

<sup>8</sup> The Naturally Raised label is defined as a minimal processing with no artificial ingredient or added color; FDA requires for Grass-fed that the diet must be derived solely from forage, and animals cannot be fed grain or grain by-products and must have continuous access to pasture during the growing season until slaughter. Forage consists of grass (annual and perennial), forbs (e.g., legumes, Brassica), browse, or cereal grain crops in the vegetative (pre-grain) state. (United States Food Safety and Inspection Service, 2016) To obtain the organic label, operations must demonstrate that they are protecting natural resources, conserving biodiversity, and using only approved substances (United States Department of Agriculture, 2013; United States Department of Agriculture, 2015; United States Department of Agriculture, 2016).

<sup>9</sup> Greendex 2014 reports that “on average in the 18 countries surveyed, beef is perceived as having the most detrimental impact on the environment”.

<sup>10</sup> The fifth country for frequency of beef consumption is Mexico.

<sup>11</sup> The US market consumption decreased by an average of 2.3 per cent per year between 2006 and 2015.



Natural Resources, People and the Community, Animal Health and Welfare, Food, Efficiency and Innovation).". National and regional roundtables have formed since to develop metrics to measure sustainability progress. In November 2013, the Sustainable Agriculture Initiative (SAI) Platform, a global initiative for food and drink industry companies founded by Nestlé, Danone and Unilever in 2002, also developed similar standards for sustainable beef production, and is an active member of the GRSB working group. The SAI Platform has over 90 members, which actively share the same view on sustainable agriculture, defined as "the efficient production of safe, high quality agricultural products, in a way that protects and improves the natural environment, the social and economic conditions of farmers, their employees and local communities, and safeguards the health and welfare of all farmed species".

#### **Box 1. How did Ireland move to a sustainable beef production system?**

##### *Context and brief history*

Origin Green is a national program for the Irish food and drink industry, that brings together the government and the private sector. Spurred by a "continued and parallel growth" in the food industry, this initiative was developed to provide a certification process for sustainability objectives, and support farms and companies in developing their sustainability plans (Board Bia is the formal food board that bring together these actors). This program was tailored to requests coming from large clients of Ireland beef industry for sustainability certifications along quality assurances that Board Bia was already certifying.

Since 2012, Origin Green has reached 559 registered companies (95 percent exports), of which 236 fully verified members, 153 companies draft plans submitted and 170 companies currently developing plans conducted 117,000 farm assessments of carbon footprint. A key aspect of the program is identifying targets for improvement and providing advice on what actions farmers can take to achieve targets. To this purpose, the key element of the roll out of Origin Green at the farm level was the development of the Carbon Navigator, a software to help beef and dairy farmers engage with measures that can drive farm profitability while at the same time enhancing environmental performance. To date, over 37,000 individual improvement targets have been established, which, when completed, can reduce greenhouse gas emissions by over 7 percent.

##### *Origin Green at Work*

Origin Green is a voluntary program available to operators across several agricultural sub-segments, from horticulture to livestock, independently verified at every stage by the Société Générale de Surveillance (SGS) group to certify set measurable sustainability targets. The roll out of sustainability assessments at farm level has been made possible by Board Bia's pre-existing Quality Assurance infrastructure, which sees more than 100 farm auditors undertake almost 800 independent farm audits each week. Every 18-months, auditors measure on and off farm key indicators such as energy, emission, water consumption but also animal health, traceability and sustainable sourcing of materials. All the applicable scores are calculated on the auditing device. This results in an overall audit score, based on 154 criteria in, including 9 critical criteria and 145 general criteria. For a farm to be eligible for certification it must: have full compliance with all critical criteria; and have no non-compliances; and obtain a score of 60 percent or greater in the general criteria. Farm info are collected on handheld devices, sent to and processed by the Board Bia database and feedback on practices is sent back to farmers. This program has been highly successful and nearly every exporter of beef is a member, or in the process of becoming one. According to Board Bia studies and farmers' own anecdotal evidence, there are significant profitability gains to be achieved by implementing the sustainability recommendations of the program. One farmer stated that his gross margins per hectare more than doubled from €500/ha to €1200/ha in three years; data from Teagasc<sup>12</sup>, indicates the potential efficiency benefits for farmers can be significant: a 10-Day extension to the Grazing Season reduces costs by €25 per suckler cow and cuts carbon footprint by 1.7 percent, a one-month reduction in the age at first calving from 29 months to 28 months improves returns by €50 per cow and reduces carbon footprint by 0.3 percent, an improvements in calving rate from 80 percent to 85 percent lifts returns by around €45 per cow and reduces carbon footprint by 4 percent, and an increase in lifetime average daily gain from 900g to 1,000g lifts return by €63 per head and reduces carbon footprint through higher output.

##### *Ireland Policy Incentives*

Ireland has promoted sustainable farming practices from the early 2000 through sets of incentive based programs. These practices were incentivized initially by the Rural Environment Protection Scheme (REPS) 3 of 2004; the Food

<sup>12</sup> The Irish Agriculture and Food Development Authority.

Harvest 2020 strategy, the Agri-Environment Options Scheme of 2010 and the Green, Low-Carbon, Agri-Environment Scheme of 2015<sup>13</sup>; and the Sustainable Beef & Lamb Assurance Scheme, which was updated lastly in March 2017.

REPS 3 introduced economic incentives for sustainable and organic farming, depending on land holding size and target area, particularly for smaller farms<sup>14</sup>. Farmers would need to accept eleven sustainable farming practices covering farming practices such as nutrient management, tillage crop production and grassland management, as well as non-farming practices, such as protection of historical cultural features and visual appearance of the farm and implement them for at least five years<sup>15</sup>. Associated with incentives to adopt these practices, there would be penalties for non-compliance.

Food Harvest 2020 is the overall strategy that charts the direction of agri-food, forestry and fisheries in Ireland between 2010 and 2020. It contains over 200 recommendations and suggestions for the Government and private sector, and sets the stage for the Agri-Environment Options Scheme (AEOS) of 2010 and the Green, Low-Carbon and the Green, Low-Carbon, Agri-Environment Scheme (GLAS)<sup>16</sup>. These two schemes set out further incentives to preserve Ireland's traditional hay meadows and low input pastures and promote low-carbon emission as it retains the carbon stocks in soil through margins habitat preservation and practices such as minimum tillage. To enter the GLAS scheme, one must apply to the Department of Agriculture through a Teagasc advisor or private agricultural consultant, which will draw up a commonage plan<sup>17</sup>, and fulfil a number of core requirements along with one or more priority actions. Incentives are up to €7,000 per farmer per year and are meant to subsidize the implementation of priority actions<sup>18</sup>.

Finally, the Sustainable Beef & Lamb Assurance Scheme's objective is to assist in the marketing of meat in several ways, including demonstrating the commitment of Irish beef and lamb farms to 'green' farming practices.<sup>19</sup> This is the main policy currently regulating the process of joining and been certified as a member of Origin Green. Auditors will establish the performance of the operator for several criteria, encompassing virtually every aspect of the farm from record keeping to farmer's competence, identification and traceability of animals, animal health, environmental background information, biosecurity and pest control, housing background information land and water management, animal feeds and use of antibiotics, as well as farm personnel health and social sustainability.

(Source: Department of Agriculture, Fisheries and Food, 2010; Department of Agriculture, Food and The Marine, 2010; Department of Agriculture, Food and the Marine, 2011; Department of Agriculture, Food and the Marine, 2015; Rural Environment Protection Scheme, 2004, Board Bia, 2016; Board Bia, 2015)

<sup>13</sup> These two schemes implemented EU Council Regulations (EC) No. 1698/2005 and Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 (The Council of The European Union, 2005; European Commission, 2017).

<sup>14</sup> The economic incentives start from €242/ha for the first 20ha in target area land progressively decreasing to €5/ha for area above 120ha and from €200/ha for the first 20ha in non-target area land decreasing to €10/ha for areas above 55ha. Other incentives are set for organic farming of landholdings and supplementary measures. For more detailed information see (Rural Environment Protection Scheme, 2004; REPS 3: Past Scheme, 2018).

<sup>15</sup> The full eleven areas are the following: nutrient management, including manure spreading times, grassland management, watercourse management and maintenance, wildlife protection, farm and field boundary maintenance, restricted use of pesticides and fertilizers near boundaries and waterways, historical and cultural feature protection, maintenance of visual appearance of the farm, tillage crop production, participation in a REPS training course, maintenance of appropriate farm records and conservation of natural heritage. For more detailed information, see (Rural Environment Protection Scheme, 2004, pp. 7-33).

<sup>16</sup> For more information, please refer to Department of Agriculture, Fisheries and Food (2011) and Department of Agriculture, Fisheries and Food (2010).

<sup>17</sup> Communal land refers to lands in which two or more farmers have the right to graze. In the Republic of Ireland's communal lands also have communal land tenure. Each farmer has a distinct and separate interest in the property. The property is divided into deferred shares, instead of shares in a company. Communal lands are not physically divided, so no individual person is the full owner of any separate part of the property. Access to communal grazing is technically restricted to its shareholders. Each shareholder cannot exclude other shareholders, the use of land which is shared among all. Approximately 426,000 hectares of communal lands remain unused. More than 11,000 farms have a system of actions in one or more of the 4,500 ha properties that remain unused. Most of this land is located on the west coast where four counties Mayo, Galway, Donegal and Kerry use 70 percent of the country's communal lands.

<sup>18</sup> For more detail on core, priority and secondary actions and incentives please refer to Department of Agriculture, Food and the Marine (2015). For more information on AEOS actions and incentives, please refer to Department of Agriculture, Food and the Marine (2010).

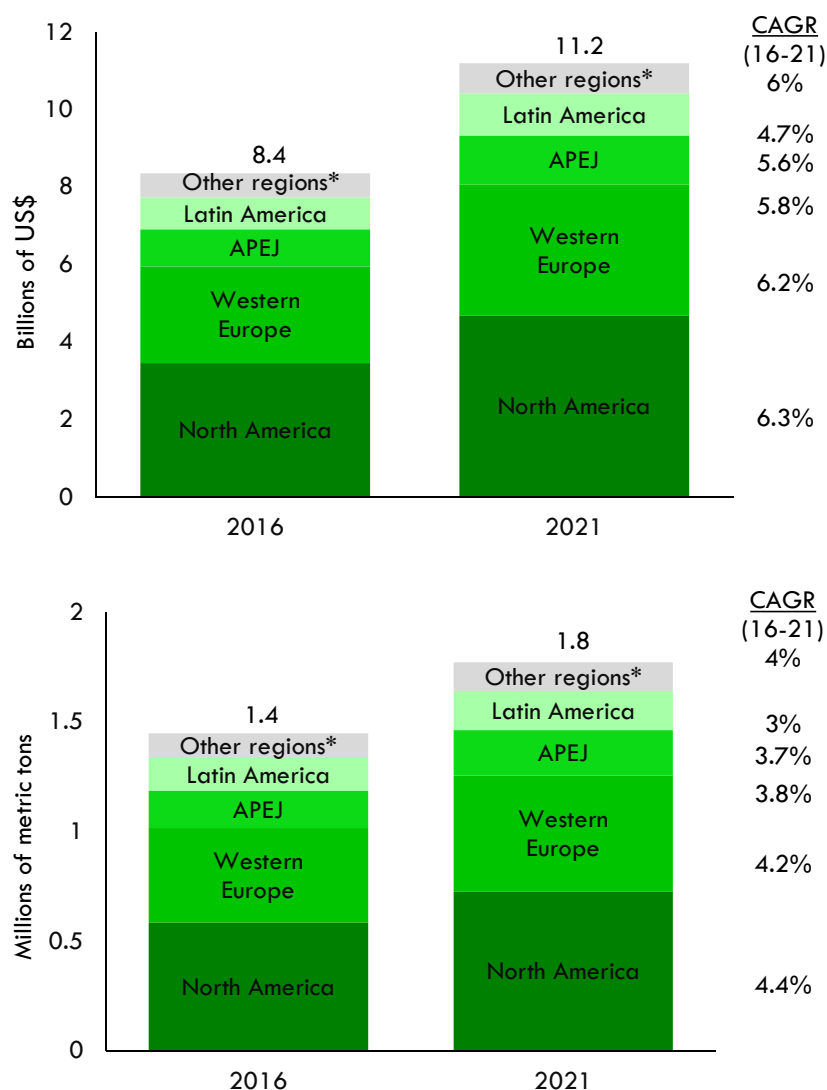
<sup>19</sup> The Sustainable Beef & Lamb Assurance Scheme is based on the requirements of existing legislation and standards including: ISO 17065 (2012) Conformity assessment — Requirements for certification bodies certifying products, processes and services; Codex Alimentarius: Recommended International Code Of Practice General Principles Of Food Hygiene (Cac/Rcp 1-1969, Rev. 4-2003); Hazard Analysis and Critical Control Point (HACCP) as outlined by Codex Alimentarius (1997 3rd edition); Relevant National and EU legislative requirements; Recognized international quality management standards such as ISO 9001:2015 (Quality Management System — Requirements) and ISO 22000: 2005 (Food safety management systems — Requirements for any organization in the food chain); PAS 2050: 2011 - Specification for the assessment of the life cycle greenhouse gas emissions of goods and services.

## 2.1.2. MARKET DEMAND OUTLOOK

**There is significant potential in the global sustainable beef market, which has shown increasing value added.<sup>20</sup>**

The global sustainable beef market has shown a significant increase in value, driven by growing prices (from an average of ~US\$5.5 thousand to US\$6.2 thousand per metric ton). The global market was valued at ~US\$7 billion in 2012, reached US\$8.4 billion in 2016 and is expected to increase to US\$11.2 billion by 2021, growing at 6 percent per year (Figure 1). Volume wise, the beef production was 1.3 million metric ton (MT) of beef in 2012, 1.45 million MT in 2016 and projected to reach 1.8 million MT in 2021, growing at 4.1 percent per year. Regionally, North America accounted for ~US\$3.5 billion (41 percent), Western Europe for ~US\$2.5 billion (30 percent), Asia and the Pacific for ~US\$1 billion (12 percent) and Latin America for ~US\$0.8 billion (10 percent). Africa, Eastern Europe, Japan and the Middle East accounted for ~US\$0.6 billion (~8 percent).<sup>21</sup>

**Figure 1. Global sustainable beef market value (upper panel) and volume (lower panel) by region, for 2016 and 2021.**

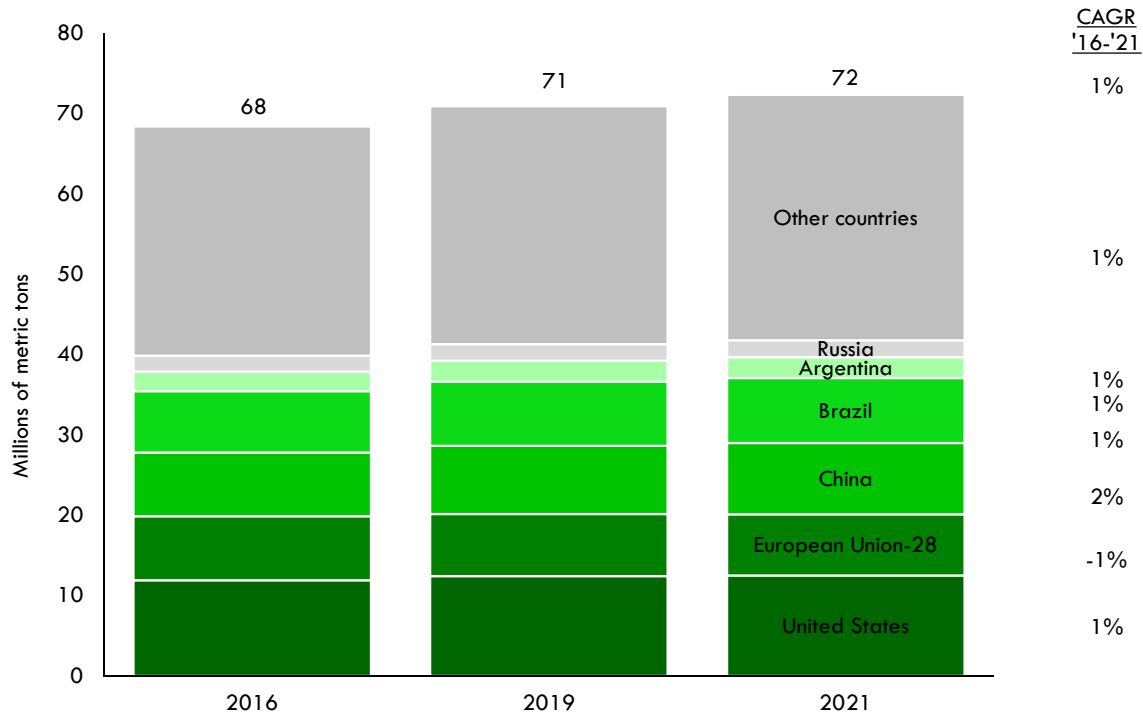


**Note:** \* represents Eastern Europe, Japan, Middle East, Africa.  
**(Source: OECD)**

<sup>20</sup> According to a study commissioned by the World Bank to FutureMarketInsights in 2017.

<sup>21</sup> The market value referenced here and later in the report is the total amount paid for the products.

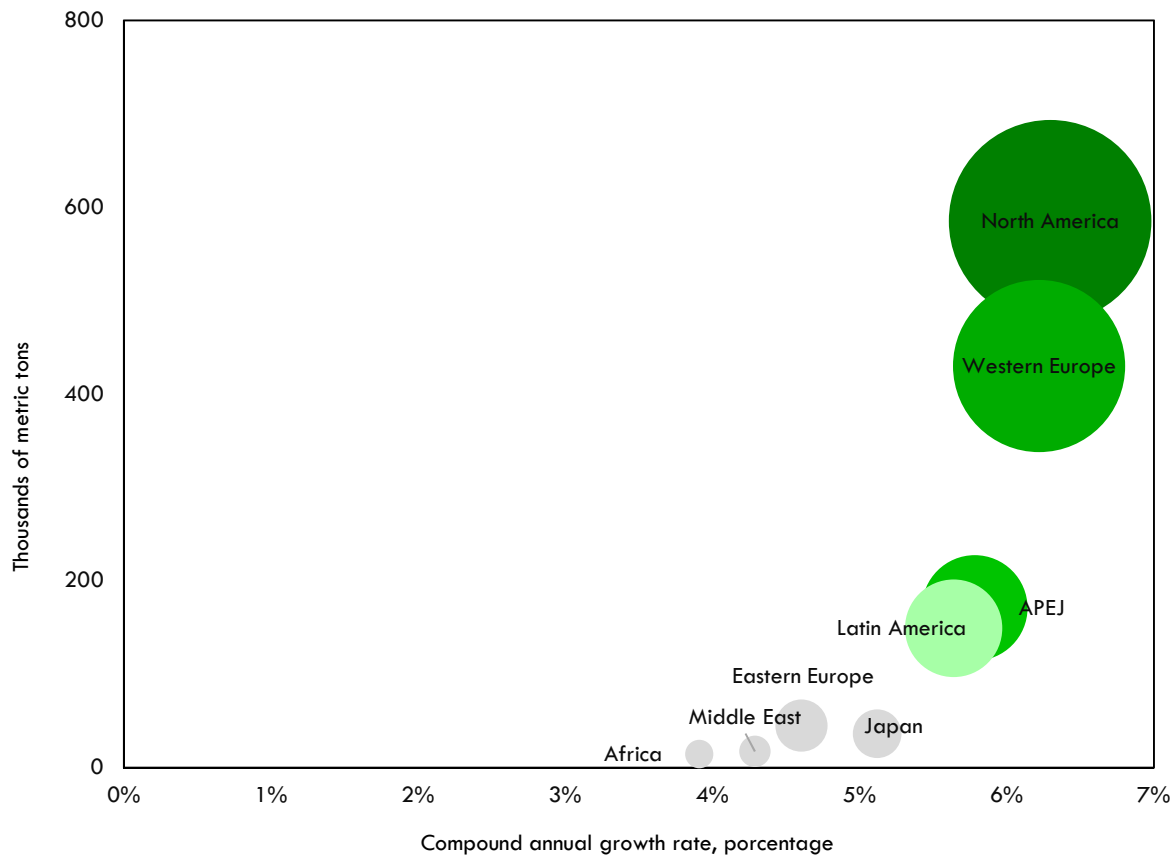
Figure 2. Beef consumption by major country: volume and growth rate, 2016-2021.



(Source: OECD Agricultural Outlook)

Conversely, the global beef market volume is expected to grow at ~1 percent per year from 68m MT in 2016 to 72m MT in 2021, with no country growing faster than 2 percent per year (Figure 2). The largest markets are: the US, accounting for ~ 12m MT, the EU-28 accounting for ~8m MT, China, accounting for ~7.9m MT and Brazil, accounting for ~7.7m MT. These countries are expected to grow at ~1 percent per year, except for the EU-28, which is expected to decrease over the projected period, and China, which is expected to grow by 2 percent per year. Furthermore, prices are significantly lower than those offered by sustainable beef, with an average markup of 23 percent in the US and 41 percent in the EU (see Subsection 2.2.2 and Figure 9 for more information on US markup).

Figure 3. Sustainable beef market attractiveness by region for 2016-2021.



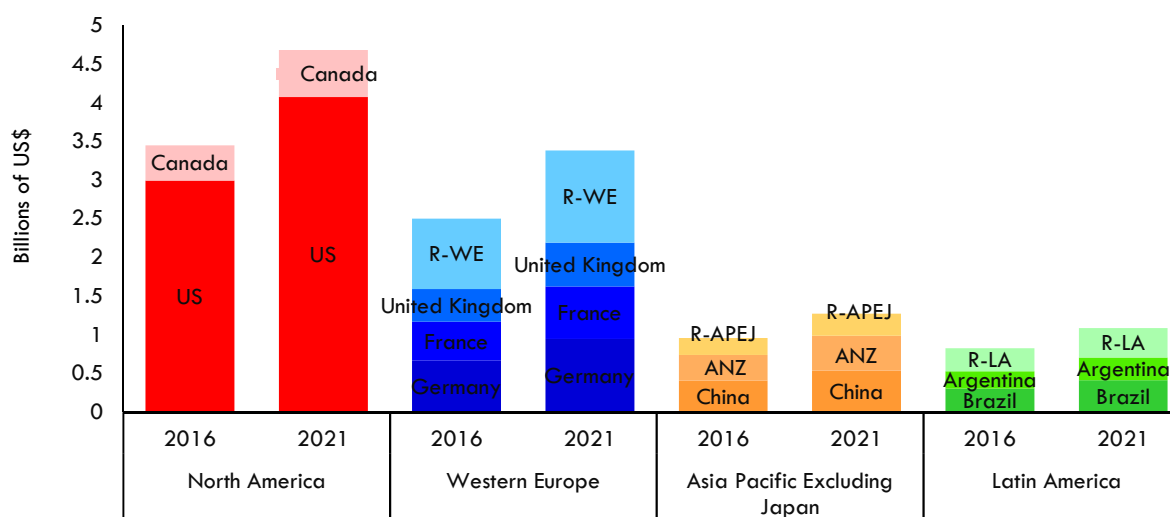
(Source: FMI)

**North America and Western Europe are expected to experience the largest growth in value between 2016 and 2021 for sustainable beef.** As Figure 3 shows, the most attractive market between 2016 and 2021 are the US and Western Europe because of their promising market growth along with the largest added value.<sup>22</sup> In 2016, the US represented ~85 percent of the North American sustainable beef market (~US\$3 billion and 508k MT), and is expected to reach US\$4 billion and 632k MT by 2021. In the EU, the largest markets were Germany, France and the U.K. accounting for ~64 percent of the market (US\$ 1.6 billion and 273k MT), and expected to reach ~US\$2.2 billion and 343k MT by 2021. The largest markets in the Asia and Pacific region were China, Australia and New Zealand, respectively accounting for US\$405 million and ~US\$330 million as well as ~72k MT and 59k MT, and expected to reach ~US\$532 million and ~US\$451 million, and ~86k MT and ~73k MT by 2021. In Latin America, the largest markets were Brazil and Argentina, accounting for ~US\$526 million and ~95k MT, and expected to reach ~ US\$705 million and ~ 116k MT by 2021 (Figure 4 and Figure 5).

<sup>22</sup> Volume on the y axis, market growth on the x axis and future market size as the bubble size.

**The Chinese sustainable beef market is small but growing very quickly.** The Asian market represented ~14 percent of market value in 2016 and is not expected to outgrow the global market share, trailing behind the North American and European markets. Rapid urbanization in China and increasing health concerns of the younger population are expected to be the drivers of market growth, estimated at 5.7 percent per year. China is expected to outperform market growth in Asia by ~1.5 percent and will remain the largest market, reaching US\$532 million by 2021 from US\$405 million in 2016. This growth is driven by increased prices, as the value growth (7.1 percent annually) outstrips volume growth (4.6 percent per year). Uruguayan exporters could leverage their presence in China to cater to this increased demand for sustainable products and provide appropriate healthier and greener options to consumers.<sup>23</sup> Australia and New Zealand are expected to also experience a high growth rate of ~8 percent per year, but given the already large organic dairy and beef producers present in their market<sup>24</sup> are unlikely to be as attractive. Modern trade and convenience stores are expected to continue to be the largest retail method, and grow at 8.2-8.5 percent per year compared to an average growth ~7 percent for other retail types.

Figure 4. Sustainable beef market (value) by region and major countries, for 2016 and 2021.

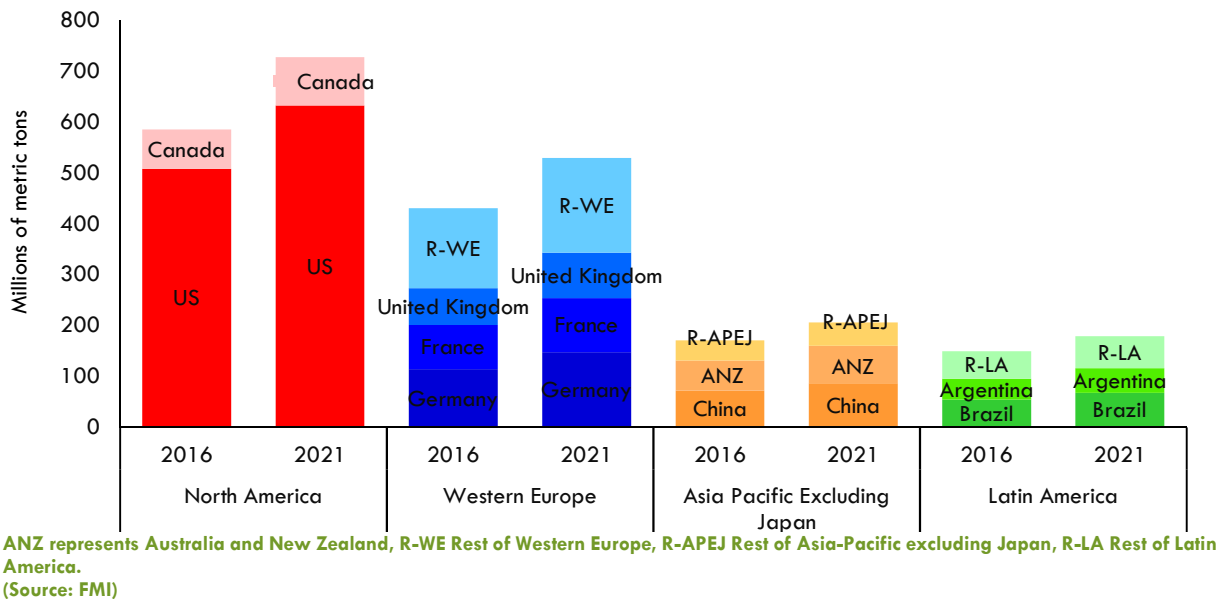


ANZ represents Australia and New Zealand, R-WE Rest of Western Europe, R-APEJ Rest of Asia-Pacific excluding Japan, R-LA Rest of Latin America.  
(Source: FMI)

<sup>23</sup> The type of product that could be catered as well as competitiveness that would be faced is out of scope for this demand study.

<sup>24</sup> For example, Fonterra is one of the global leaders of organic dairy production; and New Zealand is the largest exporter of organic dairy.

Figure 5. Sustainable beef market (volume) by region and major countries, for 2016 and 2021.



**The US appears particularly attractive for sustainable beef because of higher markup, volumes and imports than the EU.** First, the US market pays a 16 percent premium for beef compared to the EU (European Commission, 2017).<sup>25</sup> For sustainable beef, FMI estimates closer prices between the US and Western Europe, with the average price per MT to be US\$5.9 thousand in the US and US\$5.8 thousand in Western European countries. Second, the EU has a self-sufficiency close to 100 percent, producing about 7.5 million MT of beef (European Commission, 2017)<sup>26</sup>. The US market has about 92 million head of cattle and calves (30 million slaughtered in 2015) for a value of US\$78.2 billion, and imported ~1.4 million MT of beef in 2016<sup>27</sup> (Cheung & McMahon, 2017). In addition, about 75 percent-80 percent of the total value of U.S. grass-beef sales are already imported.<sup>28</sup>

**Lower US beef import duties and higher import quotas increase the attractiveness of the US market.** As shown in Table 1, Uruguay has fewer in-quota available exports and higher in- and out-of-quota duties when exporting to the EU when compared to the US or China. American tariffs stand at US\$44/MT for in-quota and 26.4 percent for out-of-quota imports, and the quota applies to 20k MT of beef. EU quotas for Uruguayan beef and high-quality beef are 5.85 thousand MT and 6.3 thousand MT and its import duties depend on the type of beef and cut (European Commission, 2017; United States Department of Agriculture, 2016). Given these more complex and costly regulations, as well as a 24 percent lower price paid in the EU for each metric ton of beef<sup>29</sup>, the emerging assessment is that the US is a more attractive market for beef. The Chinese market, instead has a flat 12 percent - 20 percent import duties of the CIF (Cost, Insurance and Freight) value for fresh, chilled or frozen beef cuts, with an average 14.7 percent. Carcasses face higher import duties, respectively at 20 and 25 percent.

<sup>25</sup> The average price for beef in the EU is US\$4,117/MT; the average price for beef in the US is US\$4,770/MT.

<sup>26</sup> The EU is the world's second largest producer of beef after the United States, with Brazil trailing only slightly in third place. Total number of cattle in the EU27 amounts to almost 90 million animals. France has by far the EU's largest cattle herd, with more than 19 million animals, followed by Germany (about 12.7 mio) and Britain (10.3 mio.). Italy, Ireland, Spain and Poland are each home to around 6 million cattle. (Leip, et al., 2010).

<sup>27</sup> Carcass equivalent weight, USDA ERS.

<sup>28</sup> The imported beef has to pass through a USDA-inspected plant, and therefore it can be labelled "Product of the USA".

<sup>29</sup> The EU market observatory for beef and veal estimates that the average price for a MT of beef (carcass) is US\$4,770 in the US and US\$4,117 in the EU.

Table 1. Beef tariffs in the US, EU and China.

	In quota	Out-of-quota
<b>European Union</b>		
Beef – Carcass & bone in	20 percent for carcass	12.8 percent + €1414/MT, €1768/MT, €2652
Beef – Boneless	20 percent+€1768/MT 20 percent if for processing	12.8 percent +€1414 -€2652/MT depending on cut
HQ Beef – Carcass & bone in	0 percent in 2017 20 percent	12.8 percent + €1414/MT €1768/MT, €2122/MT, €2652
HQ Beef – Boneless	0 percent up to 06/2017 20 percent	12.8 percent + €3034/MT
<b>United States</b>		
Beef	\$44/MT	26.4 percent
<b>China</b>		
Beef, fresh or chilled	--	12 percent - 20 percent, avg 14.7 percent
Carcass, fresh or chilled	--	20 percent
Carcass, frozen	--	25 percent

(Source: WTO, European Commission, USDA)

The US labelled beef market also shows an increasing demand and value added.<sup>30</sup> According to Retail Marketing<sup>31</sup>, the quarterly production of several labels of sustainable beef is estimated at ~18k MT and US\$250 million for the fourth trimester of 2016, and a total of ~72k MT and US\$1 billion of direct sales in 2016 (National Cattlemen's Beef Association, 2017). These figures represent 3 percent of the total volume and between 4 and 4.5 percent of the total market value.<sup>32</sup> The value has been increasing by 10 percent - 12 percent per year between 2011 and 2017, from ~US\$145 million in 2011 to ~US\$260 million in 2017, at a faster rate than its volume, which experienced a growth of ~6.5 percent from 12.7k MT in 2011 to 18.6k MT in 2017. These labels include the following: Naturally Raised, Organic & Grass Fed, No Hormones, Naturally Raised & Grass Fed, Organic, No Hormones & Grass Fed, No Antibiotics & No Hormones & Grass Fed, No Antibiotics & No Hormones, and Grass Fed.<sup>33</sup>

**Grass-fed and organic grass-fed beef are the fastest growing segments in value and volume.** The largest segment in the labelled beef market is Naturally Raised accounting for US\$544 million and 43.k MT (Figure 6). Grass-fed and organic grass-fed beef have been the fastest growing segments, respectively at 43.5 and 183.3 percent per year in value, and 37 and 211 percent per year in volume between 2011 and 2016 (National Cattlemen's Beef Association, 2017). Retail sales of labelled fresh grass-fed beef in the US were at US\$272 million in 2016, from US\$17 million in

<sup>30</sup> This data refers to retail value of beef and therefore does not include packaged food.

<sup>31</sup> A website sponsored by the Cattlemen's Beef Board & National Cattlemen's Beef Association.

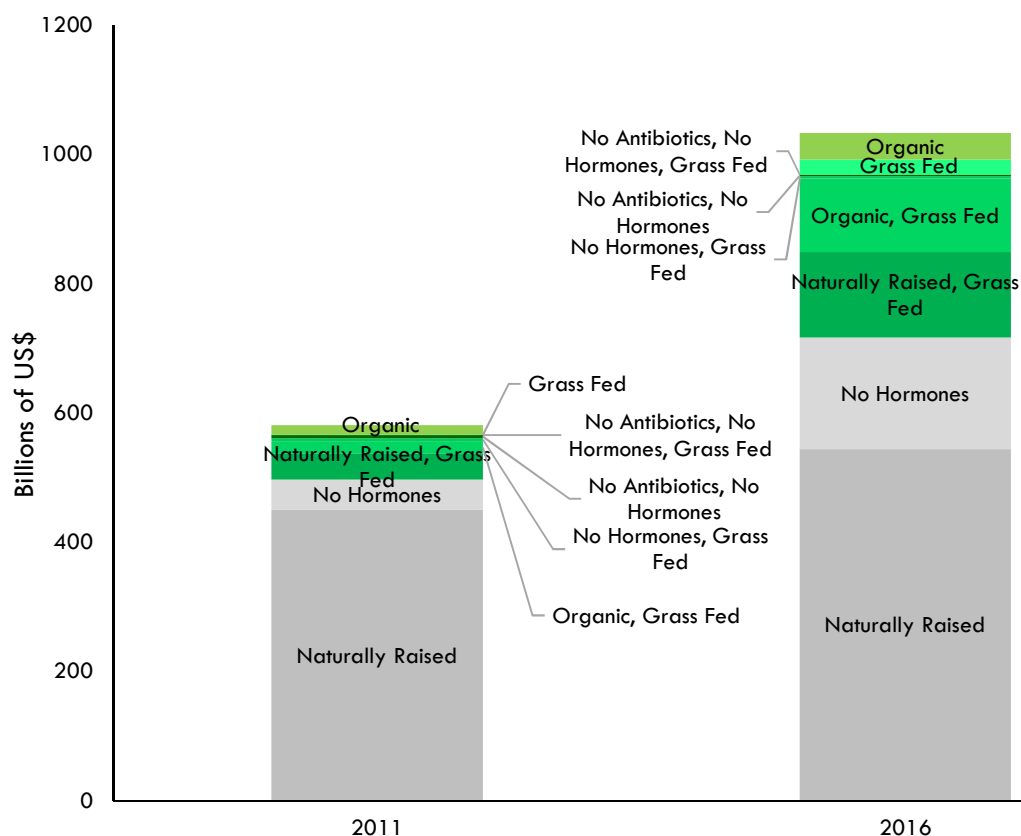
<sup>32</sup> From this initial analysis, it is evident that there is a price premium for having a sustainability label.

<sup>33</sup> The Naturally raised label is defined as a minimal processing with no artificial ingredient or added color; Grass-fed required up to January 2016 that grass, forbs, and forage needed to be 99 percent or more of the energy source for the lifetime of a ruminant species after weaning. After January 2016, when USDA dropped its grassfed standard, the industry came together and developed a similar, albeit more stringent than USDA. FDA standards remained the same, stating: The diet must be derived solely from forage, and animals cannot be fed grain or grain by-products and must have continuous access to pasture during the growing season until slaughter. Forage consists of grass (annual and perennial), forbs (e.g., legumes, Brassica), browse, or cereal grain crops in the vegetative (pre-grain) state. (United States Food Safety and Inspection Service, 2016) The organic label certifies that operations are protecting natural resources, conserving biodiversity, using only approved substances and specific "humane" standards for animal care. (United States Department of Agriculture, 2013; United States Department of Agriculture, 2015; United States Department of Agriculture, 2016).



2012 growing at 118 percent per year (Cheung & McMahon, 2017).<sup>34</sup> In addition, the overall grass-fed market is estimated at US\$4 billion in retail and food services sales, (4 percent of the total market), with about US\$1 billion of certified grass-fed beef sales and an estimated US\$3 billion of grass-fed beef sold as conventional beef.<sup>35</sup> The largest distribution segment is food service operators, which have an advantage in using the less popular cuts of the animal (i.e. chuck and round).

Figure 6. Sustainable labelled beef market in the US, 2011 and 2016.



(Source: National Cattlemen's Beef Association)

Other estimates of the US certified beef market also confirm that it is potentially 4 times larger, when indirect sales are included (Future Market Insights, 2017). Direct sales represented ~40 percent of the market, accounting ~US\$1.4b in 2016; indirect sales, instead, accounted for the bulk of sales, with ~US\$2 billion in 2016.<sup>36</sup> Fresh meat demand, which FMI defines as “the raw organic beef meat which has not undergone any value-added process [...] and

<sup>34</sup> This figure is coherent with data from the National Cattlemen's Beef Association, that project total value of grass-fed beef at US\$272m. There is a discrepancy in the rate of growth, which data from the National Cattlemen's Beef Association show at 33.5 percent per year.

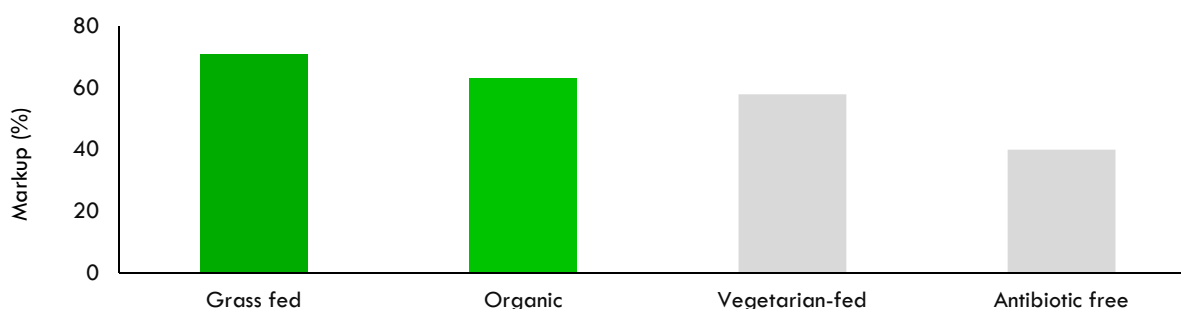
<sup>35</sup> This is an estimate from Bonterra & SLM, based on data from marketing research firms Nielsen and SPINS, the retail marketing website of the National Cattlemen's Beef Association (Beefretail.org) and the USDA. On the one hand, unlabeled grass-fed beef is often blended with meat from conventional animals to produce ground beef and hamburger. On the other, an estimated 20-25 percent of the slaughtered beef cows in 2015 consumed only grass and nongrain supplements during their life but are not labelled. For a full discussion, please refer to Appendix 1 of *Back to grass: the market potential for US grassfed beef*.

<sup>36</sup> Indirect sales are those sales past the b2b segment, i.e. retail and consumer level sales (FMI, 2017).

is cut at the point of sale”, was estimated at US\$~858 million, whereas processed beef market value was estimated at ~US\$2.6 billion<sup>37</sup>.

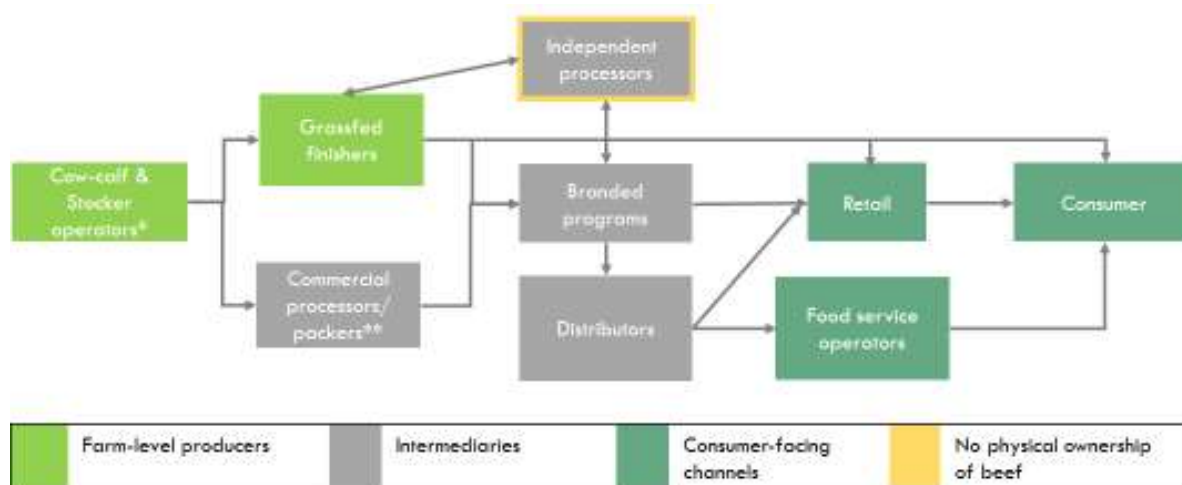
**Significant price premiums for sustainable certified beef are not captured by producers due to an inefficient and fragmented value chain.** Consumers are willing to pay high price premiums for certified beef (Figure 7). Markup over conventional beef is highest for grass-fed beef at 71 percent and for organic at 63 percent. Incidentally, these two segments are also the most sustainable of the various certifications. While this markup shows that there is strong consumer demand for certified quality, the fragmentation of the sustainable beef value chain in the US prevents producers from reaping efficiency gains, increasing their margins, and progressively reducing the price premiums (Cheung & McMahon, 2017). 81 percent of grass-fed beef are sold through branded grass-fed programs, which remain inefficient (Cheung & McMahon, 2017).<sup>38</sup> As comparison, the market of conventional beef is dominated by four large players (Tyson, JBS, Cargill and National), that buy 80 percent of the cattle in the US and have streamlined vertically integrated operations relying on competitive cost and high volumes. The processing costs for these small-scale businesses run from twice to 4-6 times as much as the largest beef producers (Cheung & McMahon, 2017). As a consequence, grass-fed, sustainable beef remains a niche market limited to few consumers.<sup>39</sup>

Figure 7. Retail markup in the beef market by type of labelled beef relative to conventional beef price.



(Source: Bonterra & SLM)

Figure 8. Grass-fed beef value chain in the United States.



<sup>37</sup> This also includes food service operators and restaurants.

<sup>38</sup> The remaining 19 percent is estimated to be sold directly to customers by small-scale producers.

<sup>39</sup> The largest four producers can process animals for US\$100-120 per head, against US\$150-300 for large grass-fed programs and US\$400-800 for small scale producers.

Notes: \* Many small cow-calf operation and stockers are also grassfed finishers; they also send cull animals to packers; \*\* Often vertically integrated: some own branded programs and distribution

(Source: Bonterra & SLM)

**Lower retail grass-fed beef markups could be achieved through efficiency gains in production and vertical integration, and would stimulate greater consumer demand (Cheung & McMahon, 2017; Nielsen, 2015).** The cost of US grass-fed beef could be economically viable even at a 20-30 percent price premium at the retail level as opposed to the 71 percent current premium over conventional beef. This lower premium would effectively stimulate higher sales volumes among general consumers. However, to be economically viable, operators in the market would need to increase their production efficiency and develop a more vertically integrated presence in the value chain. Currently, most of the revenues are held by stockers, distributors, and retailers, while producers only account for ~25 percent of the revenues from the grass-fed beef value chain, and processors for ~21 percent (Cheung & McMahon, 2017; Nielsen, 2015).<sup>40</sup>

### 2.1.3. KEY INTERVENTION IN THE VALUE CHAIN AND INTERNATIONAL STANDARDS

**Key interventions to implement a low greenhouse gas (GHG) emission beef focus on pasture and manure management practices as well as breeding and animal health.** International standards for sustainable production of beef have been developed by the Global Roundtable for Sustainable Beef under a Voluntary Sustainability Standard approach (Global Roundtable for Sustainable Beef, 2014; Global Research Alliance on Agricultural Greenhouse Gases, Sustainable Agriculture Initiative Platform, 2013). Key relevant principles include adaptive management, improvement of air quality, minimized GHG emissions, ecosystems (native forests, grasslands, high conservation areas etc.) protected from degradation, land management practices to protect ecosystems, water resources responsibly and efficiency managed, soil health maintained, sustainably produced feed.

**The objective of sustainable practices is to enhance productivity and reduce GHG emissions per livestock unit.** These outcomes are achieved by improving animal growth rates and weight, reducing finishing times, increasing conception rates, reproductive performances and animal health. According to a report by FAO, the New Zealand Agricultural Greenhouse Gas Research Center and the Climate and Clean Air Coalition in 2016, the recommended practices in Table 2 can help reduce GHG emissions in Uruguay by up to 43 percent and increase production in live weight terms by up to 200 percent (Food and Agriculture Organization of the United Nations; New Zealand Agricultural Greenhouse Gas Research Centre, 2017). This report also conducted a cost-benefit ratio analysis, showing that among these practices increasing forage allowances, heterosis and controlled mating are most effective in cow-calf systems, while artificial insemination, heterosis and increasing forage allowance in cycle 1 systems.<sup>41</sup>

**Table 2. Production gains and Methane (CH<sub>4</sub>) reduction potential in Uruguay.**

	Production gains (%)	CH <sub>4</sub> reduction potential (%)	Benefit-cost ratio
<b>Cow-calf system</b>			
Increasing Forage allowance	27.6	- 21.6	28
Heterosis (use of crossbreeds)	27.5	- 19.2	27
Artificial Insemination	24.8	- 29.0	22
Controlled mating	11.2	- 14.8	25
Winter supplementation	5.9	- 13.2	16

<sup>40</sup> This study bases its estimate on a model of a medium sized producing and processing firm that finishes 10,000 animals per year and uses best-practice grazing management and greater scale to bring down production costs.

<sup>41</sup> Cow-calf systems are breeding systems: The breeding activity includes the reproductive phase, producing calves as the main product that enters the meat production stages and culled cows; cycle 1 systems include breeding of calves as well as rearing and fattening for 26 to 35 months (Food and Agriculture Organization of the United Nations; New Zealand Agricultural Greenhouse Gas Research Centre, 2017).

Summer supplementation	1.6	- 9.6	21
Flushing <sup>42</sup>	1.6	- 9.6	23
<b>Complete Cycle 1</b>			
Artificial Insemination	80	-40.3	64
Heterosis (use of crossbreeds)	55	-24.2	67
Controlled mating	47	-25.9	58
Increasing Forage allowance	28	-16.8	65
Winter supplementation	22	-25.0	32
Summer supplementation	21	-19.2	50
Flushing (Temporary weaning and Supplementation)	21	-18.7	60

(Source: CCAC, 2017)

**Forage, manure management and animal productivity are consistently found as main practices to reduce GHG emission.** An additional FAO report confirms that there are three main mechanisms to decrease GHG emission from beef: controlling forage quality and intake, cattle housing and manure management, and increasing animal productivity through improved animal health and reduced mortality (Food and Agriculture Organization of the United Nations, 2013). According to this report, increased forage digestibility and intake, effective silage preservation, inclusion of concentrate feeds in the diets above 40 percent of dry intake or, alternatively, improved low quality feeds nutrition value will generally reduce GHG emissions from rumen fermentation and are highly-recommended mitigation practices. Manure storage, processing and co-generation are recommended practices. In locations with average temperature above 15 °C, anaerobic digestion systems have the potential to capture and destroy most CH<sub>4</sub> from manure, while generating renewable energy.<sup>43</sup> In addition, where soil acidity is not an issue, acidification is a further effective method for reducing ammonia and CH<sub>4</sub> emissions from stored manure. Finally, increasing animal productivity is a very effective strategy for reducing GHG emissions per unit of livestock product through crossbreeding or selection within breeds; reduction of herd size; reducing age at slaughter of finished cattle, improved animal health and reduced mortality and morbidity.

**The use of growth hormones (rBST) and antibiotics could also reduce greenhouse gas emissions by increasing overall productivity but will restrict export markets.** Albeit attractive, these practices would make it more difficult to export beef in the US and EU market. The EU does not allow the use of hormones or antibiotics as feed additives for cattle, and the US has recently started to promote a more “judicious use of medically important antimicrobial drugs in food animals” (United States Food and Drug Administration, 2017; United States Food and Drug Administration, 2013). The Food and Drug Administration has produced two strategies to “help phase out the use of medically important antimicrobials in food animals for production purposes” by focusing on (a) voluntary approach “to revise the approved use conditions for their medically important antimicrobial drug products to remove production uses” and (b) transitioning the products currently used for production purposes from over-the-counter medication “to one that will require producers to have a prescription or order from a licensed veterinarian to obtain these products” (United States Food and Drug Administration, 2017) . Together with the FDA, the US Department of Agriculture also regulates the type and amount of growth hormones that can be used as feed additives, which are primarily given to cattle in the form of small pellets placed under the skin in the animal’s ear. Six hormones (estradiol, progesterone, testosterone, zeranol, trenbolone acetate and melengesterol acetate) are approved to promote efficient growth for 90 to 120 days, although

<sup>42</sup> Flushing and supplementation refer to providing high quality feeds, usually grains prior to the start of the breeding to increase reproductive performance; Weaning is the removal of a suckling calf from the cow.

<sup>43</sup> The effect of anaerobic digesters on N<sub>2</sub>O emissions is unclear. Anaerobic digestion is the process of degradation of organic materials by archaea in the absence of oxygen, producing CH<sub>4</sub>, CO<sub>2</sub>, and other gases as by-products and is a promising practice for mitigating GHG emissions from collected manure (FAO, page 89 QUOTE). The downside is the large upfront capital investment required and which typically requires some sort of government subsidy.

not all combinations of hormones are approved for use in all classes of cattle (United States Code of Federal Regulations, 2017).<sup>44</sup>

**To capture the certified market, Uruguay could leverage its branding strategy on certified beef by expanding sustainable practices and setting measurable standards.** Low emission beef can be achieved through sustainable practices, which enhance the quality of the beef and can leverage existing quality standards (such as grass-fed or organic) for marketing, or through a high growth strategy using antibiotics and hormones to decrease morbidity and increase productivity. The tradeoff between these production methods, along with consumer and business preferences will need to be explored to understand how much value would be placed on environmental sustainability alone when other quality standards are not provided.

## 2.2. DEMAND FOR NON-GMO SOY IN EUROPE

### 2.2.1. CONTEXT: INCREASING UNMET DEMAND FOR NON-GM FEED

**The growing demand for non-GM soy feed been driven by the increased awareness of consumers about GMOs-free products and the growth of non-GMO labels (including animals reared on non-GM feed as either GM-free or non-GM).**<sup>45</sup> The growth in the non-GMO soy volume has been fueled by retailers throughout Europe – for example in Germany, Austria and Switzerland, countries that instituted positive labels for animal products reared on non-GMO feed. These labeling options provided an opportunity to further differentiate products than originally envisioned in the EU legislative framework (Tillie & Rodríguez-Cerezo, 2015; The Council of the European Union, 2007)<sup>46</sup>. An analysis by Technavio also highlighted that “Europe was the largest non-GMO food market in 2013 accounting for 40-45 percent of the total market. (Technavio, 2015) Consumers across Europe express a preference for GM-free products and hold a particularly negative attitude to GMOs when compared to other countries (ICF GHK, 2013, p. 48).

**Increasing availability of non-GM soy is essential for livestock producers in Europe.** Most of the soybean and soybean meal that is imported into the EU goes to the feed industry because of its high protein content (48 percent). Each year, the EU-28 consumes about 150 million MT of industrial compound feed, mainly for the poultry, pork and cattle (beef and dairy) sectors, productions that require high concentrated energy and protein feed. Following a low supply of non-GMO soy in Brazil in 2014, demand for non-GMO soy in the EU remained unmatched to the extent that, despite a long tradition of using only non-GM feed, the German poultry farmers association had to withdraw its long-term commitment to non-GM soybeans (United States Department of Agriculture GAIN Report, 2014).

**GMO-free availability is likely to be the main forthcoming issue in the future.** In 2012, the EU consumed ~33m MT of soya (soybean meal equivalent) and derived products, of which 95 percent was imported<sup>47</sup> (Tillie & Rodríguez-Cerezo, 2015). The soy market in the EU can be divided in three sub-segments: the conventional market (non-GM grain that is not identity preserved nor certified as such); the “mixed” one (GM and conventional crops mixed, undifferentiated, and sold and labelled if needed as GM) and the “non-GM Identity Preserved”, which is certified non-GMO (Bertheau & Davison, 2011). With the growing area of GM soybean in Brazil, alternative sources of non-GM soy are actively looked for, as Brazil represented ~80 percent of the non-GM IP certified supply in 2015. The main forthcoming issue might be the availability of low cost non-GM soybean varieties both in non-EU and EU countries (Bertheau & Davison, 2011). According to a presentation by the University of Copenhagen, non-GM soy availability

<sup>44</sup> The full regulation including amount and type of uses can be found at <https://www.ecfr.gov/cgi-bin/text-idx?SID=7a54ecff9d6f62c35da7f18c29ab3a9c&mc=true&node=pt21.6.522&rgn=div5>

<sup>45</sup> Non-GMO soy is soy that has not been genetically modified, segregated from GMO soy in the field, has followed a dedicated logistics and supply chain for transportation, storage, and processing, and does not include more than 0.9 percent of genetically modified material.

<sup>46</sup> The EU legislative framework of labeling food or feed that contain more than 0.9 percent of GM material does not apply to animal products from animals reared on GM feed.

<sup>47</sup> About 67 percent was imported as soybean meal, while the rest was produced from crushing imported soybeans.

in Brazil in 2014 was between 10 and 25 percent corresponding to 9 - 20 million tons per year, of which only 4 – 6 million MT were IP certified (Bosselmann, 2014).

### 2.2.2. MARKET DEMAND OUTLOOK

**The EU was estimated to be the largest demand market for non-GM soya in 2015 at 5m MT (~14 percent total) of non-GM soymeal equivalent demand (CERT-ID, ProTerra Foundation, Danube Soya, 2015)<sup>48,49</sup>.** Proterra, Danube Soya and CERT ID estimated the global production of non-GMO soybeans at 56.1 million MT in 2015, 17 percent of the total soy output (~320m MT). Around 5.6 million MT of soybeans were estimated to be segregated along the food chain and certified non-GM in 2016 (~2 percent of total production, ~10 percent of estimated non-GM production).

**Compared to 2012, the EU non-GM soy market has been growing at 10 percent per year according to available market estimates.** In 2015, JRC estimated that the total non-GM soymeal equivalent consumption IP certified was at 2.7 million MT in 2012, roughly 10 percent of the total market with an approximate market value of 1.5 billion euros, at EUR 550 per MT (Tillie & Rodríguez-Cerezo, 2015). The largest EU importers of non-GM IP soybean were the Netherlands and Germany, accounting for 57 percent of EU imports of non-GM soybean products (Table 3), while the largest consumers were Germany, Hungary, and France, which accounted for ~60 percent of the total production of soy feed (Table 4)<sup>50</sup> (Tillie & Rodríguez-Cerezo, 2015). Non-GM animal feed represented roughly 12 percent (15 million MT) of the total animal feed produced in the EU (130 million MT). As Table 5 shows, poultry had the highest share of non-GM animal feed produced (21 percent), followed by beef (9 percent) and pork (5 percent).

**Table 3. Extra-EU imports of non-GM IP soybean in 14 EU countries, 2012.**

Country	Imports (thousands of MT)
Netherlands	1,003
Germany	539
France	294
Denmark	252
Sweden	219
Belgium	109
Italy	105
Spain	78
United Kingdom	71
Ireland	26
Hungary	12
Others	1
<b>Total</b>	<b>2,709</b>

(Source: JRC, 2012)

**Table 4. Non-GM animal feed production by top EU countries, 2012.**

Country	Imports (thousands of MT)
Germany	3,586

<sup>48</sup> As the report notes, this figure includes hard and soft IP segregated soya (in soymeal equivalent terms).

<sup>49</sup> While an EU Joint Research Center Science and Policy publication (Tillie & Rodríguez-Cerezo, 2015) stated that “no official statistics exist about the size of the EU markets for non-GM IP soybean and derived products, a market that is highly variable across country and product destination”, there are several estimates of overall consumption.

<sup>50</sup> These estimates were calculated based on import statistics of non-GM feed and animal feed production data, as the animal feed production generally occurs near its consumption place.

Hungary	3,550
France	2,124
United Kingdom	1,839
Sweden	1,716
Italy	1,412
Austria	708
Poland	267
Ireland	192
Denmark	155
<b>Total</b>	<b>15,549</b>

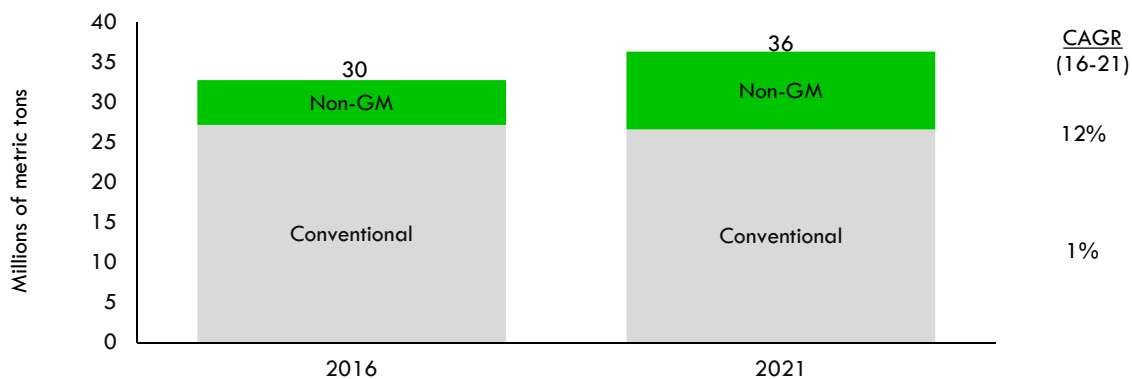
(Source: JRC, 2012)

**Table 5. Total production of non-GM certified IP feed by industry, 2012.**

Industry	Total feed (kMT)	Non-GM feed (kMT)	Non-GM feed share (%)
Pork	46,348	2,276	5
Poultry	47,085	9,809	21
Beef	37,464	3,464	9
<b>Total</b>	<b>130,897</b>	<b>15,549</b>	<b>12</b>

(Source: JRC, 2012)

**Figure 9. Soymeal consumption in Europe for 2016 and 2021.**



(Source: own elaboration)

**This study estimates that the non-GM soymeal equivalent consumption will reach roughly 10m MT by 2021, and demand is currently unmet.** Non-GM soymeal equivalent consumption is expected to grow at a pace of ~12 percent per year, compared to the conventional market which is expected to experience a relatively low growth at 1 percent per year (Figure 9)<sup>51</sup>. According to consultations with industry leaders, there are positive expectations for the GM-free

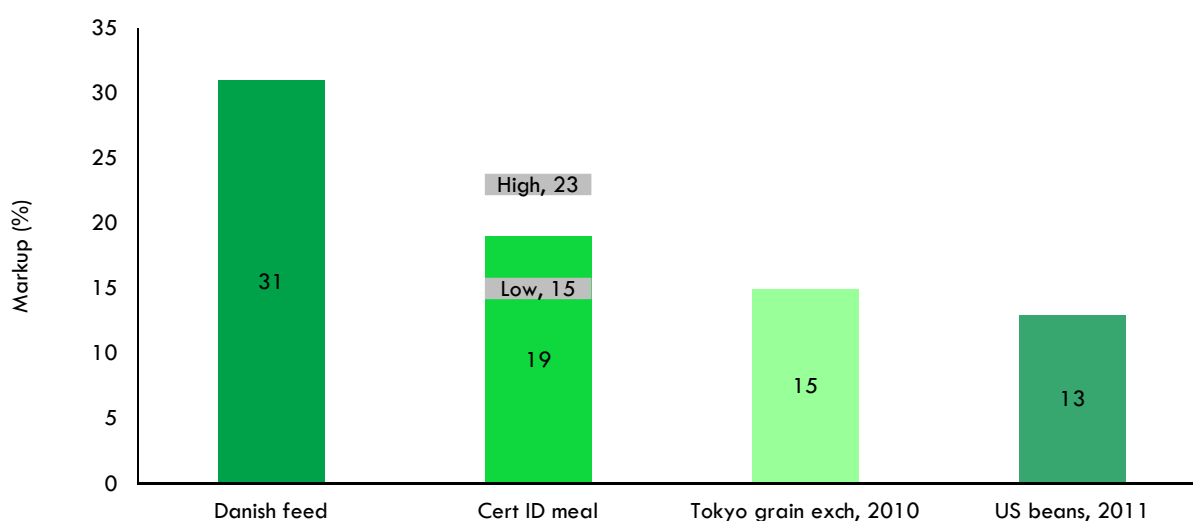
<sup>51</sup> These estimates are based on data from ProTerra, FiBL, the Economist Intelligence Unit and other available resources.

IP market due to production shortages in Brazil and a growing demand. In fact, “for Germany alone the demand is at about 4m MT. If one considers the countries in Europe that have non-GMO programs, this amount can easily double.”

**The major producers of non-GM soy in 2015-2016 were estimated to be China (15m MT), Brazil (11m MT), India and the US (8-9m MT each).** (CERT-ID, ProTerra Foundation, Danube Soya, 2015)<sup>52</sup> Data from FiBL show that global organic soy (which has more stringent requirements than non-GMO soy) production between 2008 and 2016 increased by 25 percent per year but experienced significant variations, while the area harvested steadily increased by a CAGR of 27 percent (with two dips in 2012 and 2013). There was steady growth in production between 2007 and 2011 from ~180k MT to 851k MT, followed by a major drop in 2012 and 2013, with production estimated at ~610k MT, and another increase between 2014 and 2015, when it reached 861k MT.

**The premium price for non-GM IP soybean meal has grown from between 10 and 40 EUR per MT (5 to 15 percent of the markup price) to between 20 to 30 percent.** Since 2012, the markup began to increase due to the imbalance between the Brazilian supply of non-GM IP soybean and the EU demand (Tillie & Rodríguez-Cerezo, 2015). As shown by Figure 10, the latest figures indicate that non-GM soy premium averages between 20 and 31 percent, according to the certifiers and the country where it is traded<sup>53</sup> (Bosselmann, 2014; Tillie & Rodríguez-Cerezo, 2015).

Figure 10. Non-GM soy markup compared to GM soy, 2014.



(Source: University of Copenhagen)

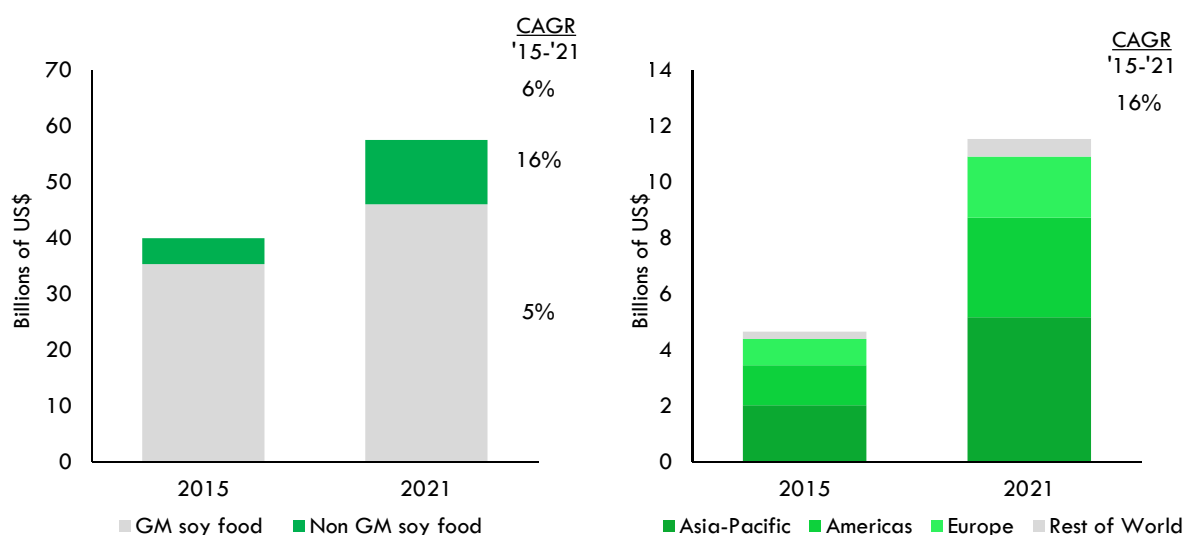
<sup>52</sup> The percentage of illegal GMO soy cultivation in China is unclear.

<sup>53</sup> For example, the same report by Tillie & Rodríguez-Cerezo indicates that the price premium for non-GM soy meal reached about €150/MT in 2015.



**Increasing negative perception of genetically modified organisms for health in China is leading the segment growth in non-GM soy food.** Europe accounts only for ~10 percent of the market and is not expected to grow by 2021 (Figure 11). One of the key drivers of market growth is the health benefits of soy food<sup>54</sup>, and further consumer attention to non-GM food products<sup>55</sup>. Second, soy food has also been used as an alternative to meat and other animal-based products that contain cholesterol and saturated fat, as well as to dairy products. Third, soy flour is widely used in the production of bread, cake, processed food, and infant food. Finally, one of the major driving factors in the Chinese market is the fact that soy milk is a traditional drink. Stringent government regulations continue to pose a major challenge to market growth, but overall the market is expected to witness steady growth during the forecast period. Demand for whole soy food (i.e. edamame, miso, soy beans, soy milk and other soy beverages, soy nuts, soy yogurt, tempeh, and tofu) slightly decreased in the past five years and is projected to decrease from 53 to ~50 percent of the market, while soybean oil and additives (soy-based beverages, such as protein drinks and yogurt shakes, that contain soy protein isolates) are slowly growing. It is estimated that in China, nearly 70 percent of the population consumes soy sauce on a regular basis. New product launches demand for functional food<sup>56</sup> have also facilitated the growth of this market between 2013 and 2015<sup>57</sup>.

Figure 11. Soy food market by GM attribute (left panel) and region (right panel).



(Source: Technavio)

### 2.2.3. KEY INTERVENTION IN THE VALUE CHAIN AND INTERNATIONAL STANDARDS

**Non-GM soy needs to use non-GM seeds and have separated supply chains (Figure 12).** It is necessary to avoid commingling of GM and non-GM soybeans during transportation, storage and processing, particularly in the phase of collectors and elevators (Proterra Foundation, 2016). After harvesting, soybeans are generally processed by a different company. The crushing of soybeans leads to two major products, soymeal (~80 percent of the content), crude

<sup>54</sup> Soy food contains a high protein nutritional value and all nine essential amino acids; and is also rich in fiber and a great source of other nutrients, such as vitamin B and omega-3 fatty acids.

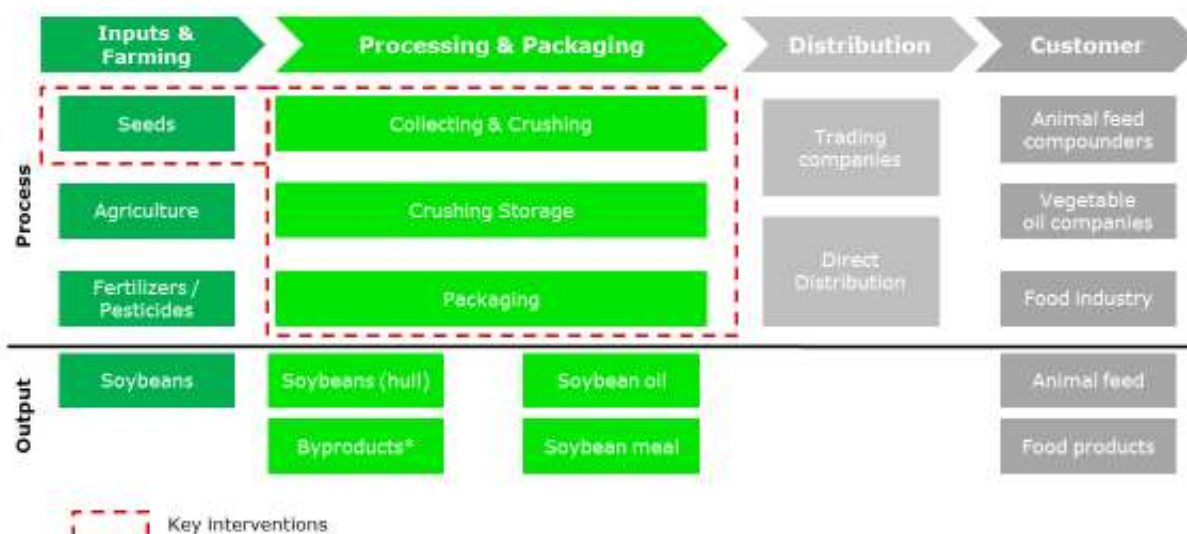
<sup>55</sup> The government of Japan has announced labeling regulations similar to those in Europe for encouraging non-GMO foods. In addition, Thailand and Sri Lanka have declared most of their regions GMO-free and promote the sales of non-GMO food products. In some parts of New Zealand and Australia, GM foods are still grown and sold but only after undergoing safety evaluation by Food Standards Australia New Zealand.

<sup>56</sup> Those products less sweet and contain proteins and other nutrients.

<sup>57</sup> For example, in 2014, Nave S&F launched Sim Yeong Sun Soup Soy Sauce for babies in South Korea, which consists of 43 percent thick soy sauce. In 2015, Khao Khao Shong Nuts launched soy sauce peanuts in Thailand (Technavio, 2015).

soybean oil (~19 percent of content), and other byproducts (including hulls). From the processing of the oil and further processing of crushed and de-hulled soybeans, lecithin and soy protein concentrates are obtained.

Figure 12. Areas of intervention in non-GM soy value chain.



Note: \* The by-products include lecithin, flour, etc.  
(Fuente: Proterra, JRC Policy report)

**Processing and trading companies typically specialize in either GM or non-GM soy to avoid costs and supply of segregation.** Even if self-pollination of soybeans and a high seed purity reduces the cost related to farming both non-gm and GM soy, the IP certification requires procedures to ensure segregation at every stage of the supply chain (Bullock, 2000; Bertheau & Davison, 2011; Koester, 2008)<sup>58</sup>. Such procedures include testing for seed purity, ensuring crop production in fields clean from weeds and volunteers, field isolation to avoid contamination, cleaning and inspection of planting and harvesting equipment, multiple units for production segregation, cleaning and inspection of facilities used for transport, maintaining IP documents for handling and processing facilities, and proper labeling of segregated products (Tillie & Rodríguez-Cerezo, 2015).

**According to DanubeSoy, there are several best practices to follow during pre-farming, farming and post-farming in non-GMO soy production (Table 6).** When preparing the soil, it is important to keep soil acidity neutral (ph values 6-8), measure water intake and temperature as well as build buffer strips to reduce harmful erosion. During farming, it is important to include winter cover and catch crops (i.e. rye, barley and oat) to improve soil protection during winter, as well as use small grain before planting soya. Furthermore, it is important follow best sowing practices and inoculate only seeds to be sown in the near future. Harvesting is still the greatest challenge in the process of soya bean production (Đorđević, Malidža, Vidić, Milovac, & Šeremešić, 2016). Harvest losses can reach up to 30 percent of the biological yield due to inappropriate harvesting. Poorly adjusted harvesters and insufficiently trained operators are the main causes of high harvest losses (considered acceptable up to a level of 5 percent of the biological yield).

<sup>58</sup> Rapid strip tests allowing detection of GM soybeans and certain types of GM corn are already available.

**Table 6. Best practices in soy farming.**

Areas		Best Practices
Pre-	Soil	<ul style="list-style-type: none"> <li>Well aerated, neither acidic nor saline soil (neutral pH, 6-8). Soils rich in humus are recommended</li> <li>Primary husbandry in autumn; In case that the small cereals are the preceding crop, plough into the soil at a depth of 12 cm-15 cm</li> </ul>
	Seedbed preparation	<ul style="list-style-type: none"> <li>More often twice in early spring and just before planting (also used for the weed elimination and application of herbicides and mineral fertilizers). The goal is to have a 5-6 cm thick layer of warm and moist soil</li> </ul>
	Water	<ul style="list-style-type: none"> <li>Between 460mm and 500mm depending on group type. These values may vary <math>\pm 15</math> percent in real conditions</li> </ul>
	Temperature	<ul style="list-style-type: none"> <li>Requirements depend on development stage; best description of soya plant requirements with regard to temperature is the sum of the effective temperatures *</li> <li>From emergence to maturity: from 1000 ° C for very early varieties to 1800 ° C for very late ones</li> </ul>
	Landscape Structure	<ul style="list-style-type: none"> <li>Buffer strips beside fields work as an effective measure to reduce harmful erosion and its impact on the water quality of surrounding streams</li> </ul>
Farming	Rotation	<ul style="list-style-type: none"> <li>Potentially include winter cover and catch crops (mostly cereals such as rye, barley and oat) in order to improve soil protection, nutrients and water resources</li> <li>Generally speaking, small grains are good preceding crops for soya. Maize is a good preceding crop. As a succeeding crop after soya beans, winter cereals like winter wheat are recommendable as they could use the remaining nitrogen in the soil</li> </ul>
	Inoculation & Fertilization	<ul style="list-style-type: none"> <li>Only the seeds to be sown should be inoculated; storing of inoculated seeds is not recommended; inoculants and inoculated seeds should not be exposed to direct sunlight. Chlorinated tap water should be avoided. Optimum temperatures are between 15 ° C and 26 ° C</li> <li>Soya plants need 70-90 kg of nitrogen, 16-27 kg of P<sub>2</sub>O<sub>5</sub> and 36-60 kg of K<sub>2</sub>O for one MT of grain and the corresponding quantity of green biomass</li> </ul>
	Sowing	<ul style="list-style-type: none"> <li>Optimum planting time when the seedbed layer temperature levels off at about 10 to 12 ° C. The sum of effective temperatures for soya emergence is about 100 ° C</li> <li>Optimum plant density differs depending on the variety, the planting time and other local conditions. The optimal row spacing for soybeans is 45-50 cm. The optimum planting depth is ~ 4-5cm</li> </ul>
	Irrigation	<ul style="list-style-type: none"> <li>Emergency and early vegetative development: soil moisture at 50 percent; flowering and seed filling: soil moisture at 60-70 percent; once seed filling is over, two or three irrigation cycles in most cases</li> </ul>
	Record keeping	<ul style="list-style-type: none"> <li>Regular scouting and visiting parcels once per week</li> </ul>
AR	Harvesting	<ul style="list-style-type: none"> <li>Harvesting should start when seed moisture drops to 13-14 percent. A combine harvester that is well adjusted is essential, and needs to be adjusted to parcel and crop conditions, with appropriate changes made to the harvester speed, airflow, drum revolution and sieves</li> </ul>
	Drying	<ul style="list-style-type: none"> <li>The optimum seed moisture for soya beans is 13-14 percent. If drying is necessary, temperature should be 55 ° C -60 ° C and for 30 minutes maximum</li> </ul>
	Storage	<ul style="list-style-type: none"> <li>Storage temperature should be kept at 1-4 ° C in the winter period and 4-15 ° C during summer to reduce mold and insect activity</li> </ul>

Note: \* sum of average daily temperatures above 10 ° C

(Fuente: DanubeSoya 2014, GIZ)

**In the EU, despite strict procedures on GMO detection, traceability and labeling, there are 15 accepted varieties of GM soy** (Bertheau & Davison, 2011; European Commission, 2017). The European Food Safety Authority (EFSA) deals with GMOs, along with any other food on the EU market. GMO dossiers can be notified to the European Commission (EC) either under the 2001/18 directive or the (EC) regulation 1829/2003 (Bertheau & Davison, 2011). Once a positive EFSA assessment has been obtained, and once validated GMO detection methods and control sample and reference materials are available, the application is then sent to the European Commission. Relying on the EFSA opinion, national advisory agencies and committees, the EC drafts a proposal for granting or refusing the authorization, which it submits to the Section on GM Food and Feed of the Standing Committee on the Food Chain and Animal Health. If this

Standing Committee accepts the proposal, it is adopted by the EC. Otherwise, it is passed on to the Council of Ministers which has a time limit of 3 months to reach a qualified majority for, or against, the proposal. In the absence of such a decision, the EC adopts the proposal. Over the last years, all GMO approvals in the EU were accepted on that scheme basis with approvals for a renewable 10-year period (Bertheau & Davison, 2011). Currently, none of the GM soy varieties are approved for cultivation, while they can be imported as beans or meal.

**While GMOs labelling is harmonized at the EU level, Members States have approved different regulations on positive non-GM labelling.** These requirements do not apply to foods containing authorized GM material at <0.9 percent, if this presence is adventitious or technically unavoidable (ICF GHK, 2013). There is also no European obligation of labeling animals, or their derived products, reared on GM (Bertheau & Davison, 2011). However, the possibility of labelling animal and derived products not reared on GMOs has been introduced in Germany, Austria, France, Italy, the Netherlands, Slovenia, and the United Kingdom (The Library of Congress, 2017; VLOG - Verband Lebensmittel ohne Gentechni, 2017; ICF GHK, 2013; Brody, 2012; Inf'OGM, 2017; The Library of Congress, 2017). While there are more stringent, private operator-led schemes<sup>59</sup>, the following are key regulations in EU Member States (ICF GHK, 2013, p. 18):

- In Germany, the “No Genetic Engineering” (Ohne Gentechnik) has a threshold of 0.1 percent, including feed in case of livestock<sup>60</sup>, and the certifier is a German NGO, VLOG (The Library of Congress, 2017; VLOG - Verband Lebensmittel ohne Gentechni, 2017).
- In 2012, France introduced new rules for GMO-free labeling allowing the “GMO-free” label to be placed on the front of a product’s packaging when the GMO-free ingredient makes up 95 percent of the product, otherwise the label can only be placed in the ingredients list at the back of the packaging, and must be written in the same size, color and font as the ingredients list. (The Library of Congress, 2017; Inf'OGM, 2017; Brody, 2012).
- In Finland, the Netherlands and Switzerland, all animals must be fed on non-GM feed from birth (ICF GHK, 2013, p. xix)
- The minimum non-GM feeding time for dairy animals in Austria is two weeks before milk production, three months in Germany, and six months in France. For poultry, both Austria and France require non-GM feed from three days from birth (ICF GHK, 2013, p. xix).
- In Germany, non-GM feed 10 weeks before slaughter is required. (ICF GHK, 2013, p. xix)
- Pigs must be fed on non-GM feed for approximately 4.5 months before slaughter in France, for four months before slaughter in Germany and for the whole period of fattening in Austria.
- In Austria, France and Germany non-GM feed is required for six weeks before egg production. (ICF GHK, 2013, p. xix)
- Cattle must be fed non-GM feed for 12 months before slaughter in Austria, France and Germany. Additional rules apply in these Member States for small ruminants, horses, and fish.
- In Austria, these minimum feeding times are transitory provisions to 2017, after which all animals must be fed non-GM feed from birth (ICF GHK, 2013, p. xix).

#### Box 2. Re-emergence of Non-GM soy farming in Mato Grosso, Brazil.

##### Context

Mato Grosso is the biggest soy producing state in Brazil, and produced 29.8 million Metric Tons of soybeans in 2016/17 on 9.3 million hectares (22.9 million acres). GM soy was allowed in 2005 and reached over 96 percent of the state acreage as the country became a leading global supplier of GM soy. Since 2012, it has starting to grow non-genetically modified soy beans, in response to the growing market for conventional (non-GMO) soy, particularly in places such as Europe. The current biggest challenge to growth in the sector is a shortage of appropriate seeds.

##### Re-emergence of Non-GM soybean farming

<sup>59</sup> For example, Carrefour, and Loué Poultry in France, COOP Italia and UNI Working Group in Italy, Heumilch in Austria and Institute for Inspection and Certification, University of Maribor in Slovenia.

<sup>60</sup> The label also requires No vitamins, aromas, enzymes and other food additives manufactured with the help of GMOs.

A movement to replace genetically modified soybeans with conventional, non-GM seeds has gaining traction in Brazil's largest soy- producing state as farmers anticipate growing demand from Asia and Europe. The Soybean and Corn Producers Association of Mato Grosso (Aprosoja) estimated that 10 percent of the 2016 soybeans production was GM-free varieties, and IMEA, an agricultural research agency, estimated that increased to 13.6 percent in 2017. This change has been supported by three Brazilian companies (Amaggi SA, Imcopa International SA, and Caramuru Alimentos SA) that cater their products to the European and Chinese market, and are willing to pay a premium for non-GM soy (at ~US\$64/MT, or 12 Brazilian Real per bag of 60kg).

The government agricultural research agency, Embrapa, said that doubts related to the impact of GM food on human health is one driver behind demand for conventional raw materials. Soy demand from China, a major factor in Brazil's agricultural expansion, remains strong, and a Chinese consumer backlash against GM crops is beginning to dent demand for soy oil, its main cooking oil. China, which does not grow GM soy, needs 11 million metric tons of conventional soybeans for food production per year to be imported.

In Mato Grosso, co-existence and non-GM soy farming are facilitated by the location of the state and existence of infrastructure needed to segregate, trace, and test the physical quality of local soybeans. The conventional soybeans that are exported from that part of the state are exported through ports on the Amazon River where the conventional soybeans are kept separate from GMO soybeans. Instead, none of the other major ports in Brazil preserve the identity of conventional soybeans unless they are shipped in containers, thus increasing costs for identity preservation.

#### *Institutional support*

While support from the federal state is unclear, Embrapa has opened a research center in Mato Grosso largely dedicated to the research and development of conventional soybean varieties suited for production in Mato Grosso. According to the local program coordinator, the soybean breeding program includes GM and non-GM germplasm cultivars with genetic resistance to the main diseases affecting soybean production in Brazil, notably the Asian rust, as well as varieties adapted to a second summer crop cycle, i.e. with early life cycle and resistance to higher rust incidence. The availability of non-GM soybean seeds is seen as a strategic issue to provide seeds to farmers not covered by other companies.

Embrapa is regularly assessing the performance of its non-GM cultivars compared to control varieties. Results show that in their majority non-GM cultivars perform very well, across regions and over different cropping seasons. Farmers cultivating Embrapa's non-GM varieties even won regional and national yield contest, reaching more than six metric tons per hectare, about twice the Brazilian average yield for soybean.

(Source: Finlay, 2015; Kieman, 2017; Mano, 2017; Van Wey & Richards, 2014; Garrett, Rueda, & Lambin, 2013; Cattelan, 2012; Maggi Riberio, 2007)

## 2.3. ORGANIC DAIRY

### 2.3.1. CONTEXT: SLOW DEMAND FOR CONVENTIONAL DAIRY

**The outlook for the dairy market is stable, with slowly increasing production and prices after the previous years of declining prices.** Overall milk production for 2017 is at about 607 million MT for the year – up marginally from the 2016, when 596 million MT were produced (United States Department of Agriculture, 2017; United States Department of Agriculture, 2017). For 2017, the global dairy herd was expected to increase by 200,000 heads, although milk prices have risen by 19 percent to an average of €36/100 kg in August 2017 compared to a rolling average of the previous 12 months of ~€33/100 kg (ZuivelNL, 2017; United States Department of Agriculture, 2017). Prices for milk are expected to increase further after 2 seasons of unusually low prices, and prices for other dairy commodities as butter, cheese, and whole milk powder have staged a significant recovery trading at over \$3,000/ton (ZuivelNL, 2017; United States Department of Agriculture, 2017).<sup>61</sup> Milk production is forecast to grow marginally as higher milk yields-per-cow are likely to more than offset lower cow numbers. Most of this additional milk is likely to flow into the production of cheese and whole milk powder while butter and skim milk powder production is expected to decline. The outlook is considerably brighter as Fonterra, which processes approximately 90 percent of milk

<sup>61</sup> In previous years since 2013, lower Chinese import demand<sup>61</sup> and continued production growth in key export markets (Australia, New Zealand, the US) affected international prices of skim and whole milk powder (Organisation for Economic Co-operation and Development; Food and Agriculture Organization of the United Nations, 2016).

produced in New Zealand, has raised its estimated milk payout price (United States Department of Agriculture, 2016; United States Department of Agriculture, 2017).

**Previously good margins combined with the removal of the EU milk quota as of April 2015 promoted growth in total milk production** (Organisation for Economic Co-operation and Development; Food and Agriculture Organization of the United Nations, 2016). EU exports for all major dairy commodities on aggregate are expected to increase by 58.5 percent between the 2013-15 base years and 2025. World milk production is projected to increase by 177m MT (23 percent) by 2025 compared to the base years (2013-15), corresponding to an average grow rate of 1.8 percent per year<sup>62</sup>. The majority of this growth (73 percent) is anticipated to come from developing countries, in particular India and Pakistan. This expansion of production is largely in fresh dairy products, which will grow at 2.9 percent per year in developing countries, and predominantly supply domestic markets. At the world level, production of the main dairy products (butter, cheese, skim milk powder and whole milk powder) is increasing at similar pace to milk production, albeit more slowly than that of fresh dairy products.

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### 2.3.2. MARKET DEMAND OUTLOOK

**Organic dairy shows significantly faster growth than conventional.**<sup>63</sup> Organic dairy was ~5 percent of the overall dairy market and expected to grow to 7.4 percent by 2021 (Figure 13). The total dairy market in 2016 was estimated at ~US\$338 billion and is forecast to reach ~US\$400 billion by 2021 (MarketLine, 2015), growing at ~4 percent per year. While the conventional market exhibits a relatively slow growth of 3 percent per year, organic dairy shows a growth three times faster of 10.4 percent per year globally.<sup>64</sup> This quicker growth is driven by regional dynamics, such as increasing product diversification in the EU (i.e. flavored organic milk drinks), and global trends, such as increasing health awareness and general concerns over the extensive use of additives and preservatives (Technavio, 2016). Organic milk production increased globally at 12 percent per year from 2.5 million MT in 2007 to 6.3 million MT in 2015 (Research Institute of Organic Agriculture (FiBL), International Federation of Organic Agriculture Movements Organics International, 2017).

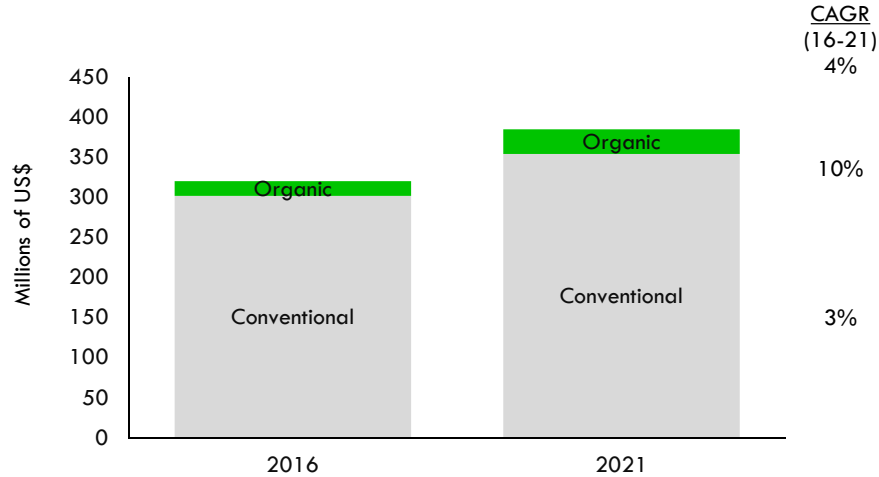
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<sup>62</sup> Although these figures remain below the 2.0 percent per year witnessed in the last decade.

<sup>63</sup> Organic refers to a process in which operations demonstrated that they are protecting natural resources, conserving biodiversity, using only approved substances (including feed) as well as treating animals humanly. For more detailed information, please refer to table 7 and 8.

<sup>64</sup> The conventional dairy market was estimated at ~US\$300 billion in 2016 and expected to reach US\$353 billion by 2021. The organic dairy market was valued at US\$18.6 billion in 2016 and expected to reach US\$30.5 billion in 2021.

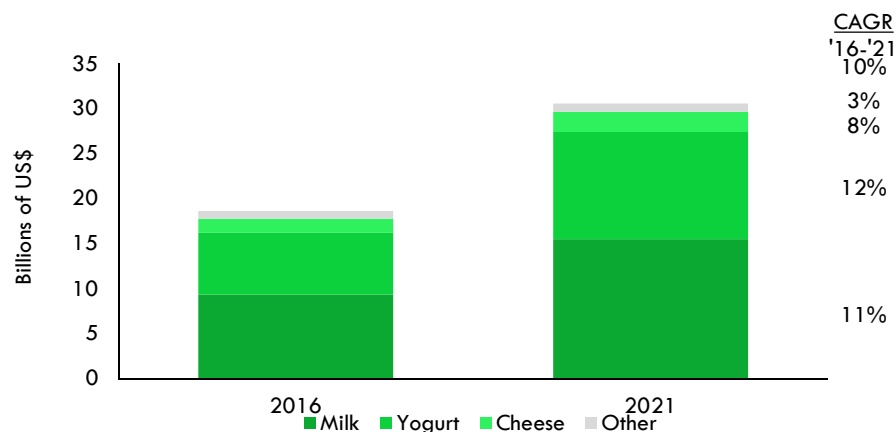
Figure 13. Global milk market by type: organic and conventional, for 2016-2021.



(Source: own elaboration based on MarketLine)

**Milk and yogurt are the largest and fastest growing final products within organic dairy (Figure 14).** The two largest and fastest growing product segments are milk and yogurt, which are expected to grow respectively by ~11 percent per year and ~12 percent per year and increase their share of the total market value of organic dairy from 84 percent in 2014 to 90 percent in 2021. Most organic milk is also consumed as fluid milk, and between 2010 and 2012 annual U.S. Organic milk sales increased by 12 percent in 2010, 13 percent in 2011, and 5 percent in 2012 (United States Department of Agriculture, 2017). In the first half of 2017, organic fluid milk production accounted for ~5 percent total production in the US (United States Department of Agriculture, 2017).

Figure 14. Organic milk market by segment for 2016-2021.

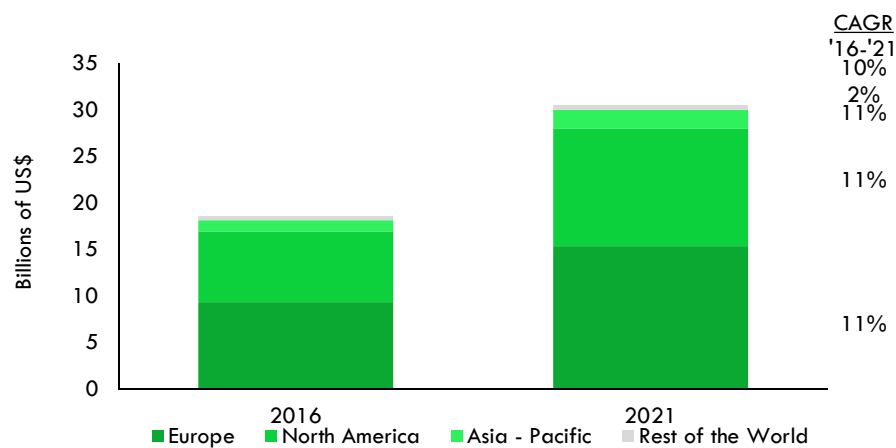


(Source: own elaboration based on MarketLine, Technavio)

**Europe is the largest market and Asia is the fastest growing region for organic dairy products (Figure 15).** Regionally, the US and Europe are the largest markets, accounting together for ~89 percent of the market in 2014 (US\$13.6 billion), and are expected to continue being so by 2021 reaching a total of US\$28 billion (Technavio, 2016). In 2015, Europe was the largest region and accounted for ~50 percent of the market (US\$8.4 billion), while the US

accounted for 40 percent (US\$6.8 billion). Asia Pacific is forecasted to be the fastest growing region between 2014 and 2021, growing at 11 percent per year from an estimated US\$1.1 billion market value in 2016 to US\$2.2 billion in 2021. The largest producer of organic milk is Europe, with ~4.6m MT produced, followed by the United States, which produces roughly 1.6m MT (Research Institute of Organic Agriculture (FiBL), International Federation of Organic Agriculture Movements Organics International, 2017). In Europe, the UK, Germany, France, Denmark and Austria are the largest markets for organic dairy, and together accounted for roughly two thirds of the EU production in 2014 (Technavio, 2016; Organic Milk Supplier Cooperative, 2015). According to a UK organic milk cooperative, Russia, Korea, Mexico, China and India experienced the percentage largest growth between 2007 and 2013 at 20 - 25 percent per year (Organic Milk Supplier Cooperative, 2015).

Figure 15. Global organic milk market by region, 2016-2021.



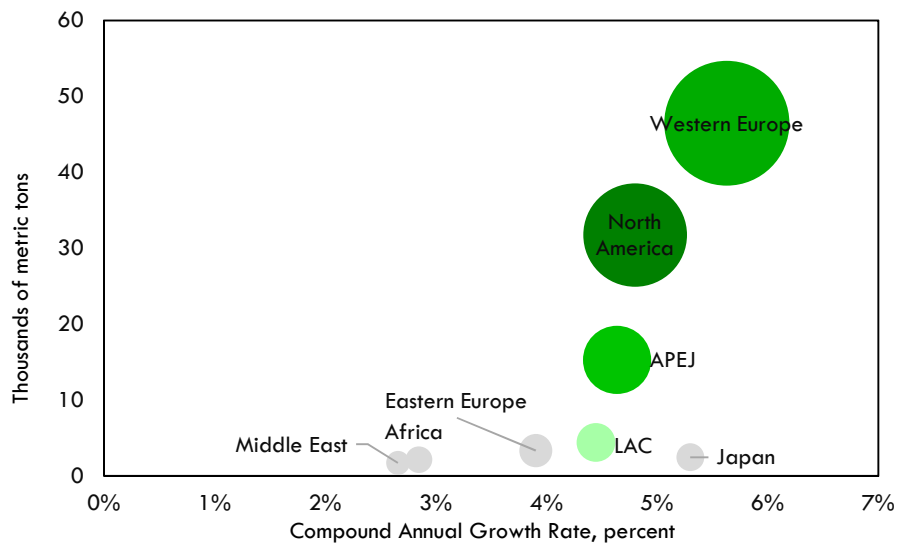
(Source: own elaboration based on MarketLine, Technavio)

**The global organic milk powder market is expected to reach US\$2.2 billion and ~134 thousand MT by 2021,** growing at ~5 percent per year in value and 4.5 percent in volume. In 2016, it accounted for US\$1.7 billion and ~107 thousand MT. As Figure 16 shows<sup>65</sup>, market attractiveness is ranked highest for Europe and the US. The largest markets in 2016 were Western Europe and North America, which respectively accounted for ~US\$738 million (43 percent) and US\$528 million (~30 percent). The fastest growing markets are expected to be Western Europe, Japan and the US, which are forecast to grow in value between 4.9 and 5.7 percent between 2016 and 2021. In terms of product, organic whole milk powder dominated the market in 2016 with ~54 percent of the market followed by skimmed milk powder (~26 percent) and buttermilk and whey (~20 percent). Future growth is expected to continue in the whole milk powder market, driven by an increased use in food and beverages as well as dietary supplements (Future Market Insights, 2017).

Figure 16. Organic milk powder attractiveness by region, 2016-2021.

<sup>65</sup> Volume on the y axis, expected growth in the x axis and future market size as the bubble size.

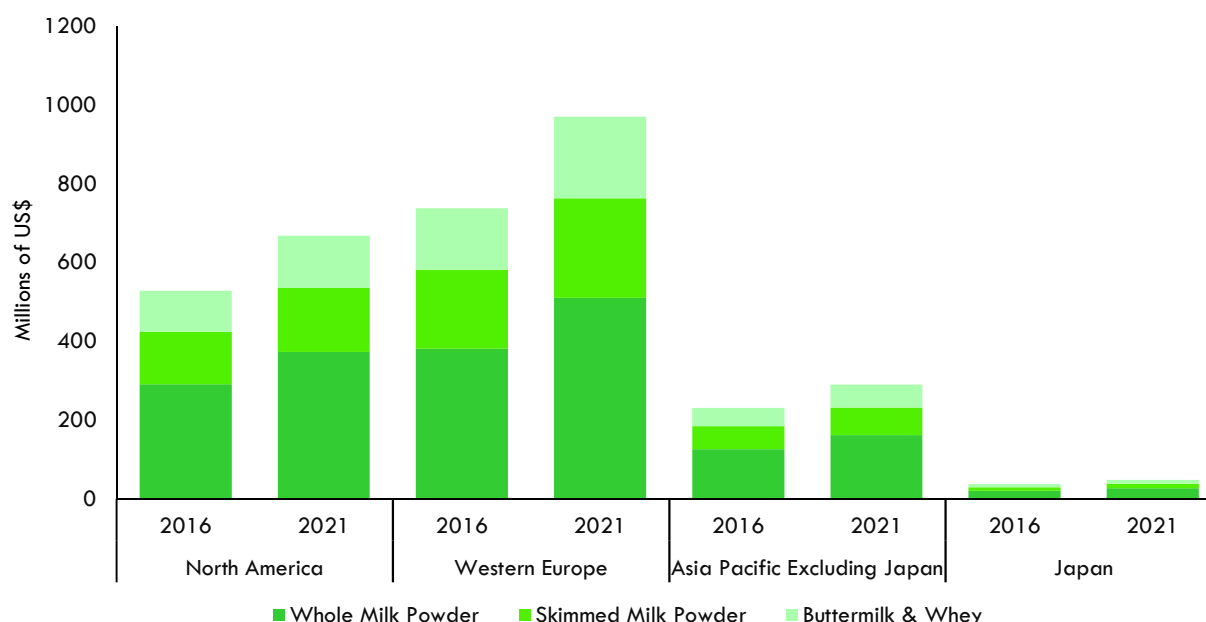




Note: LAC represents Latin America and the Caribbean and APEJ Asia-Pacific excluding Japan.  
(Source: FMI)

**Organic whole milk powder is the largest and fastest growing segment in each region (Figure 17).** In Europe, organic whole milk powder accounted for US\$381 million (~52 percent of the market) in 2016 and expected to grow by 6 percent per year to reach US\$510 million in 2021. Similarly, in the North America region, organic whole milk powder accounted for US\$290 million (55 percent of the market) in 2016 and is expected to reach US\$373 million by 2021 growing at 5.3 percent per year. In Asia and the Pacific, organic whole milk powder also accounted for ~55 percent of the market and US\$125 million, and is expected to reach US\$161 million by 2021 growing at 5.2 percent per year.

Figure 17. Organic milk powder market by region and segment, 2016-2021.



(Source: FMI)

**Growth in organic milk powder is expected to be driven by increasing prices rather than volumes.** Across all regions, growth in market value is forecast to grow by ~0.4 - 0.6 percent higher than growth in volume per year. This is particularly evident for Western Europe, where value is expected to increase at ~1 percent per year faster than volume. This increase in value is driven by growth in prices, moving on average from US\$15.9 thousand per MT to US\$16.4 thousand per MT (about 5 times those of conventional milk powder).

**Conversely, the conventional milk powder market has experienced fluctuations since 2013 and offers much lower markups.** The milk powder market has been experiencing stagnating demand between 2014 and 2016 due to weak import demand and excess supply, which eventually led to increased Chinese and EU stock. The end of 2016 represented the first period since 2014 where production of both skim and whole milk powder has significant grown, driven by strong demand in other Asian countries (Malaysia, Thailand, Philippines and Vietnam), and prices recovered to US\$3,114 per MT for whole milk powder, while still at US\$1,820 per MT for skimmed milk powder (United States Department of Agriculture, 2016; Global Dairy Trade, 2017; CLAL, 2017; United States Department of Agriculture, 2017).

**Demand in Latin America for organic dairy products is small, and local production is destined to exports.** Despite recent pledges to strengthen domestic organic markets in Latin America<sup>66</sup>, the overall market for organic dairy is small, at less than 4 percent of the global market (Guédez, 2016; Technavio, 2016; Technavio, 2015; Organic Milk Suppliers Cooperative, 2017). Regional demand in Latin America for organic milk powder is estimated at US\$75 million and expected to reach US\$93 million by 2021, growing at 4.4 percent per year. Brazil is the largest market accounting for ~57 percent of the regional demand in 2016 and projected to reach ~60 percent by 2021, growing at 5 percent per year. Whole milk powder is expected to remain the most demanded organic milk powder, with a ~50 percent market share (US\$36.6 million in 2016, estimated at US\$48.4 million in 2021, growing at 5.3 percent per year). About

<sup>66</sup> In august 2016, at the eighth assembly of the Inter-American Commission of Organic Agriculture (CIAO), it was agreed that the strengthening of the domestic markets is key for Latin American producers to be able to satisfy consumers' growing demands for this type of produce.

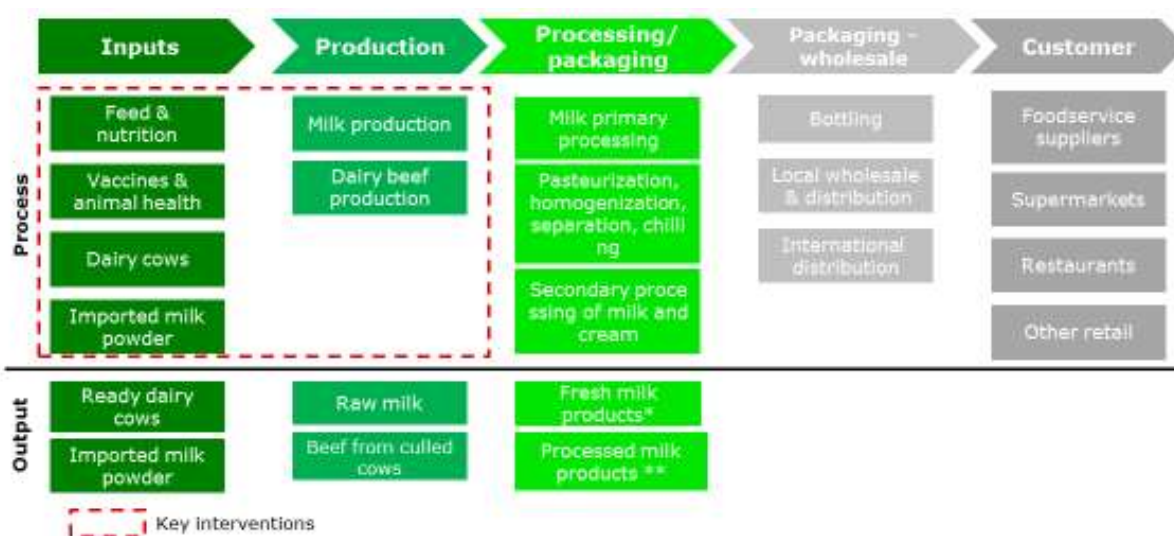
half of the organic milk powder is used in the production of other items as half of its market is in business to business sales. The food segment, particularly dairy products) is expected to remain dominant, with ~70 percent market share (Future Market Insights, 2017).<sup>67</sup>

**Recognition of nutritional value, product diversification, and environmental concerns amongst consumers are driving growth in organic dairy (O'Hara & Parsons, 2012).** Confined animal feeding operations are known to cause increased incidence of antibiotic-resistant bacteria, animal-welfare ethical issues, massive accumulations of manure, and reduced property values in neighboring communities; all practices not allowed under the organic label. Wellbeing, health, and rise of disposable incomes are the main drivers of growth for organic dairy in China, South Korea and Japan. Instead, in the EU diversification of product offerings and subsidies are driving the market, particularly in the UK, France and Germany. In the US, the health-conscious movement that has supported continuous growth in sustainable beef is the main driver also for organic dairy (Technavio, 2016).

### 2.3.3. KEY INTERVENTION IN THE VALUE CHAIN AND INTERNATIONAL STANDARDS

**The dairy value chain closely resembles the beef value chain.** The organic value chain is highly regulated in the US and EU and many regulations overlap for beef and dairy. Furthermore, one of the outputs of the beef value chain is beef from culled dairy cows. Specific interventions for dairy cows focus on inputs, from feed to vaccines and use of organic imported inputs (Figure 18). The standards for labelling and production of organic milk are discussed below.

Figure 18. Key interventions in organic dairy value chain in the US and EU.



Note: \* Fresh dairy products include: fresh milk, yogurt, fresh cheese. \*\* Processed dairy products include: aged cheese, UHT milk, ice cream, baby food, packaged milk beverages, lactose, casein, etc.

(Source: World Bank, Research Gate, Center on Globalization, USDA Organic)

**Organic dairy farms are usually smaller and produce ~40 percent less milk per cow than conventional methods.** In 2011, there were ~1,800 dairy farms in the United States, accounting for ~200,000 dairy cows and with an average herd size of 110 cows per farm, ranging from 51 cows per dairy farm in Pennsylvania to 3,278 cows per dairy farm in Texas (O'Hara & Parsons, 2012). An average organic dairy farm in Vermont would have 63 dairy cows, each producing ~6,000 kg of milk per year<sup>68</sup>. As a comparison, an average conventional dairy farm in New England

<sup>67</sup> As opposed to organic milk powder uses in beverages, dietary supplements and cosmetics & personal care. Other food uses of milk powder are in bakery and confectionery.

<sup>68</sup> In 2011, 70 percent of organic dairies were located in the Northeast and upper Midwest because converting to organic was easier for dairy farms in which cows were already on pasture-based diets (O'Hara & Parsons, 2012).

was estimated to have 287 cows, each producing about ~9,800 kg of milk per year. Another study by the university of New Zealand also confirmed this finding for organic dairy farming in the EU, stating that “milk yields per cow are lower (9-30 percent) and stocking rates are also 20-40 percent lower due to lower yields in forage production.” However, a study financed by the UK Ministry of Agriculture, Fisheries and Food found that average milk yields per cow for all commercial farms were similar to pre-conversion figures once conversion to organic was achieved, while feed concentrate was reduced by 15 percent without a change in the milk fat and protein content (Hagggar & Padel, 1996).<sup>69</sup> An all-the-year-round calving pattern was essential for many of the farms as the organic premium was dependent on regular supplies of milk of consistent quality. To achieve this calving pattern, some farmers crossed Holstein-Friesian cows with breeds having genetically higher milk quality.

**Yet, organic dairy farming offers higher margins due to a price premium on organic milk and lower feed costs once conversion is achieved, provided forage is produced on farm.**<sup>70</sup> In the US North East, O’Hara and Parsons (2012) found that, on average, while Vermont’s organic dairy farms had similar total revenues to conventional dairies, organic farms had higher net margins on a per-cow basis (~685 percent) and higher net earnings (~130 percent)<sup>71</sup>. Comparing Vermont with Minnesota, the authors also found that large conventional dairies were more profitable than organic farms by ~163 percent, driven by significantly higher non-milk sources of revenue (i.e. crop sales). Shadbolt, Kelly and Holmes (2005) also found that economic performance was better on organic farms, although absolute revenues were lower. Examining conversion to organic dairying in California, where farmers rely on mostly purchased feeds and grow little of their own, the authors found that organic farms’ net farm income was 84 percent of their conventional peers on a per-unit of milk basis, despite a higher price for their milk (21 percent net of marketing costs). The same study also reported results from a study done in Italy in 2001 where it was found that organic farms performed better than conventional farms on most environmental indicators as well as financially. However, the length of time required to achieve organic certifications could be a deterrent to those considering converting (Shadbolt, Kelly, & Holmes, 2005)<sup>72</sup>. The study from Hagggar and Pattel (1996) also found that, after conversion, organic farms achieved better financial results as they tapped into organic price premiums coupled with reductions in concentrate (typically 35 percent) and fertilizer use for forage production (typically 50 percent or more).

**As for sustainable beef, the value chain tends to be fragmented.** As it is the case for grass-fed beef, in the United States production and processing of organic dairy are generally not integrated. In 2011, only 40 percent of organic dairy farms had milking parlors (O’Hara & Parsons, 2012; Barham, Brock, & Foltz, 2006). Horizon Organic, a leader in organic dairy, contracted for 93 percent of its milk from other dairies, with the remaining sold from two dairies that it owns and operates.<sup>73</sup> Farmers typically lock in a one to two-year contract with a higher base pay price, or an annually determined price set by the farmer’s cooperative (Dyck, et al., 2009). Generally, after the cows are milked, the dairies send the milk to a processor, either directly, through a cooperative or handlers (O’Hara & Parsons, 2012).<sup>74</sup> Contrary to conventional milk, organic milk is not typically pooled when picked up from the farm and is kept separated during transportation and initial processing (Dyck, et al., 2009).<sup>75</sup> Processors then sell the dairy product to

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<sup>69</sup> During the three-year conversion period, milk production fell because of reduced forage productivity.

<sup>70</sup> Feed costs are typically the largest expense for dairies. Organic dairies spent less on feed than do conventional dairies: Organic dairies spent ~50 percent less in Minnesota and 17 percent less in Vermont than conventional dairies (O’Hara & Parsons, 2012). Most organic dairies report that 50 percent of dairy forage or more comes from pasture, which costs less than higher energy feed sources (McBride, Greene, & Catherine, 2009)

<sup>71</sup> The difference between net margins and net earnings derives from the authors’ efforts to account for the cost of labor/wage of farm operators’ other family members who work on the dairy, who typically do not pay themselves an hourly wage.

<sup>72</sup> During conversion a farm must abide to increasing organic farming practices without being able to sell its products as such.

<sup>73</sup> WhiteWave Foods, a subsidiary of Dean Foods, owns both Horizon Organic and Organic Cow brands and is the largest processor and distributor of organic and conventional milk and other dairy products in the United States. WhiteWaveFoods has approximately a 40 percent share of the organic dairy market.

<sup>74</sup> Handlers are middle-market agents that manage the collection and transportation of organic milk and act as wholesalers/distributors between producers and processor (i.e. Dairy Marketing Services).

<sup>75</sup> Under US Federal and State milk marketing orders, a milk pool is a financial pooling system used by dairy farmers to ensure that all dairy producers receive similar per-gallon payments for their product at or above a legally regulated minimum. Farmers producing milk “of equal quality and composition” will receive the same amount of per-gallon payment regardless of how their product is utilized.

companies that have brands in the market place, retail institutions such as grocery stores, where it is ultimately purchased by consumers, food services and restaurants or to other businesses for further processing, such as infant formula (O'Hara & Parsons, 2012; Dyck, et al., 2009) Packaging and bottling is typically integrated with processing.

**US and EU tightly regulate organic dairy production (Table 7).** The regulated areas cover from conversion of conventional to organic farms, feed, manure management, animal housing, animal health, animal breeding and marketing. There are minimum regulations on land conversion times (two or three years), quantity and quality of organic feed, including the minimum number of days the animals need to spend on pasture, the minimum size of housing and the maximum period in which an animal is allowed to be confined. In addition, the EU and the US do not allow the use of antibiotics nor growth hormones, and require calves to be reared on organic milk.<sup>76</sup> The US has stricter rules regarding continuous organic management and herd replacement than the EU (where replacement of animals from conventional herds are allowed up to 10 percent), while the EU is more specific about the manure management (maximum 170 KGN/ha/year of nitrogen applied on the farm). In both the EU and US, organic milk is certified by accredited agencies, which need to also register processing operators.

**Table 7. Organic regulations for dairy and beef industries in the US and EU.**

Area	United States	European Union
Conversion	3-year minimum for land conversion; 1-year transition time for existing stock under continuous organic standards 100 percent organic feed, that can include own forage certifiable by 3rd transition year	2-year time minimum for land conversion Existing stock can be kept, but not sold as organic; milk can be sold as organic Bovine spongiform encephalopathy (BSE) cases and progeny must be removed
Feed	100 percent organic feed, certification needed for purchased feed. Additives and supplements (USDA approved) need to be approved by certifier Provision of pasture for no less than 120 days/year, average 30 percent of daily intake Required pasture plan	All feedstuff must be certified. 60 percent of feed should be from farm, 60 percent of diet should be from forage All protein concentrates must be organic 100 percent No mineral supplementation
Manure	Manure must be managed in a manner that does not contribute to contamination of crops, soil or water, by plant nutrients, heavy metals, or pathogenic organisms and optimizes the recycling of nutrients.	Maximum 170 KGN/ha/year of nitrogen applied on the farm
Animal housing	No continuous total confinement over 6 months Confinement prohibited if prevents animals from lying down, standing up, fully extending its limbs and moving about freely	Minimum of 6m <sup>2</sup> per animal (down to 1-1.75m <sup>2</sup> / 100kg for young stock) Slats can be no more than half of the floor area
Animal health	No hormones or antibiotics in absence of illness. In case of antibiotics use, record-keeping, segregation & sale of animal, and consultation with certifier. Use of parasiticides is allowed only in health care emergencies or high levels of infestation. 90 days withholding period for lactation.	Antibiotics and veterinary medicines only used to prevent distress in the event of illness or injury. Withdrawal period at least twice the stated withdrawal period and minimum of 48hrs
Animal breeding	Calves must be fed organic milk and organic feed. The use of conventional milk replacer and medicated grain is prohibited No breeding hormones	10 percent maximum replenishment rate from conventional herds. No sale of organic stock through marts but for rare breeds Minimum weaning age at 12 weeks, during which whole organic milk forms 51 percent of overall ration
Marketing	Organic meat must be from an animal that was under continuous organic management from at least the last third of gestation Organic label must include handler and certifier information Segregation required for operations that choose to produce organic and non-organic livestock products.	Processing outlet needs to be registered to access premium prices

<sup>76</sup> There are slight differences in how the US and the EU regulate the use of antibiotics. The US takes a stricter approach and requires isolation, segregation and sale of the animal. The EU requires longer withdrawal periods after use of antibiotics and before milking.

(Source: Northeast Organic Farming Association of Vermont, (2011); The Council of the European Union, (2007); UK Department of Agriculture, Environment and Rural Affairs, (2017))

**Other best practices go further than regulations.** Table 8 summarizes current best practices for soil, manure and pasture management, as well as crops, nutrition and herd health, breeding and record keeping. Soil management is fundamental in producing high-quality pasture and crops for a healthy and productive herd. Manure is a major source of soil fertility input, manure must be managed to avoid nutrient losses (urine loss, leaching, volatilization, and runoff). Pasture management is essential in achieving good levels of matter intake and dairy production. Crops can be farmed on farm for feed purposes (if dairy cows are not 100 percent grass-fed) to avoid having to buy expensive organic feed. Herd health needs to focus on preventive practices, particularly on good nutrition, reducing stress, calf management and housing. Reproduction should be planned to keep milk production at high level, and possibly use artificial insemination. Proper record keeping is essential in documenting compliance with organic standards. (Dyck, et al., 2009).

**Table 8. Best practices in organic dairy farming.**

Area	Best Practices
Soil Management	<p><b>Focus on overall soil health and quality</b>, including maintaining soil organic matter, keeping the ground covered in pastures and cropland, include a diversity of plants</p> <p><b>Assess soil health</b>, including identify and map the soil types that occur on the farm, testing and monitoring soil biological and physical health and fertility</p> <p><b>Supply nitrogen through biological N fixation by planting forage legumes.</b> Forage legumes provide protein-rich pastures and hay crops, which when fed to cows, produce N-rich manure. In crop fields, legume-based hay crops can contribute to the Nitrogen requirements of heavy feeders like corn and sorghum, and are an excellent source of organic matter</p>
Manure Management	<p><b>Manure should not be applied to frozen ground.</b> It is also important to determine its application rate based on: (i) the nutrient content of the manure, (ii) previous manure applications to the field (manure will continue to release nutrients over several years), (iii) the soil test results of the field to which it will be applied, and (iv) the nutrient requirements of the crop.</p> <p><b>Comply with strict National Organic Program (NOP) regulation §205.203</b> if manure is going to be applied to crops that will be consumed by humans.</p>
Pasture Management	<p><b>Use management-intensive Grazing (MIG)<sup>77</sup> with high stock density, short periods of stay in smaller paddock, and extended periods for plant regrowth.</b> MIG will favor the pasture plant species you want, reduce weed problems, and increase the quantity of pasture dry matter produced while improving the nutritional quality of the feed. A timely MIG also helps achieve good fertilization by having uniformly distributed cow pies from the most recent grazing. Do not follow a set rotation, but graze according to plant growth rates.</p> <p><b>Develop a model to estimate the number and sizes of the paddocks</b>, based on the number of animals, the feed provided in the barn, the feed in the pasture, and the time pastures need to regrow after each grazing.</p> <p><b>Paddock management techniques.</b> Do not let animals stay in one area for more than three days; 12–24 hours is better. Do not let animals return to a paddock until it has fully regrown (recovery periods will be variable). Lock animals in each paddock so they cannot wander back to the barn</p> <p><b>Improve pasture productivity by using smaller paddocks and moving the herd more often.</b> Pasture height should be at a minimum 8in and, ideally, between 12-14 to improve productivity and soil organic matter.<sup>78</sup></p> <p><b>Consider setting aside “shade pastures” for hottest days in summer.</b> Alternatively, consider grazing at night, moving cows more frequently to high-quality pasture, and using sprinklers or portable shade structures</p> <p><b>Provide high-quality forage for the herd</b> by maintaining forage legumes at 50–70 percent of the sward.</p> <p><b>Adjust grain and other supplemental feed in the barn to lower protein mix as soon as cows graze daily in the spring.</b> If the protein content of the supplemental feed is not reduced, cows will lose condition and drop in milk production. If this imbalance continues, it may result in lower fertility and other health problems</p> <p><b>Carefully consider zero grain feeding.</b> Moving toward zero-grain feeding requires beginning by rearing young stock and selecting suitable breeds or bloodlines that thrive on an all-forage diet.</p> <p><b>Avoid grazing pastures under wet condition because of compaction risk<sup>79</sup>.</b> During rainy periods, graze cows only on well-drained pastures. Allowing livestock access to the pastures during the nongrowing season can also cause damage, particularly during wet or freeze/thaw conditions.</p>

<sup>77</sup> Management-intensive Grazing (MIG) refers to several grazing systems wherein animals are allowed to graze only a small portion of the pasture (an individual paddock) while other paddocks are rested and allowed to recover.

<sup>78</sup> Because of how cows eat, they will first eat tender young plants and the tops of plants (leaves instead of stems). Using a higher stocking density (smaller paddocks) and moving cows to new pastures more often will result in more predictable pasture nutrient intake.

<sup>79</sup> Soil compaction in pastures decreases the activity of soil organisms, restricts root growth, and decreases water infiltration, thus increasing the potential for runoff and erosion.

	<p><b>Use electric fencing</b> to make MIG grazing management easier. Install a good-quality, low impedance energizer and ground it correctly. It is also helpful to have high-quality perimeter fencing that can conduct electricity with minimal resistance.</p> <p><b>Diversify plants grown.</b> Plant diversity assures that some plants grow even when weather conditions are extreme. Different plants grow differently throughout the growing season</p>
Crops	<p><b>Consider growing organic grain and forage crops on the farm.</b> While pasture is the key crop on organic dairy farms, annual grain and forage crops as well as cover crops can also provide important benefits for some operations.<sup>80</sup></p> <p><b>Assess farm fields</b> to determine its best use under organic management and optimize its productivity. If cropland is not available on the farm, an option is to rent land that is or can be certified organic.</p> <p><b>Develop a sound crop rotation</b> to maintain soil productivity and control weeds, disease, and insect pests. Give cover crops, which have critical roles in managing soil, weeds, and pests, the same careful attention as feed or cash crops.</p> <p><b>Investigate growing requirements of crops</b>, such as the crop's preferred temperature and soil conditions because organic standards do not allow the use of inputs such as seed coatings, synthetic fertilizers, pesticides, and herbicides</p> <p><b>Use only organic seeds.</b> The National Organic Program standards require the use of organically certified seed unless such seed is not commercially available for the crop or variety to be grown (NOP Rule §205.204)</p> <p><b>Identify the right timing of harvest</b> as is especially critical to produce high-quality forage.</p>
Herd health	<p><b>Focus on preventive practices, management, and sanitation</b></p> <p><b>Reducing stress, proper nutrition, considering comfort and welfare, vaccinating, and good husbandry.</b> Prevent overcrowding, provide superior nutrition, and practice good animal husbandry. During the winter housing season, ensure superior ventilation to prevent respiratory diseases. Always provide a fresh supply of good-quality water.</p> <p><b>Providing proper nutrition for calf development and a clean and comfortable environment for calving.</b> Maternity pens or stalls should be separated from other adult housing areas and cleaned out between calvings. Maternity pastures should be large enough so that calving cows have adequate space. Colostrum intake is the single most important step in maintaining neonatal health<sup>81</sup>.</p> <p><b>Calves should be fed milk equivalent to 8–10 percent of body weight per day.</b><sup>82</sup> Good quality calf starter, dry hay, and pasture can be introduced free choice after the first week.</p> <p><b>The most common weaning age is 8 weeks</b>, but if parasites or scours are an issue, milk can be fed longer. Weaning is stressful, so do it gradually when calves are eating enough starter, quality hay, or pasture. Do not wean when calves are adjusting to other stresses.</p> <p><b>Housing</b> for adult cattle varies with climate, finances, and farmer preference. Discomfort, dirty conditions, and poor ventilation will stress the immune system, and cows will be more susceptible to disease. All adult cattle must have daily outdoor access and exercise unless severe weather conditions exist.</p> <p><b>Ensure good ventilation. Good air exchange is essential.</b> Fresh air should enter the barn and move warmer, contaminated air out.</p> <p><b>Dry pasture that is free of small stones is the ideal flooring</b> for cow health and lameness prevention. Avoid slick concrete flooring so cows do not slip and can feel secure enough to express natural heats<sup>83</sup>.</p> <p><b>Properly designed stalls should allow cows to have the freedom to lunge and move forward and side to side while rising and lying down.</b><sup>84</sup> Cows prefer to spend much of their day lying down (12–14 hours). Stalls should not be so wide that cows lie improperly and cleanliness is an issue</p> <p><b>Proper bedding is essential for cow comfort and cleanliness</b> and falls into two categories (organic and inorganic). If the bedding is a material the cow might possibly consume, it must be certified organic. Inorganic bedding can present disease management issues.</p> <p><b>Vaccinations are allowed and should be used where indicated.</b></p> <p>When animal welfare is in jeopardy, necessary medical treatment is mandatory, even if it uses prohibited substances and you must remove the animal from your herd.</p>
Reproduction	<p><b>Breed cows back in a timely manner so that daily milk production remains high</b> and a steady supply of new heifers is available for replacements or sale. Organic dairies cannot use artificial hormones for breeding or to treat reproductive problems.</p> <p><b>Consider use of artificial insemination.</b> Although frozen semen contains small amounts of antibiotics, it is allowed on organic dairies for safety reasons and to improve genetics by breeding for selected traits.</p>
	<p><b>Use farm maps that provide a picture of the farm for the inspector</b>, including individual fields with either a number or letter that corresponds to the number or letter used on the application forms; use of adjoining lands, whether owned by the certified farm or another individual; buffer zones between organic and nonorganic land; armstead, including location of barns, paddock areas, manure storage areas, water supplies, and feed storage areas</p> <p><b>Include all fields that need to be certified in the application.</b> An audit trail is a chronological sequence of records that tracks all products used on the farm from their origins to their points of sale.</p> <p><b>Keep input records and records for off-farm inputs.</b> Input records document that everything brought onto the farm for use in the organic operation is certified organic or approved for use. Purchasing off-farm inputs requires many records to verify their organic status.</p>

<sup>80</sup> Purchased certified organic feed is expensive and often hard to source, and 100 percent of the feed used for the herd must be organically grown.

<sup>81</sup> Colostrum is the milk produced during the few days prior to and after calving. Calves should receive two to four quarts (depending on breed and size) of good quality colostrum within the first hour of life and again 12 hours later.

<sup>82</sup> For example, an 80-lb. calf should receive 6–8 lb. of milk or about a gallon a day, divided into 2–3 feedings.

<sup>83</sup> Standing on hard concrete all day can cause hoof damage and can strain the cows' feet and legs. Cows sometimes do spend the majority of the day indoors, for example during harsh winters. Concrete floors can be grooved to provide better traction.

<sup>84</sup> Blood flow through the udder increases by 30 percent when cows are resting, thereby increasing milk production. Time spent lying in stalls also increases rumination and rests the cows' feet and legs.

Record Keeping	<p><b>Maintain harvest records for all certified and noncertified crops.</b> All of these records must identify field numbers, letters, or names that match the farm maps in the organic system plan. Harvest records need to include field identification, planting dates, production records (harvest date and yield), post-harvest handling records, storage records and buffer zones</p> <p><b>Keep livestock records,</b> including animal list and origin of livestock from the time they arrive on the farm (birth or purchase) until the time they leave the farm (death or sale from the herd), and log the purchase of animals, breeding, freshening, and sale information</p> <p><b>Keep herd health records,</b> including sanitary animal identification, birthdate or date of purchase, sire and dam, lactation number, calving dates, milk production and components, dates and outcome of testing (Johnes's, BVD, etc.), treatments (product, date administered and dose, site administered, and by whom, withholding time, and outcome), date of culling, sale, or death</p> <p><b>All feed must be certified 100 percent organic.</b> Furthermore, feed records must include feed ration records for each type of animal during each stage of growth and production; pasture intake records; purchased feed, feed supplements and feed additives; feed-storage records detailing the exact storage areas</p> <p><b>Milk quality records</b> track milk quality including somatic cell counts (SCC) and standard plate counts (SPC), and are used to monitor milking and sanitation practices, and identify potential dairy health problems?</p> <p><b>Maintain sales records,</b> including all products sold off the farm from milk, to animals, crops, compost, seeds, and all other organic and nonorganic products</p>
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(Source: Dyck et al., 2009)

### Box 3. New England's journey to organic milk.

#### Context

Organic dairy has been the fastest growing agricultural segment in Vermont since the mid-1990s, reaching approximately 20 percent of Vermont's dairy farms in 2010. This growth was driven by stable producer prices and perceived positive returns to farm operations. While livestock could not be labelled until 1999 and only 16 of the 40-active group in the US certified livestock, non-meat annual foods were regulated by the FDA, and were able to carry organic labels through 1990s.

More than 80 percent of U.S. organic dairies are located in the Northeast and Upper Midwest. these operations are small, averaging, respectively, 53 and 64 cows per dairy farm. Average feed costs per cow are low on organic dairies in the Northeast and Upper Midwest due to greater use of homegrown feed and pasture. A profitability analysis (McBride & Greene, 2007) suggests that there were economic incentives for small conventional dairies to covert to the organic approach. Since then, developments in the industry saw organic and grassfed milk prices continually on the rise from 2007, a total growth in prices of over 42 percent. 2016, in particular, saw prices for conventional milk dropping to US\$13.58 per hundredweight, as opposed to organic and grassfed dairy farmers, which received US\$35.60 and US\$39.50 respectively by La Farge-based Organic Valley, one of the largest organic dairy cooperatives in the country.

#### Brief history

Until 1994 organic dairy farmers in the Northeast had only two options: they could either process and sell their dairy products locally—with or without certification—or they could sell conventionally in which case their milk would be mixed with milk from other farms. Except for CROPP, the organic cooperative founded in Wisconsin in 1988, there were simply no processors buying significant amounts of organic milk from small farms. This situation significantly changed when the rbST controversy<sup>85</sup> made mainstream shoppers wary of conventional milk and boosted sales of organic dairy products. In just a few years, a supply chain for organic dairy arose with established price premiums, widespread certifications standards, and clear incentives to transition. Then, organic dairy became the fastest-growing segment of the organic foods industry.

While the organic dairy industry did not truly gain traction until the mid-1990s, a movement of dairy farmers applying organic methods started decades earlier in different regions of the United States. Some were conventional producers who decided on their own to move away from the milk industry's prevailing production methods, and others were back-to-the-landers who were organic from day one. Today's organic dairy sector is rooted in both the conventional US milk-production system and the counterculture of the 1970s. As early as the 1960s the negative effects of confinement and intensive production drove conventional farmers in different states—including Minnesota, Michigan, Ohio, Wisconsin, Kansas, and New York—to seek alternative ways to produce milk. A rapidly increasing

<sup>85</sup> rbST (bvine somatotropin) is a hormone that is naturally occurring in female dairy cows, and became commercially available to dairy producers as a way to augment milk production in 1994 (Granite State Dairy Promotion, 2013).



demand for organic milk has emerged from consumers' recognition of its nutritional advantages as well as from a growing awareness of confined animal feeding operation's (CAFO) environmental consequences<sup>86</sup>.

#### *Institutional setup*

The now-defunct Minnesota-based Organic Growers and Buyers Association (OGBA) began certifying farms in Minnesota and other Midwest states and held annual conferences beginning in 1971. The Northeast Organic Farming Association started certifying farms in 1977, though consumers were not involved in the process, and in the early years participation remained low. The Maine Organic Farmers and Gardeners Association (MOFGA) certified twenty-seven farms in 1972. Both organizations, like other newly formed organic advocacy groups around the country, based their standards on those of the Rodale Institute. These were usually in the form of strong recommendations, rather than strict requirements and, for example, did not ban antibiotics outright as they do today. Farmers were permitted to use them in "emergency" or "last resort" situations, but routine use was prohibited.<sup>87</sup>

Facing supply shortages of organic crops, the US organic industry has launched initiatives to encourage more farmers to transition their land to organic, and several private operators use supplier financing strategies.

Support for organic standards and lobbying at USDA and FDA is performed by the Northeast Organic Farming Association (NOFA)<sup>88</sup>, which also provides key technical support for farmers. Incentives provided at the federal level by USDA were focused either on organic farming, or the overall dairy sector. An institutional program to protect and favor organic farming is the National Organic Program, by USDA Agricultural Marketing Services. The NOP establishes clear standards and certifications protocols. With an appropriated budget of approximately \$9- million in FY 2014 and 2015, the NOP oversees more than 80 certifying agents and 19,474 certified organic operations in the US alone. The Dairy Margin Protection Program is a program to protect margins for dairy farmers when the national dairy production margin is less than \$4.00 per hundredweight, and between 2014 and 2017 has refunded US\$1.6 billion to dairy producers.

(Source: Greene (2001), O'Hara & Parsons (2012), Parsons (2009), Parson, Dalton & Wang (2006), Saucier & Parsons (2014) McBride And Greene (2007) y (2009), USDA Agricultural Marketing Services (n.d.), Fortune (2016) USDA Farm Service Agency (n.d.), Hansen (2016))

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<sup>86</sup> The biggest problems caused by CAFOs are the increased incidence of antibiotic-resistant bacteria, animal-welfare ethical issues, massive accumulations of manure that pollute the air and water, and reduced property values in neighboring communities (Saucier & Parsons, 2014; O'Hara & Parsons, 2012).

<sup>87</sup> The definition by USDA in 1980 of organic farming was: "A production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely upon crop rotations, crop residues, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients, and to control insects, weeds, and other pests."

<sup>88</sup> The NorthEast Organic Farming Association is based in the following states: Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont.

## 2.4. SUSTAINABLE TOURISM

### 2.4.1. CONTEXT: TOURISM EXPECTED TO INCREASINGLY CONTRIBUTE TO URUGUAY GDP

**Tourism's contribution to the global economy has been growing rapidly and is expected to continue to do so in the future.** According to the World Travel & Tourism Council and for 2016, direct contribution of tourism to GDP was US\$2.3 trillion (3.1 percent of global GDP) while its total contribution was of 7.6 trillion (10.2 percent of global GDP). It is projected that the direct contribution of tourism to GDP will increase on average at 4 percent per year from 2017 to 2027, reaching US\$3.5 trillion by 2027 (3.5 percent of global GDP). The total contribution of tourism to GDP will increase at an average of 3.9 percent per year to reach US\$11.5 trillion by 2027 (11.4 percent of global GDP). Tourism is the fourth largest contributor to GDP, higher than agriculture, mining, banking or automotive manufacturing. In 2016, tourism GDP growth outpaced global economic growth and the growth of other major sectors such as retail, manufacturing and agriculture; and was only slower than the growth in the communications sector (4.2 percent). The total contribution of tourism to global employment was 108 million jobs (3.6 percent of total employment) whereas total contribution was 292 million jobs (9.5 percent of total employment). This contribution is expected to rise 2.2 percent per year up to 138 million people directly employed (4 percent of total employment) in 2027, or 2.5 percent per year, up to 381 million total jobs in 2027. Compared to other sectors, for both direct and total, tourism supports more jobs than any other sector except for construction, agriculture and retail <sup>89</sup> (World Travel & Tourism Council, 2017).

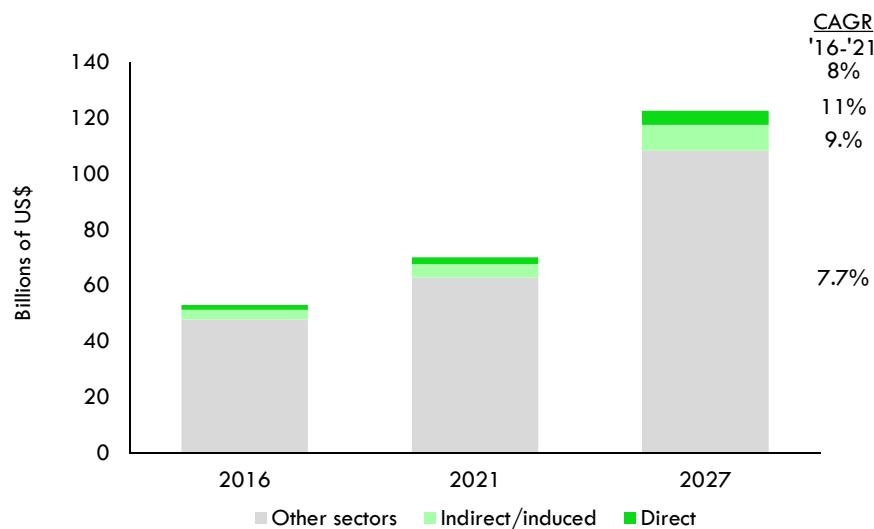
Figure 19. Global tourism contribution to world's GDP, 2016-2021.



(Source: WTTC)

<sup>89</sup> The sectors covered were agriculture, automotive manufacturing, banking, chemicals manufacturing, communications, construction, financial services, mining and retail.

Figure 20. Tourism contribution to Uruguay's GDP, 2016-2027.



(Source: WTTC, IMF)

**International tourism is on the rise globally.** According to UNWTO, international tourist arrivals grew 7 percent in 2017, from 1,232 million arrivals to 1,322 million. Since 2010, growth in arrivals have been around 4 percent, which makes 2017 the strongest year in the last seven years. The most popular destination for tourists is Europe (50.8 percent), followed by Asia and the Pacific (24.5 percent) and the Americas (15.6 percent) but this is changing. The market share of emerging economies increased from 30 percent in 1980 to 45.2 percent in 2017 and it is expected to reach 57 percent by 2030, equivalent to over 1 billion international arrivals. This growth will be caused, particularly, by the increase in importance of Asia and the Pacific, which will reach 30 percent of all arrivals by 2030 (United Nations World Tourism Organization, 2017). For 2016, the three most common reasons for tourism were leisure, visiting family & friends and business, respectively accounting for approximately 53 percent, 27 percent and 15 percent of total arrivals<sup>90</sup> (United Nations World Tourism Organization, 2018).

**Tourism represents a significant and growing share of the Uruguayan GDP (Figure 20).** In 2016, total contribution<sup>91</sup> of tourism to the GDP was estimated at US\$5.1 billion (9 percent of Uruguay GDP), and is projected to reach US\$7.1 billion by 2021 (10 percent GDP), growing at 7 percent per year, and reach US\$14.2 billion by 2027, growing at 10 percent per year (World Travel and Tourism Council, 2018). Of this value, direct contribution<sup>92</sup> accounted for US\$1.7 billion and is expected to reach US\$2.4 billion by 2021 (7 percent CAGR) and US\$5 billion by 2027 (11 percent CAGR). The number of foreign visitors with Uruguay as their final destination reached 3 million in 2016 up from 2.7million in 2014 and are expected to reach 4.4 million by 2027 (Uruguay XXI, 2017; World Travel and Tourism Council, 2018; Uruguay Instituto Nacional de Estadística, 2017)<sup>93</sup>. The main purpose of tourism in Uruguay is leisure, which accounted 85 percent of total spending, and about 60 percent of the international arrivals, since 2010 and is expected to remain stable in the future (World Travel and Tourism Council, 2018).

<sup>90</sup> The visiting family and friends category also includes other purposes such as religious, pilgrimage or health treatments.

<sup>91</sup> Total contribution includes indirect and induced contribution. See footnotes 106 and 107 for more details.

<sup>92</sup> According to the World Travel and Tourism Council, the direct contribution of Travel & Tourism to GDP reflects the 'internal' spending on Travel & Tourism (total spending within a particular country on Travel & Tourism by residents and non-residents for business and leisure purposes) as well as government spending, including services directly linked to visitors such as cultural (i.e. museums) or recreational (i.e. national parks) (World Travel & Tourism Council, 2015).

<sup>93</sup> In 2016 total visitors were 3.32 million; of these ~300 thousand were in transit and 313 thousand were Uruguayans.

**In Uruguay, tourism source markets are highly concentrated with about 80 percent of all foreign tourists coming from neighboring countries.** In 2015 and 2016, Argentina and Brazil accounted for 75 percent of all international arrivals (2.7 million), Chile and Paraguay accounted respectively for 1.6 and 1.2 percent, and the rest of Latin America accounted for 2.5 percent. Europeans and Americans respectively accounted for 5 and 2.5 percent of arrivals (Uruguay XXI, 2017). This concentration is less strong for cruise tourism, where Brazilians and Argentinians represented 42 and 25 percent respectively of cruisers, and Americans and Europeans accounted for 15 and 11 percent (Uruguay XXI, 2017)

**Despite this concentration, spending by international tourists in Uruguay has increased since 2014 and is expected to continue to grow.** Tourists spending (foreign and domestic) was estimated at US\$3.3 billion in 2014, and is projected to reach US\$7.4 billion by 2027. Foreign travel spending accounted for US\$1.9 billion (57 percent of total tourist spending) in 2014 and is expected to increase to US\$4.9 billion by 2027 (66 percent of tourism spending), while domestic tourism accounted for US\$1.4 billion (43 percent of total tourist spending) and, although expected to reach US\$2.5 billion by 2027, its share will decrease to 34 percent of tourism spending (World Travel and Tourism Council, 2018).

**Uruguay's tourism added value is growing faster than number of visitors, showing increased spending per person.** While the direct tourism sector contribution to the economy is expected to grow by 3.8 percent per year, expected number of foreign tourists will grow by 4.6 percent per year to reach 4.4m people in 2027 from 3 million in 2016. In 2015, the number of domestic tourist trips was 6 million (World Travel & Tourism Council, 2017; Uruguay XXI, 2017). A moderate growth is expected in tourism and travel jobs, 2.1 percent for direct jobs and 1.6 percent for total jobs, per year. In 2016, the tourism industry accounted for 51,000 direct jobs (3.1 percent) and 150,000 total jobs (9.2 percent). In 2027, tourism is expected to generate 63,000 direct jobs (3.7 percent) and 177,000 total jobs (10.5 percent) (World Travel & Tourism Council, 2017).

**Yet, when benchmarked against some of its competitors, Uruguay is significantly less competitive.** The World Economic Forum places Uruguay low in the Travel & Tourism Competitiveness Index, ranking 77<sup>th</sup> out of 136<sup>th</sup> in the world and 7<sup>th</sup> out of 10 in the region.<sup>94</sup> Table 9 shows that Uruguay however performs better than the selected benchmarking countries in most sub-pillars relative to the *Conditions of the country*. This reveals a relatively higher level of development, a better business environment, and a stronger governmental support of the tourism sector, including an effective marketing and promotion. Its weak performance in the Environmental Sustainability sub-pillar is caused, specifically, by its high share of endangered species, the annual loss in forest cover and a deficient wastewater treatment system. These factors could be problematic when expanding the sustainable tourism offer. Nevertheless, within this sub-pillar, the effectiveness of the government in the sustainable development of the industry is perceived as particularly strong by the business community, only after Costa Rica's (World Economic Forum, 2017).

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<sup>94</sup> The WEF TCCR groups its ranking in sub-pillars within four pillars: Enabling Environment (sub-pillars: Business Environment, Safety and Security, Health & Hygiene, Human Resources and Labor Market and ICT Readiness), T&T Policy and Enabling Conditions (sub-pillars: Prioritization of T&T, International Openness, Price Competitiveness and Environmental Sustainability), Infrastructure (sub-pillars: Air Transport, Ground and port, Tourist Service) and Natural and cultural resources (sub-pillars: Natural Resources and Cultural and Business Travel). Each sub-pillar is made up of a variety of indicators. For this comparison, the sub-pillars have been grouped in three different tables to reflect the Conditions of the Country, Travel Facilitators & Reasons to Travel.

Table 9. Benchmarking in terms of Conditions of the country.

Country <sup>95</sup>	Rank	ICT readiness	Human resources and labor market	Health & Hygiene	Safety & Security	Business environment	Prioritization of T&T	Environmental Sustainability
Uruguay	<b>77</b>	<b>34</b>	<b>68</b>	<b>45</b>	<b>63</b>	<b>63</b>	<b>23</b>	<b>90</b>
Colombia	<b>62</b>	69	<b>66</b>	86	136	111	97	<b>62</b>
Costa Rica	<b>38</b>	43	<b>42</b>	84	68	<b>62</b>	24	<b>32</b>
Peru	<b>51</b>	79	<b>62</b>	91	108	83	69	<b>73</b>
Chile	<b>48</b>	53	<b>53</b>	74	<b>44</b>	<b>33</b>	72	<b>69</b>
Argentina	<b>50</b>	61	69	<b>18</b>	97	132	66	125
Ecuador	<b>57</b>	88	95	81	85	120	58	<b>86</b>

(Source: WEF TTCR, 2017)

**Uruguay's performance in the sub-pillars that compose the *Travel facilitators pillar* is particularly weak.** Within this pillar, Uruguay ranks lowest in its Airport infrastructure and its International Openness, driven by the low numbers of operating airlines (only 15) and domestic and international airline slots. Its performance in Ground and Port infrastructure, on the other hand, is better than most of its counterparts but still weak at a global level due to low quality and efficiency of roads and railways. The quality of port infrastructure is higher than most counterparts, which benefits the 47.5 per cent of arrivals that come through ports. Poor air access hinders the potential of long-haul international markets that need air infrastructure, such as the US or Europe (United Nations World Tourism Organization, 2017). Performance in the Tourist Service Infrastructure sub-pillar -particularly the level of quality and the number of rooms per hundred inhabitants- indicates a need for expansion of the supply of hotels and improvements in quality, especially if the country wants to target higher spenders.

Table 10. Benchmarking in terms of Travel facilitators.

Country	Air. Infrastructure	Ground & Port infrastructure	Tourist Service Infrastructure	International Openness
Uruguay	<b>102</b>	<b>93</b>	<b>61</b>	<b>90</b>
Colombia	<b>60</b>	116	82	<b>4</b>
Costa Rica	<b>48</b>	99	<b>30</b>	<b>21</b>
Peru	<b>73</b>	109	<b>45</b>	<b>12</b>
Chile	<b>64</b>	<b>61</b>	<b>56</b>	<b>3</b>
Argentina	<b>66</b>	100	<b>54</b>	<b>89</b>
Ecuador	<b>75</b>	<b>52</b>	75	<b>49</b>

(Source: WEF TTCR, 2017)

**Uruguay is performing worse than the set of countries in those sub-pillars that make up the *Reasons to Travel*.** Uruguay ranks lower than all countries and in all indicators of the Natural Resources sub-pillar, except for the Attractiveness of Natural Assets, where it performs slightly better than Peru and Colombia. Of specific significance is the low performance in the surface of areas protected and the low score in digital demand for nature products. According to these results, Uruguay is not benefiting from the potential positive outcomes of protected areas and the Uruguay brand is not as recognizable for nature-related tourism as the rest of countries analyzed. Uruguay, like Chile, does not have any World Heritage natural sites within its borders. Uruguay also performs significantly worse than the rest of countries in Cultural Resources and Business Travel, except for Costa Rica. While having two UNESCO World Heritage cultural sites and two Intangible heritage expressions, Uruguay is still not recognized for culture-based tourism either. Regarding its performance in the Price Competitiveness sub-pillar, Uruguay is in line with the rest of countries

<sup>95</sup> Colors in Uruguay's ranking reflect a better situation than its competitors (green), significantly worse (red), or slightly worse (orange). Numbers in bold in the rest of countries reflect those where the country ranks higher than Uruguay.

despite having one of the lowest average rates of first-class branded hotels. Its rank is hurt by its very high Ticket and Airport Taxes -in line with its poor performance in all air travel related matters- and by its relatively overall high prices (especially for fuel).

**Table 11. Benchmarking in terms of Reasons to Travel.**

País	Recursos Naturales	Recursos Culturales y Viajes de Negocios	Competitividad de Precios
<b>Uruguay</b>	<b>96</b>	<b>63</b>	<b>123</b>
Colombia	22	20	103
Costa Rica	3	66	108
Perú	4	24	73
Chile	59	40	39
Argentina	25	14	119
Ecuador	11	56	50

(Source: WEF TCR, 2017)

**Montevideo, the Eastern coastline, the thermal coastline and Colonia are the key four tourist areas of Uruguay.**

The Eastern coastline, including Rocha's coastline, Maldonado and Costa de Oro, is the most important tourism destination, accounting for 32 percent total tourists, while Montevideo accounts for 27 percent of tourists and the thermal coastline for 17 percent (Uruguay XXI, 2014, p. 7). In 2015, the Eastern coast received 1 million tourists for a total spending of US\$946 million, with an average stay of over 8 days. Tourism in the East was driven by beach and sun, and natural tourism. Montevideo received 1.1 million visitors for a total spending of US\$640 million, with an average stay of 7 days; driven by historic tourism, beach and sun, natural tourism, and all-inclusive cruise tourism.

**Maldonado, Montevideo, Colonia, Rocha and Canelones account for 88 percent of registered accommodation offerings for tourists in Uruguay<sup>96</sup>.**

Nationally, there are 526 operators classified as tourist accommodation, 24 as Bodegas, 107 as rural tourism establishment, and 634 as real estate agents. In Maldonado and Canelones, the majority of establishments are real estate agents (70 and 58 percent); in Montevideo and Colonia, there is a quasi-even split between hotels and real estate agents; and while in Rocha, hotels account for 70 percent of the offerings. Rural establishments are generally limited in numbers, except for Lavalleja, San Jose, Flores and Treinta y Tres and Florida, where they account between 60 and 100 percent of the registered establishments (Government of Uruguay, 2018). This high concentration in the South-East and Colonia seems to respond to tourism demand, which is highly concentrated in the same departments, as Table 12 shows (Inter-American Development Bank, 2017) .

<sup>96</sup> The Ministry of Tourism lists several different types of licensed touristic operators, although it is not clear whether this list is exhaustive or not.

**Table 12. Tourist arrivals, expenditures and stay per department.**

Region	Average expenditures per night per capita (US\$)	Average stay (# of days)	Arrivals (%)
Montevideo	137	6	39
Maldonado	203	7	21
Colonia	99	3	11
Rocha	97	8	3
Canelones	51	7	4
Salto	94	4	7
Paysandú	64	4	3
Artigas	160	3	1
Cerro Largo	49	4	0
Durazno	40	7	0
Flores	67	5	0
Florida	57	7	0
Lavalleja	45	7	0
Río Negro	62	4	3
Rivera	119	3	0
San José	41	6	0
Soriano	53	3	1
Tacuarembó	72	4	0
Treinta y Tres	63	5	0
Transit	52	1	4

(Source: IDB, 2017)

**Tourism in Uruguay is highly seasonal, with occupancy rates increasing greatly during summer.** With the exception of Montevideo and Punta del Este, occupancy rates in, Canelones, Piriápolis and Aledaños and Rocha<sup>97</sup> increased from 79 percent to 85 percent during the month of January 2017, and were still high at 70 percent in February 2017, but were between 29 and 45 percent in December 2016 and March 2017. In Montevideo, occupancy rates for 1 to 4 stars hotels were between 66 and 81 percent, while between 51 and 60 percent for 5 stars hotels. In Punta del Este and Aledaños<sup>98</sup>, occupancy rates were highest and most consistent for 4 and 5 stars hotels between 70 and 87 percent, across the whole four months. Three-star hotels and lower had occupancy rates of 83 percent in January and 74 percent in February, while only 59 and 46 percent in December and March (PricewaterHouseCoopers, 2017)<sup>99</sup>. In Colonia, occupancy rates were stable at 65 percent-70 percent across the three months for hotels under 3 stars, while it was between 45 and 55 percent for 4 and 5 stars hotels. A similar trend is true for the "Eje Norte" region<sup>100</sup>, where occupancy rates were between 45 and 52 percent for November and December 2016. In the "Termas" region<sup>101</sup>, occupancy rates were highest for three-star hotels and below as well as 4 stars hotels and above in October

<sup>97</sup> Canelones includes Atlántida and Guazuyirá; Colonia includes Carmelo, Colonia del Sacramento y Nueva Helvecia; Piriápolis y Aledaños include: Piriápolis and Punta Colorada; Rocha includes Chuy, Costa Azul, LaAguada and La Paloma.

<sup>98</sup> Punta del Este and Aledaños include Laguna del Sauce, La Barra, Maldonao, Manantiales, Portezuelo, Punta Ballena and Punta del Este.

<sup>99</sup> PWC used a survey from 185 hotels, with a response rate of 67 percent, which represents 7,600 rooms.

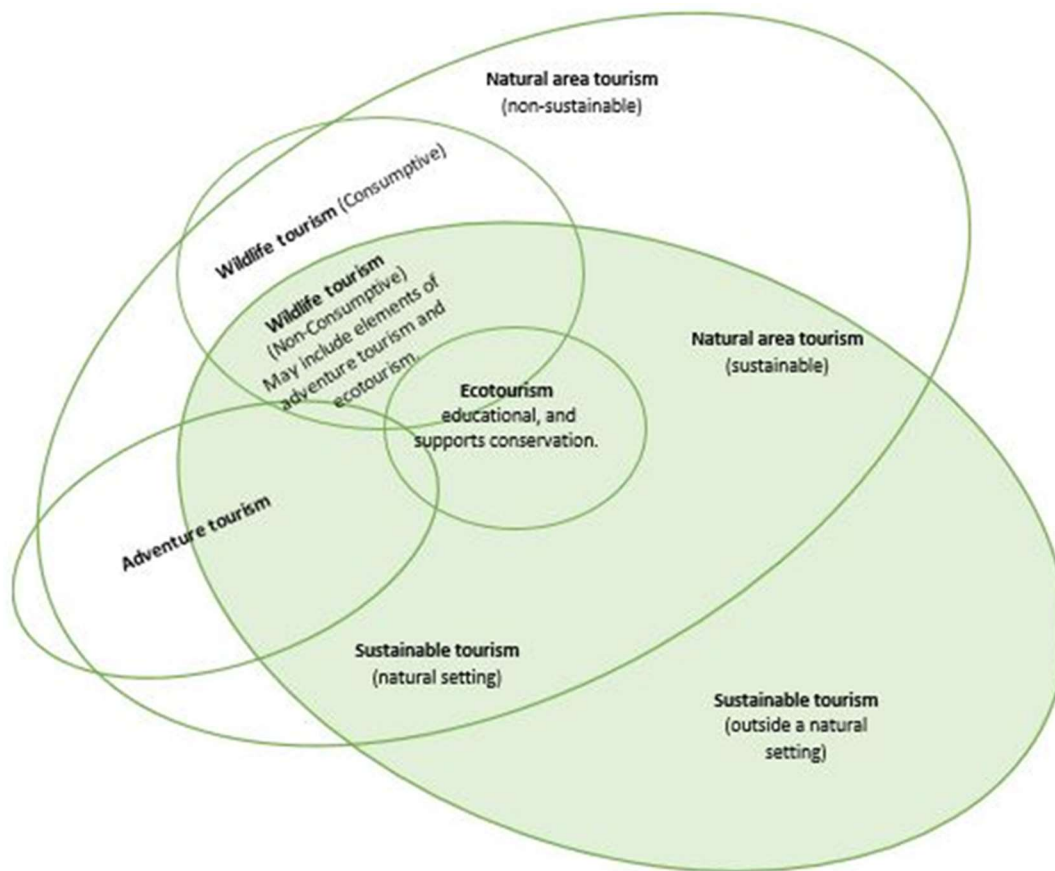
<sup>100</sup> The "Eje Norte" region includes Artigas, Cerro Largo, Rivera and Tacuarembó.

<sup>101</sup> The "Termas" region includes Paysandú, Salto, Termas del Arapey, Termas del Daymán, Termas del Guaviyú.

2016 (at 60 and 47 percent), while they declined significantly in November and December 2016 (with the lowest point at 29 and 34 percent). In the rest of the country<sup>102</sup>, there was a moderate decrease in occupancy from 74 percent in October 2016 to 66 percent in December of the same year (PricewaterHouseCoopers, 2017).

#### 2.4.2. MARKET DEMAND: POTENTIAL OF SUSTAINABLE TOURISM PRACTICES

Figure 21. Diagram of Sustainable Tourism.



(Source: own elaboration)

**Sustainable tourism is the term used to describe all kinds of tourism that is environmentally, socially, and economically sound.** Thus, sustainable tourism approaches can be applied to cities, large scale beach resorts, sporting events or even conference tourism. The relationship between sustainable tourism -shaded- and natural area tourism segments can be seen in Figure 21. The United Nations designated 2017 as the International Year of Sustainable Tourism for Development, and has identified five key pillars required to ensure sustainable tourism for development. They are: i) Inclusive and sustainable economic growth, ii) Social inclusiveness, employment, and poverty reduction, iii) Resource efficiency, environmental protection, and climate change adaptation and mitigation, iv) Respect for cultural values, diversity, and heritage and v) Mutual understanding, peace, and security.

**Sustainable Tourism should be considered a management approach not a market segment.** As such, research showing market demand for *sustainable tourism* is scarce and much is anecdotal. Nevertheless, the existence of more

<sup>102</sup> The rest of the country includes Durazno, Florida, Lavalleja, Rio Negro, San Jose, Soriano, Treinta and Tres.



extensive research in segments such as adventure tourism or ecotourism complements the data on sustainable tourism and sheds some light on the potential of sustainable practices.

**A wide variety of studies show how ethical and sustainable practices, environmental and otherwise, are having more importance than ever.** For example, consumers willing to pay more for sustainable brands was 66 percent among all generations, and 73 percent for Millennials. Other studies point to how travelers prefer companies that include green practices into their operations, to the point of expecting the same way that Wi-Fi is expected (Center for Responsible Travel, 2016). UNWTO speaks of a new profile of tourists, with a greater level of cultural and environmental awareness that, thanks to social media, have more power and influence on the products they want to consume (United Nations World Tourism Organization, 2015).

**Sixty percent of all US travelers or 105.3 million had taken at least one type of trip that could be considered sustainable.**<sup>103</sup> In the same survey, 50 percent of these travelers' factor sustainability into destination selection and were more likely to make purchases from travel companies based on their sustainable practices. Sustainable travelers travel more frequently, taking 30 percent more trips overall and five times the number of international trips than regular leisure travelers. They travel with a larger group size -five people vs. four people-, stay twice as long -7 or more days- and spend 51 percent more (Sustainable Travel International, Mandala Research & Destination Better, 2016). According to a study of travelers visiting Costa del Sol in Spain, tourists would be willing to pay up to 10 percent more if the destination adopted sustainable practices (Pulido-Fernandez & López-Sánchez, 2016).

**The exact market of Ecotourism<sup>104</sup> size is difficult to calculate, and there have not been systematic efforts to provide with current data.** Nevertheless, in 2005 The Tourism Network considered ecotourism one of the fastest-growing sectors, growing about 5 percent worldwide, representing 6 percent of the world GDP and 11.4 percent of all consumer spending. The Adventure Travel Trade Association also considered ecotourism has the highest level of client demand overall for travel activities in 2017, followed by cultural, environmentally sustainable, and hiking activities. In 2015, a study estimated that protected nature areas around the world receive 8 billion visits per year and that the direct spend in those areas was US\$600 billion (Balmford, et al., 2015).

**Adventure travel is expected to outperform growth in other tourism segments (United Nations World Tourism Organization, 2014)**<sup>105</sup>. In 2011, 79 percent of tourism boards reported that adventure tourism private sector had begun to emerge/grow in their destination (United Nations World Tourism Organization, 2014; Adventure Travel Trade Association, The George Washington University, Xola Consulting, 2010). In 2015, the global adventure tourism market generated a revenue of \$0.56 trillion (7 percent total) likely to increase to US\$3.72 (37 percent) trillion by 2020 (Technavio, 2016).

**Adventure travelers have a high impact on the local economy compared to all—inclusive resort tourists.** This was through a higher induced<sup>106</sup> and indirect<sup>107</sup> contribution, which accounted for 67 percent of adventure traveler's contribution. On average, adventure travelers are high value customers: the average length of vacation is 8 days and spending is estimated at US\$3,000 per person (United Nations World Tourism Organization, 2014). According to the

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<sup>103</sup> According to a survey by Sustainable Travel International and Mandala Research. Sustainable includes: Agrotourism, Ethical Tourism, Social Tourism, Community-Based Tourism, Sustainable Tourism, Geotourism, Ecotourism and Voluntourism.

<sup>104</sup> Ecotourism is defined by the International Ecotourism Society as "responsible travel to natural areas that conserves the environment and improves the welfare of local people" (The International Ecotourism Society, 2015).

<sup>105</sup> Adventure tourism is defined by the Adventure Travel Trade Association as "travel that is inclusive of at least three elements: physical activity, cultural immersion, and natural environment" (Adventure Travel Trade Association, 2015).

<sup>106</sup> According to the World Travel and Tourism Council, induced contribution measures the GDP and jobs supported by the spending of those who are directly or indirectly employed by the Travel & Tourism sector (World Travel & Tourism Council, 2015).

<sup>107</sup> According to the World Travel and Tourism Council, the indirect contribution includes the GDP and jobs supported by travel and tourism investment spending (i.e. investment by the industry in new hotels etc.), government spending on behalf of the "community at large" (i.e. tourism marketing and promotion, security and sanitation in resort area etc.), and domestic purchases of goods and services by the sectors dealing directly with tourists (i.e. food and cleaning services by hotels). (World Travel & Tourism Council, 2015).

ATTA industry snapshot 2014, adventure operators estimated that 66 percent of total trip cost stays locally<sup>108</sup> (Adventure Travel Trade Association, The George Washington University, Xola Consulting, 2013).

**Accessible tourism is an important market segment, and may present increasing returns to scale and help de-risking seasonality (de la Fuente & Amarillo, Unpublished).**<sup>109</sup> Worldwide, 15 percent of the population present disabilities<sup>110</sup>, and by 2050, 21 percent of the world's population will be over 60 years old (2 billion people). This market segment is particularly important when considering that people presenting disabilities travel accompanied in 92 percent of the cases (*Plataforma Representativa Estatal de Personas con Discapacidad Física de España* as cited in de la Fuente & Amarillo). Information about accessibility of destination, mobility within the tourist resources and ease of access to a consistent offer that includes all the elements of the value chain are key elements in the choice of location for a tourist with a disability.

**Uruguay presents a significant potential for attracting more high-spenders, ethically and environmentally conscious travelers, given the attractiveness of its natural assets and the rich offering focused on nature, adventure and eco-tourism activities.** However, key interventions beyond improving the existing “beach and sun” offerings are needed to move the country towards more recognition as a sustainable tourism destination, as shown by key weaknesses in environmental sustainability practices, management of protected areas and endangered species and low-recognition as a nature destination. The ten key components of a sustainable destination are: i) Inclusive public-private dialogue with shared vision, ii) clear policy direction in line with vision, iii) up-to-date action plan that is in implementation, iv) capacity building and awareness rising, v) environmental and sustainability standards for the sector, vi) sustainable product development, vii) value chain linkages across sectors, viii) funding for conservation of environmental and cultural resources, ix) sustainability marketing and rebranding and x) ongoing monitoring.

**Various organizations exist to help guide destinations towards more sustainable forms of tourism.** Examples are Sustainable Travel International (STI) and the Global Sustainable Tourism Council. STI is working across the Caribbean, Central America and South America to help steward sustainable tourism practices. The process involves a Rapid Diagnostic Assessment and the development of a Sustainable Tourism Action plan. The outcomes are reduced resource use (water, energy, waste), stronger value chain linkages, and improvement in planning and marketing. The Global Sustainable Tourism Council (GSTC) has established two sets of standards for sustainable tourism: Destination Criteria for public policy-makers and destination managers, and Industry Criteria for hotels and tour operators. These are the internationally recognized guiding principles for how to make destination more sustainable. The GSTC is also an accreditation body and accredits organizations like Rainforest Alliance, Biosphere and Earthcheck to act as Certifiers for sustainable tourism hotels, destinations and operations.

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### 2.4.3. BEST SUSTAINABILITY PRACTICES

**Costa Rica is world renowned for sustainable tourism and ecotourism.** Starting in the 1980s, the government of Costa Rica took serious efforts to leverage the country's abundant biodiversity for tourism. Today, it is considered a pioneer of sustainable ecotourism. As part of its strategy, the government invested in tourism, provided investment incentives for hotels, transportation companies, travel agencies, and car rental agencies, and sought foreign investment for luxury tourism resorts (Honey, 2008). The establishment of national parks provided assurance to private entrepreneurs that ecotourism was indeed a priority (Jones, 2017). More than 25 percent of its land is now under protected status, not counting the many private reserves such as the famed Monteverde Cloud Forest Reserve. The tourism ministry created a voluntary Certification for Sustainable Tourism (CST) program – one of the first in the world – in part to ensure that newer and larger hotels abide by sustainable principles (Honey, 2008). These days, seven out of 10 international tourists take part in ecotourism activities, and half in adventure activities (Costa Rica Institute of

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<sup>108</sup> Another estimate set ~80 percent of spending in all-inclusive tourism to foreign owned airlines, hotel and other international companies with HQ in the travelers' home country.

<sup>109</sup> Accessible tourism is the term used to identify product and service offerings that cater to the needs of all people, regardless of their physical limitations, disabilities or age.

<sup>110</sup> In Uruguay, this figure is 15.8 percent.

Tourism, 2016). Spurred by ecotourism, international visits grew by 74 percent between 2005 to 2016 to reach 2.9 million visitors (Costa Rica Institute of Tourism, 2015). In 2016, tourism accounted for 6.4 percent of GDP, or US\$ 3.7 billion, and is the largest export by far (39.8 percent of total) (Costa Rica Institute of Tourism, 2016). The sector also supports 12.9 percent of total employment (World Travel & Tourism Council, 2017). A 2014 study found that on the Osa Peninsula ecotourism has become a “keystone” sector with wide direct and indirect impacts, and jobs in the sector pay twice as much as non-tourism jobs (Hunt, 2015). There is also anecdotal evidence to suggest this green destination branding has improved market positioning for other exports, such as coffee and chocolate, that consumed by tourists.

**Belize is an emerging destination that has positioned itself as haven for sustainable tourism.** (Nuenninghoff, Lemay, Rogers, & Martin, 2015) In the 1980s, realizing the potential of ecotourism for generating foreign exchange and furthering economic development, the government elevated the sector to second place in its development strategy. More so than mass tourism, ecotourism could capitalize on the country’s rich resources: pristine rainforest, the world’s second largest barrier reef, and indigenous heritage and culture. The country has set aside one-third of its land as national parks and reserves. (Timothy & White, 1999) Tourism is now one of the country’s top sources of revenue and is estimated to directly generate 14.1 percent of GDP. (World Travel & Tourism Council, 2017) International arrivals reached a record high of 386,000 in 2016, and cruise tourists topped 1 million. Their combined total expenditure reached an estimated US\$ 410 million, though it is important to note that cruise tourism contributes much less to the Belizean economy and poses a greater risk to the environment. (Belize Tourism Board, 2016) The reef is a top attraction (around 70 and 20 percent of international tourists go snorkeling and diving, respectively) but is threatened by human activity (Belize Tourism Board, 2016). In December 2017, under pressure from NGOs and the tourism sector, Belize took the landmark step of declaring a moratorium on offshore oil exploration to protect the environment. The government is also implementing the National Sustainable Tourism Master Plan 2012-2030 with support from the Inter-American Development Bank, which aims to double overnight tourist arrivals and attract high-value tourists, while developing cruise tourism in a controlled manner (Nuenninghoff, Lemay, Rogers, & Martin, 2015).

**Since 2012, the St. Kitts and Nevis Ministry of Tourism has partnered with Sustainable Travel International to prioritize local needs, develop a tourism action agenda, pilot a destination toolkit, and establish a local fund and oversight board to own this process.** Throughout this time, St. Kitts and Nevis has continued investing in tourism sustainability, and despite significant growth in cruise traffic visitation, the small-island nation has been recognized time and again for its smart investments. Tourism investments increased 145 percent from 2014 to 2015, resulting in 3,200 new jobs. The country now leads the Caribbean in FDI, with a total of US\$ 2,090 in FDI/per capita. Other outcomes include a doubling of per day visitor expenditure to US\$ 179/per day over five years. An estimated 17,500 people have been impacted positively by this project. St. Kitts and Nevis has been recognized for its efforts: in the last two years, it won the Caribbean Tourism Organization’s Excellence in Sustainable Tourism Award and was named one of world’s ten most ethical destinations by the Ethical Traveler (Ethical Traveler, 2018).

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