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Food Security in Argentina: A Production or Distribution Problem?

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Abstract

This paper focuses on the question whether Argentina is capable of guaranteeing food security to its population while increasing its role as a food exporter to the rest of the world. The results of this study show that Argentina has no major problems simultaneously serving as a local food provider and exporter—from a food availability perspective. However, Argentina has problems ensuring food access to all its population. In order to improve food access while exploiting the food export opportunity, the authors propose eliminating the export tax and its substitution for a food consumption subsidy in the form of a conditional income transfer to the population under food insecurity. This would also open new opportunities for agribusiness companies selling products in local and external markets.

Keywords: food security, trade, Argentina

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Introduction

Argentina has not been able to solve some qualitative and quantitative food security problems of its own population, in spite of being a producer and net exporter of food to the world. According to the data provided by the 'Observatorio de la Deuda Social Argentina' (2012), 11.2% of the families in Argentina face food insecurity problems, and 16% of them are families with children. In other words, around 5.5 million people (a total population of 42 million people) suffer some degree of food insecurity in Argentina.

The literature in agricultural economics shows that in the medium- and long-term, there is a positive relationship between agricultural production efficiency and food security (Dorward 2013; Swaminathan and Bhavani 2013). This relationship works in such a way that, when technological and economic conditions allow the increase of agricultural productivity, food availability rises and food costs for workers decrease. This increases wages, the demand for non-food products, and general productivity and growth (Dorward 2013; Mellor 1995).

Argentina has the potential to achieve the above mentioned virtuous circle in which increased agricultural productivity leads to reduced food costs and broader access for the entire population. This poses the question of why with a potential to produce food for a population several times its current size, are so many people in Argentina suffering food and nutritional deficits.

While Argentina faces several nutritional problems, it produces sufficient food to ensure 2000 kilocalories per day to 42 million people. In Argentina 55,000 children under six years old (1.3%) suffer acute undernutrition and 700,000 children under the age of twelve (8%) suffer chronic undernutrition with manifestations of growth retardation. Anemia affects 30% of children under two years of age and 18% of pregnant woman. More than 20% of children have insufficient levels of calcium, vitamins A, C, folic acid, and essential fatty acids of the omega-3 group, and major excesses of risky ingredients—added sugars and sodium. At the same time, overweight is a prevalent (including obesity), affecting 30% of the children under six years of age, 34% school-age children, and 58% of the adults (Britos et al. 2013).

Nutritional problems have multiple causes: lack of access to food, education, food preparation, and quality issues, etc. However, Argentina has not been able to solve the basic problem of food accessibility, despite the production potential capacity mentioned above.

Public policies implemented by the national government in order to solve the food security problem since 2006 have been oriented towards limiting the exports of raw materials (grains, beef, milk, etc.) used to produce food and, in this way, reduce their costs for the local population. In other words, the national government has applied policies oriented to redirect the supply of food towards local markets rather than serving the export markets.

However, findings show that these types of policies have not proven efficient, as food prices increased above the general inflation rates and the production of some raw materials have declined. The prices of final food products from wheat and beef have increased dramatically instead of going down after imposing export restrictions. For example, the price of bread went up

50% in one semester in 2012.^{1,2} Also, the sown area and production of wheat have been lower in recent years than the last 100 years of Argentina's history.³

Objectives

The main purpose of this paper is to elicit whether Argentina has the capacity to guarantee food security to its population and, at the same time, increase its role as a food exporter to the rest of the world.

The research question can be stated as: *Does Argentina have the capacity to guarantee food access to its population in sufficient quantity and quality; and at the same time, be a food provider for the rest of the world?*

Conceptual Framework

Food Security as a Complex and Multidimensional Concept

If global food production is ahead of food demand, why are almost 800 million people undernourished? Current figures worldwide show 2 billion suffer from micronutrients deficit (individuals who do not get enough vitamins and minerals), 1.9 billion are overweight or obese, and one out of three people are affected by malnutrition. Food security concerns have lately ascended into the political, scientific, and socioeconomic agendas not only in developing but also developed countries. Concerns are not limited to the difficulties encircling current problems but also the future challenges of feeding an increasing worldwide population (Ingram 2011; IFPRI 2015).

Food security is recognized as a complex, broad and difficult-to-define concept due to its multiple dimensions (food availability, access and affordability, utilization and safety, and stability), its interdisciplinary nature (agronomy, nutrition, health, economics, sociology and demography, among others), the wide-range of stakeholders involved (international food aid and environmental organizations, national and local governments, farmers, and consumers) and the plurality of manifestations of the food insecurity problem in areas of human health, inequality and chronic poverty, educational capabilities and human development. As world, regions, or county governments seek to address food insecurity problems, they face the intergenerational cycle of poverty and difficulties in achieving broad-base economic growth leading to a host of problems for individuals, families, and communities. (McKeon 2011; Candel 2014; Hendricks 2015).

¹For an example see: http://www.bbc.co.uk/mundo/noticias/2013/07/130705_argentina_pan_caro_vs.shtml, July 10th, 2013.

²Regarding beef prices, according to private estimates, while the general accumulated inflation rose 220% in the last four years, beef prices went up 330%.

³For example, see article from the Buenos Aires Grain Market: <http://www.bolsadecereales.com.ar/detalle-de-las-lluvias-frenan-una-mayor-caida-en-la-siembra-de-trigo-6094>

Not only does food security spread across domains it also stretches across spatial scales. The government and challenges to food security can be considered on a global, regional, or national level, but have also increasingly come to be studied and addressed at the local, community, household, and individual level over the last decades (Defra 2006).

In 1996, the FAO adopted the following definition of food security: “*Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*”. The definition was further expanded during the World Summit on Food Security (2009) by specifically adding the word *social* to the phrase “physical and economic access. Explicitly it states that the four pillars of food security include: availability, access, utilization, and stability, and that the nutritional dimension is integral to the concept.

Food availability refers to sufficient quantities of food in appropriate quality, supplied through domestic production or imports, including food aid. Food access means that people should have adequate resources for purchasing appropriate foods for a nutritious diet. Food utilization not only concerns an adequate diet, but includes access to clean water, sanitation, and health in order to achieve a state of nutritional well-being. Finally, the stability of food security is achieved when a population, household or individual has access to adequate food at all times (FAO 2006).

The first three food-security pillars are linked in a hierarchical manner: As food availability is necessary for food access and food access is connected to food utilization. The fourth pillar is stability—stability of food security over time. It focuses on the concept of resilience and how households can develop resilience to adversity, linking the short-term shocks with long-term development. Resilience interventions seek to help households anticipate and deal with economic and social stresses that lead to food insecurity, absorb the shocks, and assign economic resources so as to escape poverty (Hendricks 2015).

The FAO definition (1996) considers that a food secure a person needs sufficient, safe and nutritious food for an active, healthy life, which implies a diet consisting of sufficient energy, nutritional quality, and safety to prevent malnutrition or limitations in activity levels. The FAO 2009 version also includes: the ability to acquire socially and culturally acceptable foods and to do so in acceptable ways, as important elements in achieving adequate food access. Socially acceptable ways to achieving food access refers to conventional food sources such as grocery stores, restaurants, and government assistance and food kitchens. It also highlights the importance of food quality when it refers to safe and nutritious food. However, it does not explicitly mention food supply elements of food security such as agriculture and food production, even if agriculture production and productivity is a key element in increasing food availability for a growing population (Campbell 1991).

Radimer et al. (1990) explain the four common aspects to the experience of food insecurity: i) a quantitative aspect of not having enough food to eat, ii) a qualitative aspect, related to the types and diversity of food a person consumes, iii) a psychological aspect, manifested as feeling of anxiety regarding food deprivation, iv) a social or normative aspect, by which individuals evaluate their own situation in terms of the generally accepted norms as the number of meals or the socially accepted ways to obtain food.

Research has shown that there is a continuum of experiences of food insecurity. The first sign of possible food insecurity is a worry over the future of possible food shortage or the means of how to purchase it. When the first signs of food shortage appear, households find ways to cut food consumption such as using cheaper ingredients and choose more energy-dense foods to prevent hunger. This food consumption reduction and lower dietary quality may lead to hidden hunger, as a result of micronutrient deficiency. These deficiencies make people more susceptible to illnesses and further compromise their nutritional health. Acute food insecurity can lead to acute hunger, in which hunger is a daily reality, and severe forms of undernutrition are common, such as stunting and wasting. Starvation would be the extreme experience of food insecurity (Hendricks 2015).

Food Security Governance

“The world now produces enough food to feed its population. The problem is not simply technical. It is a political and social problem. It is a problem of access to food supplies, of distribution, and of entitlement. Above all, it is a problem of political will.”

Source. Boutros Boutros-Ghali, Conference on Overcoming Global Hunger, Washington DC, November 30, 1993. From Ingram (2011, 46))

Food security is a complex problem and its solutions should not only consider the technical and environmental perspectives but the social, economic, and political aspects as well. Food security is a multidimensional topic that involves aspects as broad as sustainability, human health, dietary quality, and human rights. Taken together with conflicts about the roads to follow, this multidimensionality implies that a final solution is very hard, if not impossible, to reach. This does not mean that nothing can or should be done (Termeer et al. 2015).

According to Candel (2014), food security has the characteristics of a wicked problem. These are problems that are not fully understandable before the solution is formulated; they are ill defined, ambiguous and contested. Each wicked problem is new and unique, and is never definitively solved and is not subjected to the stopping rule. The specificity of wicked problems results in the fact that it is difficult to treat them in a traditional way, when the problem is defined, analyzed and solved in several stages (Grochowska 2014).

In order to address such a complex and contested topic as food security requires a well-designed and comprehensive governance regime, not only at a global but also at a national and sub-national level. Food security governance refers to different ways to steer or manage food security problems, integrating the perspectives of different stakeholders and governance levels. The sum of these arrangements would ideally form a governance regime that manages to transcend and align the plurality of sectors, policy domains, governance levels, ideas, and actors, in a holistic manner (Oosterveer 2007; Margulis 2013).

In 2011, FAO established that “*governance for food and nutrition security relates to formal and informal rules and processes through which public and private actors articulate their interests, and decisions for achieving food and nutrition security (at local, national and global level) are made, implemented and sustained.*” Under this view, food security governance is characterized by a wide variety of conflicting ideas about how food security could be effectively addressed,

involving a wide array of stakeholders, who have different and sometimes incompatible interests and ideas. Governance would be associated with the formal and informal rules and procedures by which public and actors interact, discuss and make decisions in order to solve food insecurity problems.

Presently there is not a truly authoritative and encompassing institution at a global level to address food security concerns across sectors and levels, with the exception of the Committee on World Food Security (2012), which endorses policy recommendations and guidelines on a wide range of food security and nutrition topics. Instead, there is a broad range of institutions and forums with overlapping jurisdictions and responsibilities, but none of which act holistically and inclusively. This governance vacuum at the global level makes it difficult to tackle both structural hunger and sudden food crises. Similar dynamics play at the national and local level (Candel 2014; Mc Keon 2011, Timmer 2014).

An effective food security governance system would require coherence, integration, and coordination across multiple levels. It requires policies and programs that mutually reinforce each other, thereby contributing to sharing goals and outcomes. In terms of governance modes, the concepts of adaptive governance, collaborative governance, and boundary organizations can be useful in building an effective food security system. Adaptive governance refers to the development of processes that improve management by learning from the outcome of management strategies previously implemented (Termeer et al. 2015). Collaborative governance would bring public and private stakeholders together in collective forums with public agencies to engage in consensus-oriented decision making (Ansell and Gash 2008). At the same time, coordination between governance levels needs to be stimulated, so that drivers of food insecurity are addressed on the appropriate level. By leading the coordination process, boundary organizations can play an important role (Misselhorn et al. 2012).

The next section focuses on food security issues at a national level, reviewing the strategies Latin American countries have adopted in terms of policy interventions to tackle the food security problem. Later we will center our attention on Argentina's food security governance institutions and the problems they face.

Food Security Challenges in Latin America

In the last twenty years (1992–2014) Latin American and Caribbean countries have improved significantly in terms of food security and nutrition, especially in the fight against hunger and malnutrition. The percentage of the population affected by hunger diminished from 14.7% (1992) to 5.5% (2014), almost halving the absolute number of people suffering hunger reduced from 66.1 million to 34 million. This means that over 30 million people have overcome hunger since 1992. Also, stunting in children under five years of age has been reduced from 24.5% in 1990 to 11.6% in 2014 (FAO 2015).

Concerning food availability, this region has required an increasing amount of food to feed its entire population, in terms of calories with a regional average of 2,655 calories per person per day to more than 3,000 in the last available estimate—an increase of 13% in the last twenty-five years. This region produces 10% of the world's food production, and annually it delivers 220

million tons of cereals. However, Latin America and the Caribbean not only face hunger but rising obesity and overweight trends affecting almost 25% of the adult population.

These achievements in food and nutrition security goals were driven largely by the positive macroeconomic growth in the Latin America and Caribbean region during the last ten years (2004–2014), as well as the political commitment to fighting food insecurity shown by the countries of the region. The importance that the region places on food security issues is shown by the approval of the Plan for Food Security, Nutrition and Hunger Eradication of the Community of Latin American and Caribbean States (CELAC) 2025, the main regional body of economic and political integration (CELAC 2014).

The CELAC plan is the culmination of a long process characterized by the implementation of various public policies focusing on the most vulnerable households. These include conditional cash transfer programs, support to family farming, and school feeding programs, among others. The development of public policies has integrated not only technical components, but includes a comprehensive discussion of the institutional frameworks governing the relationship between state and society, and the activities which are specific to political activity. All this has allowed food and nutritional security to be part of the political agenda in the countries of this region, through a consensus which facilitates the sustainable implementation of intervention strategies (Beduschi et al. 2014; FAO 2015).

Food and nutritional insecurity is a complex problem and there is no universal recipe to solve it. However, the positive experiences of countries such as Brazil and Mexico in Latin America suggest that there are a number of common elements that serve as a guiding point, in terms of establishing a food governance system: i) the importance of political commitment from the State; ii) the participation of a wide spectrum of the civil society through formal spaces of dialogue, iii) a holistic approach that combines the strengthening of social protection systems with measures to support production; iv) a systemic and inter-sectorial approach; v) the necessary practice of inter-sectorial coordination in designing and managing public policies and vi) the development and strengthening of legal frameworks to consolidate progress and provide adequate budgets and resources ensure food security (FAO 2014).

Argentina Export Opportunity Limitations

The world is facing a structural change in terms of the relative growth paths of developed and developing countries, which opens new opportunities for food export countries such as Argentina. Developing and emerging economies, especially but not exclusively in Southeast Asia, are growing at a much faster pace than developed countries. According to Llach & Harriague (2008, 2010), developed countries in the next twenty-five years will pass from having a 50% percent of the world GDP to a little more than 20% while developing countries will grow from roughly 50% to almost 80%. Developing countries have an urban population and a rising number of people reaching the middle classes, which explains why most economic growth will come from these countries in the future; and thus, increasing the demand for proteins and food.

Based on growth scenarios and demand for different food products extrapolated through historical values of elasticity and constant prices from 1990-2005, Llach and Harriague (2008,

2010) concluded the trend will continue through 2020. Emerging and developing countries will increase consumption of food products in the following percentages: 98.3% in beef; between 85.7% and 87.9% in poultry; 88.5% in dairy products; 88.9 in wheat; 94.5% in corn; between 95.3% and 97.4% in soybeans; 71.0% in sunflower; 98.8% in fruits (apples and pears) and 84.2% in fruits (citrus).

This is good news for Argentina, a country not only possessing abundant fertile lands, but also agricultural production and product know-how. The Argentine agricultural sector has increased its productivity substantially in the recent years—total productivity grew 4.4% annually from 1990 to 2008 due to the increasing availability of technology, the accumulation of managerial and technical proficiency, and the development of efficient input supply and grain handling systems (Lema 2010).

Will Argentina take advantage of these new opportunities of increasing its agribusiness exports? Since 2006, public policies in Argentina have been created to reduce domestic food prices and increase food availability for the internal population, in particular for products such as beef, pork meat, flour, poultry, and dairy. The means to achieve this goal was to restrict exports of food raw materials, so as to insulate their local food markets and cap food prices from the inflationary pressures of world markets. The two main instruments used to restrict food exports and insulate the local market were through export taxes and export permits of food raw materials.

The export tax allowed Argentine food processing companies to obtain their raw materials at a price substantially lower than international prices, measured in US dollars. The idea behind this policy was to convert cheaper inputs into final goods so that consumers could benefit from less expensive products.

The export taxes creates a transfer from farmers to local consumers and food companies through the lower prices they pay for food and raw material inputs they buy; and direct transfer to the government through the export tax. The total transfer from farmers to consumers, food companies, and government from 2007 to 2012 was estimated at eleven million dollars a year—equivalent to 26% of the total gross receipts of Argentine farmers. This includes the transfer from farmers to the Federal Government, which amounted to an average of nearly \$7.5 billion a year (Gallagher and Lema 2014; Llach and Harriague 2010).

In addition to the export taxes, a system of export quotas was implemented in 2006. This system called Exports Operators Registry (ROE, as per its initials in Spanish), works for beef (red ROE), milk (white ROE), wheat and corn (green ROE). The permissions to export are handled by the government through the National Office of Agricultural Commerce Control (Oficina Nacional de Control Agropecuario or ONCCA). The aim of this office is to guarantee the supply of food products in the local market. In order for a company to obtain export permission from the ONCCA (among other requirements), the total registered physical existence of the primary product in Argentina should be higher than the minimum existence of stocks set by the government.

The export quota is designed to limit the demand for the product by exporters, and in this way restricts competition among exporters. Once the exporter has the permit, knowing that the legal

quantity to export established by the quota system is less than the available amount of the product, the exporter offers farmers a lower price. Additionally, once exporters reach the quantitative limit of product established by the government, they exit the market, and the price of the primary product is now dependent on local conditions, such as the disposition to pay by local processors. Thus, local processors finding large amounts of raw materials available in the local market and are willing to pay less than in a situation without the export quota restriction. In both situations, the quota or export permit system harms farmers, while exporters, food processors, and consumers may benefit.

In addition to the export taxes and quotas, the government established a price subsidy system for food processors and small farmers who sell their primary products in local markets. This includes wheat, livestock, and dairy products. The subsidy is calculated as the difference between the market price and a domestic reference price established by the government. The subsidies for processors are conditional on maintaining the prices of their products within set limits. The logic behind these subsidies is to help local processors, compete with the export sector, obtain cheaper primary products and reduce food prices in local markets. However, these subsidies were given out without any real objective criteria and introduced many resource-allocation inefficiencies (Gallagher and Lema 2014).

The combination of export taxes and quotas (plus subsidies) in the short-term result in increases in the consumption of food products while agricultural production is initially less affected but gradually reduced. When agricultural producers take into account the profit losses in the new scenario with export taxes, they start to produce less. This leads to a shorter supply of raw materials and more problems to ensure cheap food products in local markets and higher uncertainty—which results in lower investment and long-term supply. Additionally, a host of problems ensues from the scheme in terms of efficiency in resource allocation and rationing of subsidies among potential claimants (Gallagher and Lema 2014; OECD 2010).

Recently, Argentina lost the opportunity to export an extra \$15 billion dollars a year due to the application of export restrictions in the form of quantitative restrictions and taxes. Similarly, agricultural production could have grown by \$25 billion dollars a year. In terms of food prices, food product prices are growing as much as average inflation, not less. Private inflation rate estimates for 2014 were 38%, with a 35.6% increase in food prices in the city of Buenos Aires (Llach 2015; CIPPES 2015).

To summarize, Argentina has not taken advantage of the huge opportunities to increase its agricultural and food export and production due to agricultural policies introduced since 2006 with the aim of isolating the local food markets from world price pressures. This system favored neither farmers nor final consumers. Farmers did not increase their production nor their exports and faced a reduction in profits. Local consumers were not capable of benefiting from reduced food prices since in the mid-term food prices increased substantially due to the misallocation of resources and disincentives. Having reviewed the policies in Argentina, we can say that government measures have deliberately created a short-term trade-off between increasing food exports and addressing the food security issues in the local economy. Let us have a look at the current food security situation in Argentina.

The Food Security Situation in Argentina

According to the estimates of the Observatorio de la Deuda Social (2012, 2014), 20% of the children up to seventeen years of age have suffered some sort of food insecurity in Argentina, and half of them have had severe food insecurity problems. Among the general population, 5.5 million people are under food insecurity, and also half of them are critically food unsecured. One-fourth of the children in Argentina receive food for free from schools kitchens or charity organizations. Acute malnutrition as such is a relatively marginal problem affecting 1.3% of the children, and 8% of the children suffer from some sort of chronic malnutrition.

There are three main government policies to tackle food insecurity problems (Aulicino and Díaz Langou 2012):

- a. Distribution of food packages to households: 1.8 million food meals are delivered each year to households under food insecurity, benefiting 3.8 million people.
- b. Food kitchens in schools and local communities: Almost 15,000 kitchens receive subsidies to feed four million children breakfast and lunch every day.
- c. The Maternal Infant Plan: Started in 1937, this plan provides milk to pregnant women, as well as fortified milk. By 2014, this program had a budget of \$250 million, it benefiting more than four million people, and delivering 17,000 tons of fortified milk.

The primary food security program in Argentina is the National Plan of Food Security, created in 2003 with the aim of guaranteeing the right to food for all the population. It is specially focused on assisting children under the age of fourteen, pregnant women, handicapped people, and the elderly living in poverty. Around 1.83 million families received food assistance, benefiting seven million people in poor households with food and electronic fund transfers to buy food. The total budget of the National Plan of Food Security was about \$350 million dollars in 2014, according to the Argentine National Budget (Ministry of Finance 2015).

Based on the information presented, Argentina is far from achieving food security. This problem affects 16% of the households with children and more than 11% of the general population, in spite of the government efforts to solve the problem with different assistance programs. The previously described policies, adopted by the Argentine government to untie local from international markets, seem to have not achieved its proclaimed goals. This puts pressure on the government and society as a whole to seek ways to remedy this problem.

Methodology

Approach and Methods

This research is a descriptive and quantitatively oriented, as key concepts of food security (availability and accessibility) and food exports are measured in order to answer our question: whether Argentina has the conditions to guarantee food security to its population and, at the same time, increase its role as a food exporter to the rest of the world.

In order to measure food availability a food balance sheet tool is used presenting a comprehensive overview of the food supply in a country for a certain period of time. The food balance sheet shows the sources of supply and utilization for each group of food products. The total production and imports in addition to the available stocks of a foodstuff defines its total supply; while demand is composed of human consumption, animal consumption, and other uses, on the one side, and exports on the other (FAO 2001).

By bringing together food and agricultural aggregated data, food balance sheets are used to examine the food and agricultural situation of a country. In terms of food availability, it helps analyze the surpluses and deficits of each food category in a country. It is also useful to make projections of future needs, setting production and trade targets, making relationships between food supply and malnutrition, and establishing nutrition and food policies.

Food balance sheets provide data from a food supply or availability perspective, linked with the Malthus approach.⁴ It does not give any indication of the dietary content of the food consumed in different countries or by different socioeconomic groups. For detailed information on the food supply for different consumption groups, food consumption surveys are needed; these surveys complement the information provided by the food balance sheet (FAO 2001).

We estimate the food balance sheets for the following fifteen food groups: Oil (soybean, corn, sunflower), beef, poultry, pork, fish, fruits (bananas, apples, oranges, and tangerines and pears), eggs, dairy, wheat, corn, vegetables, root vegetables (potatoes and sweet potatoes), sugar, legumes and rice.

Health Food Basket

Nutritional needs are defined as the type and amount of food that constitute a normative healthy food pattern. This pattern shall not only satisfy quantitative criteria (amount of kilocalories, micronutrients, and macronutrients) but also shall not exceed maximum intake limits of four critical ingredients: added sugar, sodium, saturated fat and *trans* fat.

The healthy food basket is based on a health food pattern, which is calculated based on normative criteria, i.e. adjusting consumption of essential nutrients to recommended amounts and limiting those in which an excess may imply a risk for health. This healthy food pattern considers the possibility of reaching those levels of consumption in a progressive way. Even if such a pattern may seem unreachable in the short term, public policies should consider it since the Argentine traditional diet shows several unhealthy biases. Even as a normative target operating as a long-term goal needs to be a part of the food policy debate (Britos et. al. 2012).

The type of food included in a normative nutritious pattern such as the one described should be both adequate for the culture of the society and accessible for the population. In this line of

⁴ The Malthusian approach to food security focuses on the goal of achieving equilibrium between population needs and food supply: in order to maintain this balance, the growth rate of food availability should be not lower than the growth rate of population (Burchi & De Muro 2012).

analysis, CEPEA has developed a nutritious pattern that is consistent with the 2015 Food Guide for the Argentine Population.

From a nutritional perspective, eight food groups are included: vegetables (non-starchy); fruits; dairy products (milk, yogurt and cheese); eggs and meat (beef, pork, poultry and fish); oil (sunflower, corn, soybean and olive); grains, cereals and legumes; rapidly absorbing cereal-derived products (such as bread, other wheat flour derivatives, refined cereals derivatives, and starchy vegetables) and sugar. The first six categories are associated with high-density nutrients⁵ (or high nutritional quality). The concept of food safety, understood from a healthy perspective, prioritizes these categories over the rest.

Table 1 reflects the total quantity of food (for the entire Argentina population) in six categories of better nutritional quality encompassing nutrient necessities within a healthy diet, its respective nutritional gaps and the increased or diminished amount in each case. Food gaps are defined as the difference between actual consumption and consumption within healthy parameters for a certain type of food.

Table 1. Food needs and nutritional gaps in categories for high nutrient density.

	Annual necessity for the whole Argentine population¹	Nutritional Gap²	Incremental needs (Increased consumption) or Diminished needs (Decreased consumption)
Vegetables (non-starchy)	6.93	-56	3.88
Fruits	6.93	-69	4.78
Dairy	10.94	-43	4.70
Grains, cereals, legumes	1.73	-67	1.16
Meat and eggs	2.60	105	-1.39
Oil	0.52	-2	0.01

Note. ¹Expressed in millions of metric tons. Over an estimated population of 42.2 million people in 2015.

² Percent of consumption deficit or excess in relation to the healthy normative pattern.

³ Expressed in millions of metric tons for entire population.

Source. Elaborated by CEPEA (2015).

Table 2 shows nutritional gaps (in this case, showing an excess) for food of lower nutritional quality and its consequent necessity for diminished consumption.

The process of calculating nutritional gaps does not allow working with individual food categories, which is why eight broad categories are used in the process.

Consequently, it is necessary to develop a food basket with individualized categories in order to analyze the results. This requires working with individual food types. These nutritional gaps were applied to the actual consumptions of fifteen individual food categories (previously enumerated in this document), in order to render a healthy food basket.

⁵ Nutrient density is a parameter indicating the nutritional quality of certain foods, and is defined as the content of individual nutrients per unit of energy (kcal). It is usually expressed over 100 or 1000 kcal.

Table 2. Food needs and nutritional gaps in categories for low nutrient density.

	Nutritional Gap	Diminished Needs Decreased consumption for entire population
Bread, other wheat flour derivatives, refined cereals derivatives and starchy vegetables	128	Bread: -1.73 Potatoes: -1.08 Wheat Flour: -0.35 Cookies: -0.24
Sugar	122	Table / granulated sugar: -0.39 Sugary Drinks: -4.60

Note. Percent of consumption deficit or excess in relation to the healthy normative pattern

*Calculated in millions of metric tons

Source. Elaborated by CEPEA, 2015.

These gaps are calculated by the Center of Studies about Food Policy and Economics (CEPEA, in Spanish), based on the Healthy Eating Index methodology developed by the USDA (Healthy Eating Index 1995). It also takes into account the Food Guide for the Argentine Population (Guías alimentarias Argentinas), the Argentine Alimentary Code (Código Alimentario Argentino), with the objective of determining portions of each food group. Both references are contrasted with recommendations of the World Health Organization for a healthy diet, adjusting food quantities according to nutritional normative criteria, and considering the possibility of arriving to those consumptions in a progressive way (Britos et. al. 2012).

The detailed process of adapting CEPEA development and measures is shown in Table 1 and Table 2. The fifteen categories taken in account by the authors in order to calculate the balance sheets are described in Appendix 1.

The Argentine diet is characterized by food monotony (concentrated consumption in few food groups, biased towards red meat, and scarce consumption of fruits and vegetables), and insufficient nutritional quality in general. This problem is not only limited to people with low incomes, but it extended to the entire population. Obesity and excess of consumption of certain critical ingredients show almost the same frequency in populations with food insecurity as in the mid- and high-class population.

So, even if poverty and food insecurity conditions worsen, quality nutrition and food monotony—attributes of average Argentine diet are also found present in homes with plenty of access to food (Britos et. al. 2012).

The research of Britos et. al (2012) on food gaps in 2010, found the largest negative gaps in food groups with among the poorest people—50% larger in dairy, while the negative gaps for fruits and vegetables is relatively similar across all income groups (this indicates that consumption of fruits and vegetables are transversally low for the entire population). Almost 30% of the total dairy gap was concentrated in 20% of poorest population, who show a scarce milk and dairy product consumption.

Information Sources

In order to answer the research question, these are the steps followed:

1. To quantify a food balance sheet of production, consumption, and exports for the main food supply chains in Argentina, FAO balance sheets, production reports from the Ministry of Agriculture and Grain Markets, export, and import reports, and food chain reports were utilized. This analysis is useful in measuring the consumption/production relations for each food group, in order to know the percentage of total production that is intended to satisfy the internal needs. These calculations, as we stated before in this document, are made for actual consumptions and for a healthy food pattern, which corrects these values in order to arrive at nutritionally-adequate consumption levels.
2. In order to assess if Argentina is able to simultaneously provide for both local and foreign markets, the results of food balance sheets are forecasted for the next 10 years. This is accomplished by comparing food production and internal demand for the group of food chains defined above. This analysis is intended to project internal needs for each food group, taking in account projected population, and compare them with different production and exports projections.

The information is based on the projections provided by:

- The Argentine Ministry of Agriculture Strategic Plan (Plan Estratégico Agropecuario Argentino (PEA)): These are the goals the Argentine government set in 2010 in terms of future production and exports for each food value chain for the year 2020.
- Baseline projections from the USDA: It makes projections of food production and exports for Argentina and world exports for the year 2023.
- INAI (Instituto para las Negociaciones Agrícolas Internacionales or Institute for International Agricultural Negotiations).⁶

The methodological approach of this paper is not new as such but borrowed from the literature on agriculture, food and nutrition using tools such as the food balance sheet, healthy food baskets, and nutritional gaps. However, these tools are applied in this paper in order to link two topics which have not been analyzed previously—agricultural policy (agricultural export restrictions) and food security, applied to the Argentine case.

Results

The food balance sheets help us estimate the consumption/production relationship for the set of food groups under analysis. This relationship provides a general idea of the percentages of production bound to cover consumption, in terms of presently consumed volumes.

⁶ The International Negotiation on Agriculture Institute was created in June of 1999 by the Bahía Blanca Grain Exchange, the Buenos Aires Grain Exchange and the Rosario Board of Trade. The objective is to achieve the best possible outcomes for Argentina in the international negotiations forums, by strengthening negotiation capabilities (<http://www.inai.org.ar/en/institucional.asp>).

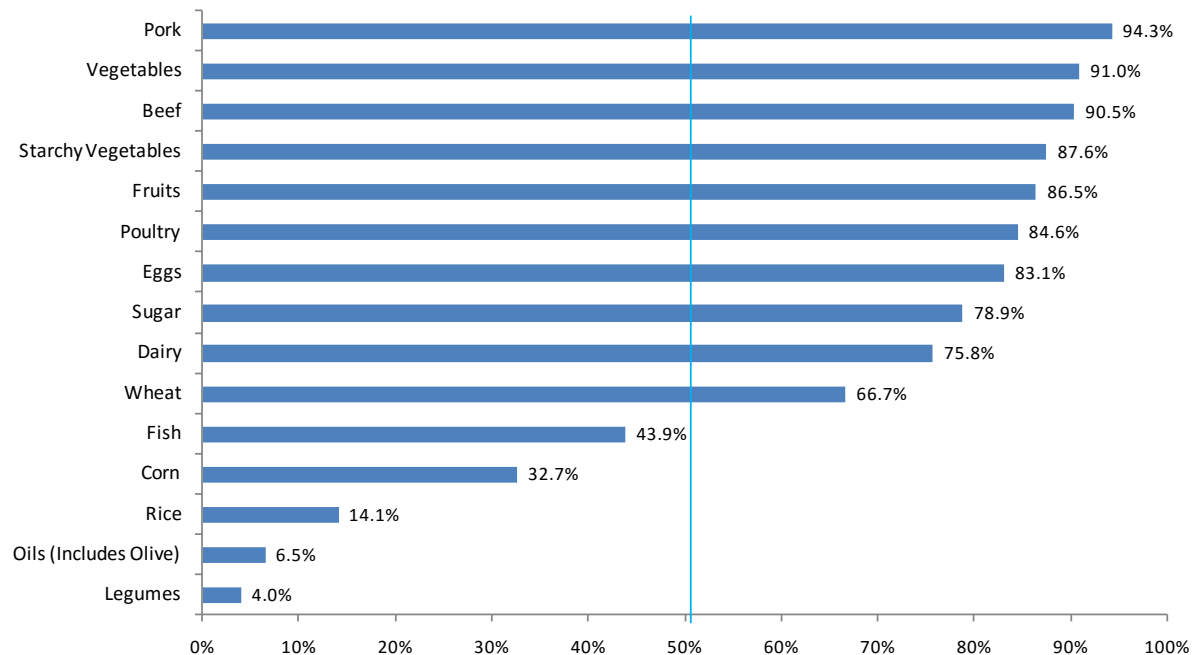


Chart 1. Apparent consumption/production ratio for selected food groups in 2013

The food chains that have lower actual consumption/production ratios are legumes (4%), oils (6.5%)—especially soybean oil which is mainly intended for exports and has a very low internal consumption, and rice (14%). To a lesser extent, other food groups with consumption below 50% of the production include corn (32.7%), fish (43.9%), fruits—including apples (33.1%) and pears (18.3%), as seen in Chart 1.

The only case where consumption exceeds production, where imports should cover part of the need, is bananas. Consumption is almost three times the amount of production. The soil and climate conditions preclude Argentina from the capacity to produce this fruit in considerable volumes.

Beyond this specific case, we observe certain food groups where consumption captures a large percentage of production leaving a rather narrow export surplus. Paradigmatic cases according to their importance in the current diet of Argentineans are meat and dairy products. Beef consumption reaches 90.5% of production, poultry 84.6% and pork 94.3%, while milk consumption captures 75.8 % of production.

Other groups that have food consumption percentages between 80–90% of total production are vegetables (non-starchy and starchy), eggs and sugar. Finally, although in a lesser proportion, wheat also poses a high consumption in relation to production, 66.7%. In general, when an analysis of the balance sheets is carried out based on the actual consumption data, it appears that in most cases production covers consumption, and imports are not necessary. However, in major food groups such as beef, poultry, pork, dairy products and, to a lesser extent, wheat, exportable surpluses are limited, since domestic consumption captures much of the production. Similarly, such ratios are observed in other chains, such as sugar or eggs.

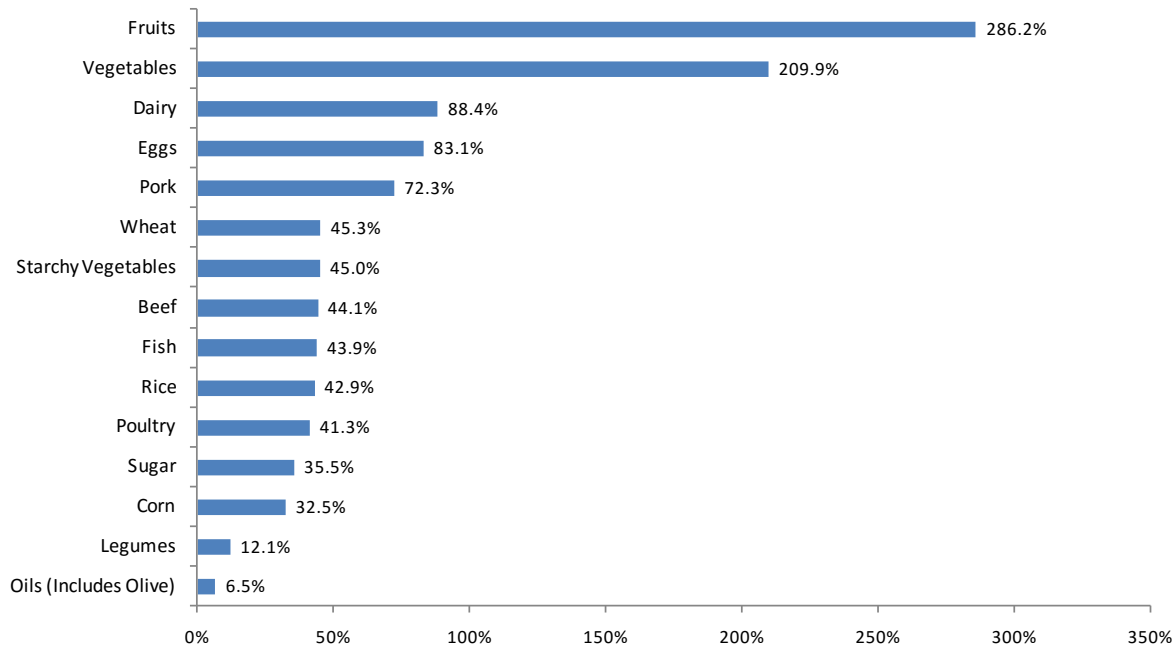


Chart 2. Healthy or recommended consumption/production ratio for selected food groups in 2013.

The analysis changes when the results are calculated based on recommended or healthy consumption values, as seen in Chart 2. These results, although more theoretical since they do not consider actual consumption, set the tone for production needs and opportunities internationally if the Argentinean diet were healthier. Additionally, as future planning demands subsidy policies, it is important to consider these results. Such policies should be built on the search for a complete diet, not only from a caloric viewpoint but also from a balanced nutrient-supply perspective.

When comparing Charts 1 and 2, it can be observed how the ratios suffer variations when recommended consumptions based on healthy food patterns are considered rather than actual consumption.

It should be noted that healthy recommended consumption levels of beef, pork, and poultry suggest how the Argentine diet is biased towards the consumption of animal protein, especially red meat. Observe in Chart 1 that actual consumption captures nearly the total production levels while in Chart 2 one can see that de-escalations into healthy ranges could result in exportable surpluses.

On the other hand, in those food groups where the average Argentine diet shows deficiencies, such as dairy, non-starchy vegetables, and fruits, there is a leap in the ratios when healthy consumption levels are considered. Dairy consumption comes close to the total production, reducing exporting surpluses. However, the actual consumptions of vegetables and fruits are so reduced relative to recommended consumption that the actual level of production would not be sufficient to equilibrate the Argentine diet, and strong stimuli would be needed to increase production.

Table 3. Dairy Balance Sheet

	Actual Consumption¹	Recommended Consumption
Total supply (Prod + Imp)	11,198	11,198
Consumption/Needs	8,476	9,884
Export surplus	2,692	1,285
Exports	2,691	2,691

Note. Estimates bases on actual consumption and health or recommended consumption.

*Reported in thousands of equivalent liters.

¹ Calculation is based on a population of 40,117,096; Argentine Population Census 2010.

The average recommended consumption of dairy products per person is 246 liters of equivalent milk, per year⁷ and implies that although production would cover consumption, the export surplus would not be sufficient to reach the present level of exports. The export surplus would be reduced by 1.3 million liters—much less than the 2.7 million liters that Argentina currently exports. Analyzing the recommended levels of consumption at the highest average production peaks for the last ten years would cover future consumption needs while maintaining the present level of exports. The highest dairy production occurred during 2011–2013, and is slightly higher than 2013; hence, it would not change the situation dramatically.

In terms of projections, production should reach 16 million equivalent liters of milk to cover the needs (based on recommended consumption), holding the present market share on the total of world exports. While the Strategic Plan of the Agricultural Ministry (PEA) has set a goal of 18 million liters, the INAI has projected 14 million liters.

Table 4. Milk Projections

	Minimum Production Required	INAI	PEA
Total supply (Prod + Imp)	15,989	14,298	18,330
Consumption/Needs	11,494	11,494	11,494
Export surplus	4,495	2,804	6,835
Exports	4,495	2,939	9,850

Note. Estimates based on healthy or recommended consumption.*Calculated in thousands of equivalent liters

Even if this latter figure does not reach the required theoretical value to cover internal needs and maintain the world market share at the same time, it is quite sufficient and more reasonable to achieve compared to the goal set by the Agricultural Ministry (PEA).

⁷ See “Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride”. Institute of Medicine (US) Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. Washington (DC): National Academies Press (US); 1997.

Table 5. Fruits and Vegetables Balance Sheets

	Fruits		Vegetables (non-starchy)	
	Actual	Recommended	Actual	Recommended
Total supply (Prod + Imp)	2,714,626	2,714,626	3,137,516	3,137,516
Consumption/Needs	1,997,831	6,610,471	2,852,326	6,582,290
Export Surplus	716,795	-3,895,845	285,190	-3,444,774

Note. Estimates are based on actual consumption and health or recommended consumption.

*Calculated in metric tons/year.

Two cases in which a deficit of production is observed is based on the recommended consumptions of fruits and vegetables. The present diet of the Argentine population suggests a bias in consumption towards animal proteins and flour, while the consumption of vegetables and fruits is lower than recommended. When these consumption levels are adjusted to the healthy diet standard, it can be observed that production is not sufficient to cover the needs. The deficit is nearly 3.5 million tons in both cases, and even when taking the largest production for the last ten years, it's observed that this deficit could not be covered. This change in the food habits requires a production strategy allowing incremental increases in fruit and vegetable production.⁸

Table 6. Meat Balance Sheets

	Beef		Poultry		Pork	
	Actual	Recommended	Actual	Recommended	Actual	Recommended
Total supply (Prod + Imp)	2,844,170	2,844,170	1,933,259	1,933,259	432,070	432,070
Consumption/Needs	2,571,506	1,254,393	1,624,742	792,557	392,782	301,120
Export Surplus	272,664	1,589,777	308,517	1,140,702	39,288	130,950
Exports	201,688	201,688	304,000	304,000	6,430	6,430

Note. Estimates are based on actual consumption and health or recommended consumption.

*Calculated in metric tons/year.

There are two cases in which the recommended consumption would decrease, allowing for an increase in exports. Meat production requires a reduction in the consumption/production ratio, especially for beef and poultry (a 40% ratio) and also pork (72%). In the case of pork meat, the share that should decrease is the one for derivatives, such as sausages and offal. This could result in a significant increase in export surplus, even if production does not increase from present levels. The export surplus for beef could reach 1.6 million tons vis-à-vis with the 270,000 tons presently exported. Projected exports for poultry could climb from 300,000 tons to almost 1.2 million, as seen in Table 6.

In other words, the adjustment to a recommended consumption pattern (with less consumption of animal proteins) would lead to an increase in exports through Argentina's participation in

⁸ We do not have available data to make projections of production, import and export of fruits and vegetables.

international markets. The lifting of strong export restrictions on the beef markets creates more opportunities for international participation as these markets are larger and the possibility of free exporting would result in stronger incentives to increase production.

Table 7. Beef Meat Projections

	Minimum Production Required	Baseline Projections USDA	INAI	PEA
Total supply (Prod + Imp)	1,720,182	2,995,000	3,081,000	3,800,000
Projected Needs	1,458,809	1,458,809	1,458,809	1,458,809
Export Surplus	262,740	1,536,191	1,623,558	2,342,558
Exports	262,740	335,000	246,000	1,008,440

Note. Estimates based on healthy or recommended consumption.

*Calculated in metric tons/year

Considering the projected consumption needs as a direct function of the predictable population growth, the minimum amount of beef production needed to cover consumption while sustaining market share in the world export markets is around 1.7 million tons. However, the projections made by the USDA and INAI, forecast a production of about three million tons. Argentina would have to potentially produce one million tons of beef to keep pace with the present level of exports.

Something similar occurs with poultry meat, in which the minimum production required in the future is 1.2 million tons; however, the USDA and INAI forecast production at 2.5 million tons. Projected exports for both organizations are between 500,000 to 700,000 tons. This would allow Argentina to increase its market share in the world exports and leave open the possibility of reaching one million tons in exports.

Table 8. Poultry Meat Projections

	Minimum Production Required	Baseline Projections USDA	INAI	PEA
Total Supply (Prod + Imp)	1,257,717	2,543,000	2,693,000	3,000,000
Projected Needs	921,712	921,712	921,712	921,712
Export Surplus	388,833	1,627,288	1,784,840	2,091,840
Exports	388,833	538,000	767,000	647,520

Note. Estimates based on healthy or recommended consumption

*Calculated in metric tons/year

The INAI figures for pork imply there is a possibility for a larger export insertion, as shown below.

Table 9. Pork Meat Projections¹

	Minimum Production Required	INAI	PEA
Total supply (Prod + Imp)	375,099	535,275	839,275
Projected Needs	350,191	350,191	350,191
Export Surplus	24,908	185,085	489,085
Exports	7,633	3,000	404,190

Note. Estimates based on healthy or recommended consumption

*Calculated in metric tons/year

¹The USDA does not publish data in particular for Argentina, since Argentina isn't among the major pork meat exporters.

Aligned with the situation described for animal proteins, the recommended consumption for wheat is lower than the present consumption, especially in derivatives such as bread and biscuits. This would lead to a reduction in the consumption/production ratio and the possibility of increasing exports. The export surplus, based on actual consumption, was 2.7 million tons for 2013; and the effective exports based on the number of permits awarded (ROE) was 2.5 million tons.

Performing an analysis based on healthy or recommended consumption and considering a constant level of production, the export surplus would be increased by 1.8 million tons. In line with the meat case, wheat exports could be even larger without exports quotas, and consequently increase incentives to produce.

Table 10. Wheat Balance Sheet

	Actual Consumption	Recommended Consumption
Total Supply (Prod + Imp)	8,197,860	8,197,860
Projected Needs	5,468,963	3,713,559
Export Surplus	2,728,897	4,484,301
Exports	2,465,482	2,465,482

Note. Estimates are based on actual consumption and health or recommended consumption.

*Calculated in metric tons

When analyzing the wheat case in terms of projections, we observe that the minimum production required to sustain the market share at international markets, is about 7.5 million tons. USDA and INAI project a production of 13.5 million metric tons, and exports of 6–7 million, which would increase significantly the export market share. To reach this production level it is necessary to redefine the incentives scheme set nowadays by current policies. This level of projected production would be more than sufficient to cover the internal needs (based on a healthy consumption) and would also increase exports.

Table 11. Wheat Projections

	Minimum Production Required	Baseline Projections USDA	INAI	PEA
Total Supply (Prod + Imp)	7,478,295	13,592,000	13,876,000	23,200,000
Projected Needs	4,318,721	4,318,721	4,318,721	4,318,721
Export Surplus	3,164,574	9,278,279	9,562,279	18,886,279
Exports	3,164,574	7,321,000	6,203,000	9,989,359

Note. Estimates are based on health or recommended consumption.

*Calculated in metric tons/year

Conclusions

This paper has explored the question of whether Argentina has the capacity to guarantee food security to its population, while increasing its role as a food exporter to the rest of the world.

As a first answer, in terms of food availability, we have shown that Argentina has no problem serving as a food provider for the internal and the external markets. The information from the food balance sheets of the fifteen food value chains shows us that Argentina is already achieving a surplus for most of the food categories. This surplus would be reached even if Argentina would change its foods habits to a healthier food pattern in the future. A health food pattern considers the possibility of reaching levels of consumption in a progressive way, and should be considered as part of the food policy debate built on a balance perspective from a nutritional approach. In this sense, considering healthy consumption, fruits and vegetables constitute an exception to the above mention results, as there would be a deficit for these two food groups. However, the need for more fruits and vegetables in future present opportunities from an agricultural and social perspective. It would benefit small producers and local economies, provide more jobs, and at the same time improve food security, as consumers are able to eat healthier food. Agriculture and food security policies should be implemented in order to produce this shift in the long term.

However, the root of the problem presented in this paper is a social issue occurring in Argentina—in spite of the country's capability to produce enough food for its population and foreign markets (as it produces sufficient food to ensure 2000 kilocalories per day to 442 million people), there is a high number of people without sufficient incomes or healthy nutritional habits, depriving them from access to a healthy food basket.

In this sense, export restrictions and internal subsidies for food companies have not been good policies for improving food security, reducing local food prices, or increasing agricultural production and exports. Agricultural policies should create incentives for producers to increase agricultural productivity which eventually create conditions that supply cheaper food products, and outcomes that export restrictions have not achieved. As seen from the export restrictions on food raw materials, Argentina has not only lost the opportunity to increase production and exports, it also has not prevented internal food price hikes.

A first response for Argentina in taking advantage of food export opportunities is to eliminate these export restrictions. This would create incentives for producers to increase production so more raw materials are available to export and produce food internally as well.

Simultaneously, in order to answer the local food security problems, an active role from the government and massive participation from a wide-spectrum of the civil society are required, as food security can be seen as a ‘wicked’ and complex problem that involves many dimensions and requires a well-designed and comprehensive food governance regime. The experiences of several Latin American countries such as Mexico and Brazil show us that a holistic approach to food security is especially required to help the most vulnerable sectors of the population. Although Argentina has a National Plan of Food Security, there is a lack of coordination among ministries at the national level, and among national, provincial and local policies to face the food security problem. The ministry of Social Development manages the National Plan, but each province and municipality has other programs which are not articulated among them. A more coherent, integrated and coordinated effort is required at different levels to fight against food insecurity.

As the literature on export taxes shows (Liefert and Wescott 2015) there are better alternatives to export taxes that result in welfare-enhancing outcomes for local consumers and less distortive from the economic perspective. For example, a consumption subsidy can be established for people with insufficient incomes to purchase food. So instead of setting export restrictions to reduce food prices (as a supply-side policies have not worked), demand-side policies to enhance food and nutritional security could provide an interesting alternative to assist the food insecure households more effectively. In this sense, conditional cash transfer programs, integrated food security and social objectives, could be a good vehicle to provide the purchasing power to food insecure families without distorting external markets. Although it has a fiscal cost and implies managing and controlling a complex system (as it is the case of the SNAP program in the US) it can be balanced by other social and economic benefits such as an increase in agricultural production and exports, and improved food and nutritional security.

Concurrently, food habits must change in order to achieve food security in Argentina. A useful tool in this sense is the Nutritional Food Guide, which has helped to reduce sodium consumption and fatty oil consumption in the past ten years. These Guides have been written and will be released and communicated to the population during 2016. There are ten principal messages they intend to convey: Incorporating all groups of foods and doing at least thirty minutes of physical activity a day; drinking eight glasses of water daily; eating at least five servings of fruit and vegetables a day; reducing the use of salt and foods with high sodium content; limiting the consumption of drinks with high contents of sugar; consume milk, yogurt and cheese—preferably skim products; when beef is used, choose lean cuts; consume more legumes and cereals, eat preferably whole grains; consume raw oil as a condiment; drinking alcohol responsibly (Ministry of Health Argentina 2015).

The implication of these results for the strategies of agribusiness firms is that there are huge opportunities for companies selling food internally in Argentina and exporting to the rest of the world, in the long run. Changing food habits will open new opportunities to sell new food products, and people will be willing to spend more money on healthier foods. This is already

happening, as there is a trend for healthier life styles—practicing more sports and healthier food choices—and this trend is likely to increase over time. A country with many natural resources and cheap raw materials should also be attractive in terms of producing, selling and exporting food products. However, in order for this opportunity to be fully materialized there are structural changes that Argentina should undertake, such as improvements in the transport infrastructure, tax reduction for internal food sales, inflation reduction, and commercial agreements with other countries, among others.

The contribution of this paper to the literature on food security consists of linking the concept of food availability with healthy food basket and food gaps, and projecting the future food availability for fifteen food chains for Argentina under a healthy food pattern. It also connects the concept of food access with demand side policies and illustrates the ineffectiveness of supply chain policies in terms of food export restrictions to solve the food insecurity problem. It also shows the need to establish a more holistic approach within the food governance system, in line with the goals set by FAO through the Community of Latin American and Caribbean States (CELAC). Future research should be oriented to issues of how to design and implement demand side policies to contribute to reduce and solve food insecurity, especially among the most vulnerable population, in the context of a food security governance system.

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Appendix 1

In this Appendix we detail the determination of both the actual consumption and the gap correction related to a healthy food patterns for the Argentine population based on an average calorie requirement of 2250 kcal. As previously stated in this research, from a nutritional perspective, the gap calculation is made over broad food categories. Nevertheless, and with the objective of determining food baskets with the criteria of actual consumption and healthy or recommended consumption, and knowing that the calculation may not be exact from a nutritional point of view, these gaps were applied to a more narrow definition of ‘food groups’ and in some cases, an individual food category. The following table sheds light into the calculation process.

Actual Consumption versus Gaps in Healthy Eating Patterns in Argentina

Food Group	Actual Consumption 2013 kg/person/year	Healthy Food Patterns 2250 kcal average kg/person/year	Comments	Calculation Methodology
Dairy	211.3	246.4	Includes fluid milk, powder milk, yogurt, cheese, dairy desserts. Everything is expressed in fluid milk equivalent liters.	Actual consumption was calculated residually, as the difference between production, imports and exports. The healthy food pattern value comes from applying the nutritional gap from Table 2 to actual consumption.
Beef	64.1	31.3		The gap expressed in Table 2 (105%) is applied to the actual consumption in order to arrive to the healthy food pattern value.
Poultry	40.5	19.8		The gap expressed in Table 2 (105%) is applied to the actual consumption in order to arrive to the healthy food pattern value.
Pork	15.0	7.5	Includes 9.5 kg of sausages and offal, and the rest is fresh meat. The gap is applied to the first part.	The reduction to arrive to a healthy food value, is made in the group “sausages and offal”, while fresh meat suffers no change. For converting sausages and offal in fresh meat, a conversion factor of 2.2 was used (which means 2.2 kg of derivatives can be obtained from 1 kg of fresh meat).
Fish	9.0	9.0		
Eggs	11.65	11.65		

Food Group	Actual Consumption 2013 kg/person/year	Healthy Food Patterns 2250 kcal average kg/person/year	Comments	Calculation Methodology
Vegetables (Non starchy)	71.1	164.1	Includes fresh tomato, processed tomato, onion, squash, carrot, and other frozen vegetables.	The gap (-56.7%) expressed Table 2 is applied to actual consumption in order to arrive to the healthy food pattern value.
Starchy Vegetables	52.5	27.0	Includes potato and sweet potato.	Table 3 considers a gap calculation (128%) for the group “Bread, other wheat flour derivatives, refined cereals derivatives and starchy vegetables” as a whole. This calculation was applied to this particular food group, knowing that it is an approximation. The reduction takes place in “Potato”, which passes to 20kg/person/year in a healthy food pattern. “Sweet Potato” stays the same.
Fruits	49.8	164.8	Includes oranges, tangerines, apples, bananas, pears and other fruits.	The gap considered was the one stated in Table 2, of -69.8%.
Wheat and Derivatives	102.5	45.0	Includes bread (fresh), bread (packaged), cookies, crackers, muffins, croissants and wheat flour derivatives.	Table 3 considers a gap calculation (128%) for the group “Bread, other wheat flour derivatives, refined cereals derivatives and starchy vegetables” as a whole. This calculation was applied to this particular food group knowing that it is an approximation. For the particular case of wheat flour, the efficiency for final products is about 75% of the wheat taken as input. In other words, each flour ton, is equal to approximately 1.33 tons of wheat ⁹ .

⁹ The wheat-to-flour conversion coefficient is 0.75, according to the report: “Una Argentina Competitiva, Productiva y Federal Cadena del trigo y sus productos derivados.” http://www.ieral.org/images_db/noticias_archivos/1900.pdf

Food Group	Actual Consumption 2013 kg/person/year	Healthy Food Patterns 2250 kcal average kg/person/year	Comments	Calculation Methodology
Corn	2.0	0.9	Corn flour	Table 3 considers a gap calculation (128%) for the group “Bread, other wheat flour derivatives, refined cereals derivatives and starchy vegetables” as a whole. This calculation was applied to this particular food group knowing that the calculation is approximate.
Legumes	0.3	0.9		The gap is applied to semolina pasta, legumes, and rice.
Oils	12.2	12.3	Includes soybean, corn, olive and Sunflower oil.	The gap (-2%) is applied to corn, olive and soybean oil. Sunflower oil presents no gap.
Rice	5.5	16.7		Table 2 considers a gap calculation (-67%) for the group “Grains, cereals and legumes” as a whole. This calculation was applied to this particular food group knowing that it is an approximation.
Sugar	29.8	13.4		The value expressed as “healthy” is calculated applying the gap for sugar stated in Table 3 (122%). This value strictly refers to a maximum limit of desirable consumption.

Sources. Actual consumption for each category was calculated by CEPEA. Healthy food pattern values for each food group were calculated by the authors, adapting the gap values presented in Table 2 and 6 to individual categories.

