v. 5, n. 6, 2025

Journal of Agricultural Sciences Research

Acceptance date: 12/08/2025

CERTIFICATION OF ORGANIC ANIMAL PRODUCTS IN BRAZIL

Vinicio Luiz Vidal Woiciekowski
Mestre em Agroecologia,
Programa de Pós-graduação em Agroecologia (PROFAGROEC),
Centro de Ciências Agrárias Universidade Estadual de Maringá (UEM)
http://lattes.cnpq.br/8993562097375456

Alessandra Aparecida Silva
Advisor – Profª. Drª.
Doutorado em Ciência da Engenharia de Alimentos.
Faculdade de Zootecnia e Engenharia de Alimentos- USP, FZEA, Brasil.
http://lattes.cnpq.br/4990257144605079

Cláudio Gomes da Silva Júnior Pedroso
Co-advisor – Profº. Drº.
Doutorado em Zootecnia.
Universidade Estadual de Maringá, UEM, Brasil.
http://lattes.cnpq.br/7764462534569789

Abstract: The aim of this work is to carry out a systematic literature review of studies on Organic Certification Processes in Brazil, focusing on animal products. The production of organic food optimizes the use of natural and socio-economic resources and fundamentally respects the culture of rural communities. It also values economic and ecological sustainability, increasing benefits, minimizing the use of non-renewable energies, without using synthetic materials or genetically modified organisms. The work is fundamental because it will provide theoretical and methodological support for other students and professionals on the subject of Certification of organic animal products in Brazil. Firstly, there will be a general approach to the consumption of organic food in the world and in Brazil, followed by an approach to organic animal products and animal welfare. A third section will focus on food safety and the conventional and organic production systems. In addition, the main pieces of legislation that deal with the subject in question and the certification processes for organic products will also be discussed.
Keywords: Pesticides, Organic Meat, Organic Certification, Food Safety.

INTRODUCTION

Organic food is produced in the Brazilian context, generally using specific techniques, which essentially seek to adopt the natural and socio-economic resources sought, always respecting the culture of rural communities. In this way, it values economic and ecological sustainability, increasing benefits, minimizing the use of non-renewable energies, without using synthetic materials, genetically modified organisms or ionizing radiation (BRASIL, 2003).

According to the criteria of the Brazilian Ministry of Agriculture, Livestock and Supply (2020), in order to be called an organic product, it must be in natura or from an organic production system, be it agricultural or the result of a process geared towards sustainability, and it must not cause any damage to the environment.

> Despite the economic crisis caused by the Covid-19 pandemic, the organic products sector recorded a 30% increase in sales in 2020, generating R$5.8 billion, according to a survey by Organis - the Organic Promotion Association. The year was also marked by the advance of these products to cities in the interior of the country. For the director of Organis, Cobi Cruz, the figures show more than just a passing jump in consumption. "The increase in itself is nothing new, since organic products quadrupled their sales between 2003 and 2017 and grew by 15% in 2019. In fact, these 30% gains in times of crisis point to a trend: the consolidation of a new scenario, in which healthy eating, sustainability and socially fairer production relations are gaining ground in society as a whole," he says. (ABRAS, 2021)

The COVID-19 outbreak that occurred in 2020/2021 has drastically changed people's lifestyles. People tend to choose healthier foods because the wrong eating habits can lead to susceptibility to the virus itself (BRACALE and VACCARO, 2020).

> In order to guarantee healthy habits, the quality of products must be guaranteed. The certification of organic products is the procedure by which a certifier, duly accredited by the Ministry of Agriculture, Livestock and Supply (MAPA) and "accredited" by the National Institute of Metrology, Standardization and Industrial Quality (Inmetro), ensures in writing that a given product, process or service complies with the standards and practices of organic production.(MAPA, 2021)

It is also worth mentioning that organic animals must be raised on large tracts of native pasture, respecting animal welfare and treated only with homeopathic and herbal medicines. In addition, production is certified by the IBD

and the meat is processed by the JBS Friboi group, following all quality and food safety standards (ABPO, 2012, FIGUEIREDO E SOARES, 2012).

Finally, the aim was to carry out a systematic literature review of studies on Organic Certification processes in Brazil, with an emphasis on Products of Animal Origin.

REVIEW OF LITERATURE

ORGANIC PRODUCTS MARKET IN THE WORLD

Organic agriculture is a procedure that shows satisfactory results in this area, due to its premise of establishing production systems based on process technologies, that is, it is characterized as a set of procedures that involve the plant, as well as the soil and favorable climatic conditions, producing healthy food with its peculiar characteristics and original flavor, which undoubtedly meets the expectations of the final consumer. (PENTEADO, 2000).

> The definition of organic food in federal law 10831 of 2003 refers to food produced without the use of synthetic materials and which prioritizes the use of biological and mechanical cultivation methods. It also points out that organic production aims to optimize the natural and socio-economic resources available, respecting the knowledge of local and traditional communities, thus promoting economic and ecological sustainability, since there is no total dependence on non-renewable energies (BRASIL, 2003).

However, in contrast to conventional agriculture, which is highly dependent on non-renewable energies and uses agrochemical products, organic production can be characterized as an alternative option, focused on sustainable practices and integrating all the elements that make up the ecosystem such as: production, soil, water, plants, animals and the presence of man in this environmental process (MUÑOZ et al., 2016).

According to Embrapa:

> The biggest obstacles to the development of organic meat production relate to the production of fodder and grains for animal feed and health. For feed, the limitation is due to the scarcity of organic rations for supplementary feeding during the dry season, low soil fertility in pasture areas, low adoption of the practice of green manuring and unfavorable weather at certain times of the year in some regions, which in the case of the latter also limits conventional systems. (EMBRAPA, 2019).

Several aspects have contributed to people seeking out this type of food as a healthy option, which have gradually been incorporated into consumers' quality of life on a daily basis. This gradual expansion took place in Europe, North America and China became the fourth country to consume organic products.

Consume organic products. There has been considerable growth, especially in European and American countries (LIMA Et alii, 2020).

> According to data from the Institute for Applied Economic Research (IPEA) (2020), the average annual growth in retail sales of organic products worldwide was over 11%, an indicator that expresses the dynamism of this sector, especially when comparing this result to data on sales of basic non-organic agricultural products. It should be noted that demand, both nationally and internationally, tends to grow over the next few years, since organic products have been associated with a higher level of food safety and quality of life (LIMA et alii, 2020).

Organic products are healthier and tastier, as they contain more nutrients than other foods, and above all they are sustainable, as farmers treat the environment with the necessary respect. In this way, there are several favorable aspects, such as lower toxicity, higher nutritional value and, above all, no pesticides.

Organic agriculture, which follows the basic principles of health promotion, ecology, justice and care, has been widely recognized worldwide over the last few decades (IFOAM, 2020).

> In short, organic food is an important practice that has been adopted in many countries for decades. According to data from the Organic Farming Research Institute (FIBL) and the International Federation of Organic Agriculture Movements (IFOAM, 2018), the global organic food market grew by 10% in 2016. According to the latest survey on organic farming in the world, 2018 was again a good year for organic farming worldwide, with the area under organic cultivation increasing by 2.9% (FIBL and IFOAM, 2020).

It is well known that the world is following a consumer trend towards products that have natural and organic characteristics and are inherently healthy. Tandon (2021) points out that consumer demand for food grown in sustainable ways, such as agroecological and organic products, is constantly growing.

> According to *Nutrition Business Journal* (2017), organic food sales in the United States increased from approximately US$ 11 billion in 2004 to around US$ 27 billion in 2012. In 2010, the United States overtook the European Union as the largest market for organic products in the world. In other words, in less than ten years, the United States has doubled its sources of income from organic products. In 2017, the United States was close to $50 billion in revenue from organic products (ORGANIS, 2019).

The marketing of organic products in these countries totaled 55.1 billion dollars in 2019, an increase of 5% over the previous year (USDA, 2021).

> The main consumer countries of organic products in the world are: United States, Germany, France, China, Canada, United Kingdom, Italy, Switzerland, Spain and Japan (Forbes, 2015). China is the largest organic food market in Asia, totally dominating the market in the region. In 2018, total sales of organic food (including beverages) in China amounted to 63.5 billion yuan, representing 0.8% of the total food consumption expenditure of 7.86 trillion yuan (IFOAM, 2020).

According to data from IPEA:

> A study carried out by IPEA identified an average growth of 11% in sales of organic products worldwide between 2000 and 2017, a period in which the number of producers rose from 253,000 to 2.9 million. According to the same study, global demand for organic food is likely to increase in the coming years, as these foods are associated with higher levels of consumer safety and health, as well as lower social and environmental impacts. (IPEA, 2020)

A gradual but extensive growth has been seen worldwide in demand for organic food (Sultan et al., 2020) with global sales exceeding $90 billion in the last twenty years. In 2015, agro-ecological agriculture is still not very widespread in the world, contributing only 0.98% compared to the conventional system. The countries with the highest levels of certified organic production are Australia and European countries such as Finland, Spain and Italy. However, when we think about the number of certified organic producers, India dominates the certification ranking with 650,000 producers. In the Americas, Mexico stands out with 169,703 producers. Europe is strongly represented by Italy with 45,969 producers, while Uganda with 189,610 producers, Tanzania 148,610 producers and Ethiopia 134,626 producers are the representatives of Africa that have been standing out in certified organic production. (IPEA, 2019)

Another important fact highlighted by the Ipea survey (2019) is the significant growth in the number of producers, which was around 253,000 worldwide in 2000 and reached almost 2.9 million in 2017. It should be noted

that this expansion has occurred mainly in Asia, Africa and Latin America. This data shows that the market is growing every year.

Below is a contextualization of the Brazilian organic market, which has been expanding ever since the 1970s.

BRAZILIAN ORGANIC MARKET

In the Brazilian context, the organic and/or agroecological market has its origins in the late 1970s, when there was a set of local initiatives that sought a healthy alternative food, and a conservative modernization began to flourish. (IPEA, 2019). However, in different states, various NGOs in partnership with social movements and family farmers' organizations also fought for this type of sustainable agriculture.

> However, as Schmitt (2017) points out, it was only in 2003 that Law 10.831 was passed, which provides for organic farming in Brazil. The law in question is a guiding principle of the regulatory framework, covering different types of alternative systems - ecological, biodynamic, natural, regenerative, biological, agroecological, permaculture and others. This law was one of the most important, projecting Brazil internationally as one of the countries that has made the most progress in favor of organic production and marketing (IPEA, 2019).

With this progress in the market, in 2019 Brazil and Chile will put into effect a mutual agreement that they have sought to formalize, which establishes that Chile will recognize Brazilian certification and vice versa. (DIB, 2019)

The organic products involved in this trade treaty are still defined and established by the local health authorities, including the official seals and common labels, which were established in order to prove the authenticity of the products (Ipea, 2019). Although the main objective was to increase exports from Chile and Brazil, it also made it possible for small producers to participate in this commercial transaction. Chilean regulations recognize, as do Brazilian regulations, that organic products established through the Participatory Guarantee System (SPG) are recognized on the same level as certification carried out by audit (private certification) (BRASIL, 2019B).

According to a survey carried out by the Organic Promotion Association (*Organis*) (2021), from March to October 2020, it showed that organic food consumption increased by 44.5% in the country compared to 2019. It's worth noting that this trend is increasing all the time. In other words, it is a well-known fact that Brazilians are increasingly concerned about their health, especially in times of pandemic.

Brazil, which has an extensive area of organic production, has little or no information on the use of its land (FIBL & IFOAM, 2020). Motivated by the consumption of healthier food, care for the environment, safety and quality of products (FIBL & IFOAM, 2020; *Organis*, 2020), the he demand for organic products has increased worldwide every year and is set to increase much more, and Brazil is part of this context. According to data from the Ministry of Agriculture, Livestock and Supply, between 2016 and 2019 there was an increase of more than 50% in the number of organic production units in Brazil (MAPA, 2020).

It is important to note that in our country, the Ministry of Agriculture, Livestock and Supply (MAPA) is responsible for registering and inspecting the bodies responsible for certifying organic production. Article 3 of Law 10.831/2003 stipulates that organic products marketed in the country must undergo a certification process via an official body (derived from an audit or participatory certification), with the exception of products

marketed directly by family farmers and registered with the MAPA (MAZZOLENI, 2005).

PRODUCTS OF ANIMAL ORIGIN - POA

It is important to note that another food that is part of the world's menu is beef. Consumer demand for this type of organic beef is becoming more and more frequent as people opt for healthier foods. Consumers and commercial establishments in Brazil are willing to pay more, as long as the meat is of high quality and safe (MORAES, 2008).

According to Neves (2016), when separating meat from cattle that can be considered organic and that is not linked to commodity designations, that is, that does not present itself as conventional meat (Neves, 2016). Organic meat caters specifically to a specific market niche, which is growing significantly every year, as more and more consumers are interested in knowing the origin of their meat (NEVES, 2016).

Organic food is grown in a special way, i.e. it is free from pesticides and is therefore produced in soil that is worked in a sustainable way.

> According to Figueiredo and Soares (2012), the main organic animal products produced annually in Brazil are chicken meat (550,000 head), eggs (720,000 dozen) and milk (6.8 million liters). This data was obtained from recent (2019) surveys carried out by the project
>
> The main challenges for the sector are the lack of marketing channels and organization of producers, as well as logistical difficulties in obtaining inputs and marketing organic products (SOARES, 2012, p. 43).

In Brazil, there are two associations of organic cattle producers, the Brazilian Association of Organic Livestock Producers (ASPRANOR) and the Brazilian Association of Organic Livestock (ABPO):

> ASPRANOR alone aims to work in other sectors of animal production, including cattle, pig, sheep and poultry farming. In turn, both have the objective of organizing the production chain for certified organic beef, as well as complying with the legal requirements for organic production, in addition to creating their own criteria with the aim of standardizing the production supplied to the market. In this sense, females must be above 12 arrobas and males above 13 arrobas (Embrapa, 2019). ASPRANOR has created its own brand called "Orgânico Boi Da Terra", which is also marketed with JBS Friboi, and all the products launched on the market, which originate from ASPRANOR, carry the association's brand and logo. The IBD (Biodynamic Institute) is a partner of ASPRANOR, certifying the properties and the industrial process at the slaughterhouse (RAMOS, 2006; FIGUEIREDO E SOARES, 2012).

The Brazilian Organic Livestock Association (ABPO) is an institution that works exclusively on the production of organic beef in the country. It seeks to market organic beef, i.e. an exclusive economic activity whose objectives are to act in a sustainable way from a social, environmental and economic perspective. ABPO's concern is to serve consumers who are concerned about eating healthily (ABPO, 2012).

We can also mention poultry farming. According to Rosa (2013), the conventional chicken meat production system is numerically the most important, representing approximately 98% of poultry farming in Brazil. This system is characterized by the use of fast-growing birds, high density, an intensive rearing system, among others. On the other hand, alternative, free-range and/or organic chicken farming, for example, has less significant production, highly informal farming, birds raised in a semi-intensive system, access to the outdoors, and healthy food, such as the exclusive use of organic ingredients for organic birds, generating

food products free of agrochemicals. The norms and legislation that standardize these systems are: ABNT NBR 16389:2015 for free-range chickens; ABNT NBR 16437:2016 for free-range eggs; Normative Instruction No. 46/2011 and 17/2014 for organic chickens and eggs.(ROSA, 2013)

According to *Certified Humane* (2020), due to technological advances within the poultry production system, such as genetic improvement, developing strains suitable for meat production, the use of drugs and veterinary medicines for sanitary control, as well as innovations that have made it possible to increase efficiency and productivity in the poultry sectors, however, it is still common to find overcrowded, uncomfortable and stressful poultry houses.

Organic poultry production must be based on a system that is concerned with raising poultry without the use of food grown with pesticides, and especially without the use of synthetic fertilizers or additives, veterinary drugs or even transgenic seeds

> In Brazil, organic plant and animal production is regulated by MAPA Normative Instruction No. 46 of October 6, 2011, as amended by MAPA Normative Instruction No. 17 of June 18, 2014, which establishes the Technical Regulations for Organic Production Systems, as well as the lists of substances and practices permitted for use in Organic Production Systems, in the form of this Normative Instruction and its Annexes, in which reference is made to products obtained through organic, ecological, biological, biodynamic, natural, sustainable, regenerative and agroecological systems (MAPA, 2011).

Pork is the most widely consumed meat in the world, even though there are a number of different meats on the market. In Brazil, pork consumption has been growing over the years, second only to chicken, which is in first place, and beef, which is in second place (USDA, 2019).

In the midst of these challenges, there is some good news: per capita pork consumption has risen in Brazil for the second consecutive quarter, reaching 17.58 kg and 17.58 kg in the six-month average, remembering that the record consumption was reached in 2020, with 16.9 kg. In other words, despite the purchasing power problems of the population in general and the restrictions of the Covid-19 pandemic, pork has increasingly shown itself to be an option for Brazilian consumers, who have increasingly increased the presence of pork on the table in 2021. (ABCS, 2021)

Currently in Brazil, pork is still not widely consumed compared to other meats, especially chicken and beef.

In terms of Brazilian states, Paraná has the largest herd in Brazil with 7.13 million head, and is the second largest pork producer in Brazil. Its total production is 828,200 tons per year, of which 97,000 tons are exported, representing 21.7% of Brazilian production (DERAL, 2018).

It should be noted that although Brazil is still in the early stages of this type of market, organic pigs are considered to have been generated by non-organic matrices, but essentially raised with this care objective in mind, from the first months of life, based on organic pig premises. (DERAL, 2018).

Finally, it is worth noting that organic products of animal origin respect animal welfare. Thus, animal welfare indicates how an animal is coping with the conditions in which it lives. An animal is in a good state of welfare (when indicated by scientific evidence) if it is healthy, comfortable, well-nourished, safe, able to express its innate behavior, and is not suffering from unpleasant states such as pain, fear and distress. (MINISTÉRIO DA AGRICULTURA, PECUÁRIA E ABASTECIMENTO, 2018)

> Animal welfare requires disease prevention and appropriate veterinary treatment, shelter, appropriate management and nutrition, humane handling and slaughter or sacrifice. Animal welfare refers to the state of the animal, the treatment the animal receives is covered by other terms such as animal care, husbandry and humane treatment (MINISTÉRIO DA AGRICULTURA, PECUÁRIA E ABASTECIMENTO, 2018).

According to the Commission on Ethics, Bioethics and Animal Welfare, an animal that has well-being is healthy and can therefore express its natural behavior.

As explained above, products of organic origin can be considered healthier for human health. In this sense, the main differences between the Conventional and Organic-Agroecological Animal Product Systems will be demonstrated below.

PRODUCTION SYSTEM ANIMAL

In Brazil, conventional agriculture was significantly motivated in the 1970s and originated in the technological packages of that particular government, known as the Green Revolution, as a result of economic growth (COMTERATO; FILIPI, 2009).

> The conventional system of agriculture, whose production process is based on the use of chemical fertilizers and pesticides. The organic system, on the other hand, is an agricultural production process that does not make use of chemical inputs, using techniques that take into account the soil/plant/environment relationship, i.e. there is a concern to take care of the health of humans and animals and to preserve the environment (MEIRELES; RUPP, 2014).

Conventional agriculture is the economic base of the country, which is heading in the opposite direction to sustainable development, where many producers use agrochemicals without any control, overdoing it, deforesting and degrading the soil and surface and groundwater.

Organic farming, on the other hand, is a promising alternative with a broadly sustainable bias. It acts in balance, providing income and well-being for producers, as well as being able to mitigate pre-existing environmental degradation (DOURADO, 2021).

According to Penteado (2012), organic farming is integrated into the basic principles of agroecology, i.e. it uses various diversification strategies that seek to act in harmony with nature, such as polycultures, biofertilizers, cover crops and animal integration, and always seeks to improve its methodologies, guaranteeing the health of the agrosystem and also bringing good productivity.

It's worth mentioning that encouraging organic farming fits in perfectly with necessary local practices, because as well as contributing as an alternative to family income for less well-off farmers, acting to eradicate poverty and achieve inclusive and sustainable economic growth, it also provides learning, female empowerment and the fight against climate change and its harmful impacts. At the same time as this practice sustains agricultural productivity, it protects the soil and conserves energy, making external inputs unnecessary (ATIERI, 2012).

In this sense, organic planting offers a good level of remuneration to farmers and, in addition to having higher nutritional quality, its production avoids workers' contact with pesticides and their possible harmful effects. Furthermore, it enables better management of natural resources, since it does not generate polluting waste and increases respect for living organisms, in the diversification of flora and fauna and consideration of life cycles and natural methods, where growth and disintegration balance fertility reserves (HOWARD, 2012).

> According to Altieri (2012) the diversity of agroforestry systems establishes a more efficient use of natural resources, presenting environmental and socio-economic advantages. The biodiversity of an agroecosystem is intensified by the number of crops that make up the rotation, the proximity of the forest, the presence of native vegetation and the diversity of vegetation around and within the production system (ALTIERI, 2012).

Deforestation is a serious problem in Brazil as a result of animal production systems. However, extensive livestock farming occupies around 70% of the deforested area in the Amazon region and more than half of Brazil's 105 million hectares of pastureland are environmentally degraded or in the process of being degraded (BRASIL, 2008).

A survey carried out in Brazil on the profile of consumers of organic beef involved retailers (supermarkets) and institutional traders (restaurants) as well as end consumers. The main aspects questioned were quantity and regularity of supply (the need to meet demand); quality (associated with certification of origin and means of production) and price (these are fundamental variables, although not determining factors in the purchase of this type of meat). (CALEMAN, 2005)

In order to differentiate between conventional and organic meat production, a detailed recommendation is the documents available from the Brazilian Association of Organic Producers (ABPO). This documentation is responsible for the technical and inspection of organic cattle produced in the country, and producers wishing to adopt organic meat production must comply with its recommendations. The use of pesticides in Brazilian agriculture began in 1920,

It began in the 1920s, a period when toxicological products were still little known. In the context of the Second World War, these products were used as a chemical weapon, expanding worldwide, reaching two million tons of pesticides per year (ECOBICHON, 1996).

> According to the definition given by Brasil (1989), agrochemicals are products and agents of physical, chemical or biological processes intended for use in the production sectors, in the storage and processing of agricultural products, in pastures, in the protection of native or planted forests, and other ecosystems, as well as urban, water and industrial environments, whose purpose is to alter the composition of flora or fauna in order to preserve them from the harmful action of living beings considered harmful, as well as substances and products used as defoliants, desiccants, growth stimulators and inhibitors.(ECOBHICHOM, 1996)

The use of pesticides in agriculture is still the main strategy in the field with the aim of combating and preventing pests there, as well as increasing productivity at a low cost (CANTARUTTI, 2005).

It is important to note that controlling pests in agriculture can significantly reduce diseases in humans and animals. Remembering that these agents remain in the environment for long periods of time, affecting the entire ecosystem. According to (1991), the long-term effects of these agents in agriculture have repercussions on public health, making it essential to monitor these products in water, soil, food and air.

The guarantee of contaminant-free food is essential for disease prevention, especially in a country like Brazil, which faces serious problems of nutritional deficiency and access to the public health system (CALDAS, 2000).

> Organochlorine pesticides have also been widely used against agricultural pests and cattle ectoparasites. Because they are extremely fat-soluble, they are slow to break down and can accumulate in the environment (they can persist for up to 30 years in the soil) and in living beings, contaminating humans directly or through the food chain, as well as having a carcinogenic effect on

> laboratory animals (Costabeber, 2003). They can be introduced into the body via the skin, digestive and respiratory routes. However, the main route of contamination is through food, especially food containing a high amount of fat (FLORES, 2004).

Caldas (2000) describes in his research that pesticides are highly toxic to humanity, although, due to their economic importance, they are widely used in agriculture. And because of their widespread use, their residues are found in food and the environment as a whole.

> Chemical compounds are used worldwide to protect agriculture and livestock as insecticides, with the aim of controlling and combating pests in crops and avoiding parasites in animals. They belong to four distinct groups: organophosphates, organochlorines, carbamates and pyrethroids (PAHO, 1997). The exposure of people to pesticides can be attributed, among other factors, to the consumption of food of animal origin when it is contaminated by residues of these substances (CANTARUTTI, 2005).

According to the Brazilian Ministry of Health, organophosphate pesticides and carbamates are widely used to inhibit cholinesterases. These substances lead to the accumulation of acetyl choline in nerve synapses (Brasil, 1998). As for organophosphates, carbamates act differently, as they reversibly inhibit cholinesterases, although they are insecticides that are widely toxic (BRASIL, 1998; CALDAS, 2000).

An important fact to mention is that according to the World Health Organization (2020), every year there are between 30,000 and 40,000 deaths from organochlorine and organophosphate pesticide poisoning, and half a million people suffer poisoning through ingestion or inhalation (SANTAMARTA, 2001).

> Another fact to note is that in Brazil, one of the world leaders in pesticide consumption, the volume of these toxic agents released for use in 2019 was the highest in the last ten years. According to data from the Ministry of Agriculture, Livestock and Supply, the overall total of registrations granted up to December 2019 reached 474, of which only 8% were of biological and organic origin (BRASIL, 2017).

Almeida (2009) argues that assessing the risk of human exposure to chemical contaminants presents challenges for researchers, scientists, public policy managers and health professionals. In this sense, the growing complexity of FNS associated with food quality requires effective approaches to prioritize the risks inherent in pesticide residues present in food and the creation of protection mechanisms for the population.

According to research by Baurdry (2018), some of the specific fears in relation to food quality mainly include nutritional quality, pesticide residues and resistance to genetically modified crops.

> According to a report produced by the Swiss Federal Office for the Environment (Ofev, 2019), organophosphate pesticides such as profenofos are extremely toxic to aquatic organisms, birds and bees, leading to disastrous deaths for the latter. Bees are the main pollinating agents and pollination is one of the essential mechanisms for maintaining biodiversity and producing quality food (COSTA; OLIVEIRA, 2013).

Carneiro (2015) argues that the contamination of food by pesticide residues in Brazil is mainly due to the lack of government oversight in relation to the substances that are used by the conventional production system. Some of these substances are even banned in other countries. It is also worth mentioning that they are often applied in higher doses than permitted or in a "disastrous" way, such as aerial spraying, which not only proves to be inefficient in many cases, but also poses risks to human health and the balance of the ecosystem.

In a study carried out by Skwarlo-Sonta (2011) with rats, it was shown that body fat levels were higher in those fed conventional crops compared to those fed organic. According to the aforementioned study, the overweight of these animals may be related to exposure to fertilizer residues. In turn, with regard to hematological parameters, leukocyte numbers were affected, being higher in the blood of rats fed diets based on organic crops, which indicates their better immune function.

It is important to point out that, generally speaking, most of the crops produced by conventional production systems are transgenic. According to Camara (2009), research and studies involving the potential risks to human consumption of genetically modified foods, such as transgenics, are still limited. Furthermore, in 2003, the *Codex Alimentarius Commission of* the Food and Agriculture Organization of the United Nations and the World Health Organization adopted a list of principles for the analysis of risks arising from the application of transgenic techniques (FAO; WHO, 2003).

> In turn, the assessment principles require the investigation of: (1) direct health effects (toxicity); (2) tendency to cause allergic reactions (allergenicity); (3) specific components that promote nutritional or toxic properties; (4) stability of the inserted gene; (5) nutritional effects associated with the specific genetic modification; and (6) any unintended effect that may result from the genetic insertion (CAMARA, 2012).

In this scenario, aspects related to products used on animals must also be assessed. According to data from the Ministry of Agriculture, Livestock and Supply (2021), even products for veterinary use contain toxic chemicals and chemicals, which, when prepared and applied individually or collectively, are directly intended for the purpose of preventing diseases, diagnosing, curing or even treating various animal diseases, and must be products that, when used on animals in their habitat, actually protect and manage to restore or even modify organic and physiological functions, as well as all products that are intended to beautify animals.

As has been widely discussed in this thesis, pesticides are made up of a wide variety of chemical substances or biological products that have already been defined... They are products designed to kill, exterminate, combat or hinder life (many act on specific processes, such as growth regulators). Thus, because they act on vital processes, most of these poisons have an effect on the physical constitution and health of human beings (EPA, 1985).

> Finally, according to information from Anvisa (2020), dietary exposure to residues of veterinary medicines (RMV) can cause adverse effects on human health, both acute and chronic. Anaphylactic reactions, although rare, have been reported in sensitive individuals after consuming milk and meat containing penicillin residues. However, the greatest concern is the health consequences of chronic dietary exposure to RMV at sub-acute doses. Another concern is the issue of antimicrobial use and the spread of bacterial resistance, especially for bacterial species of interest in human medicine (ANVISA, 2020).

CONSUMPTION OF ORGANIC POA AND CONSUMER HEALTH AND PUBLIC HEALTH

According to research by Azevedo and Rigon (2010), analyzing the effects of pesticides on human health, they found that various diseases can be triggered by the use of pesticides,

> " such as immunodepression, Parkinson's disease, depression and other neurological disorders, abortion and congenital problems, some types of cancer (especially hormone-dependent ones), infertility, congenital malformations, respiratory symptoms and

> sterility in adults. The aforementioned authors also compile studies that point to clinical manifestations (rhinitis, urticaria, angioedema, asthma and allergies) caused by synthetic chemical additives, particularly artificial colorings. In general, the studies point to harmful effects on human health". (RIGON, 2010)

Powlson (2008) contributed with his research, analyzing a positive association between nitrate and non-Hodgkin's lymph nodes, cancer of the bladder, ovary, uterus and rectal cervix and a type of anemia in babies, methaemoglobinemia. However, these studies describe the beneficial effects of nitrates on gastroenteritis and cardiovascular diseases. All this research is still controversial and more studies are needed to clarify the real situation of pesticides in human health.

> In the scientific literature, some studies have evaluated the benefits of consuming organic food for human health. These studies claim that an organic diet can reduce children's exposure to pesticides (Bravo, 2006) and have a positive effect on fertility, since many pesticides are endocrine disruptors (a diet free of this class of pesticides can have an effect on male fertility) (Jensen, 1996). However, as mentioned above, it is difficult to establish relationships, since population studies that have compared the health of people who habitually consume organic food with the health of those who consume conventional food have shown a large number of uncontrolled variables (BRAVO, 2006).

In relation to nutritional value, many aspects must be analyzed in these studies, such as the time of organic production, the re-establishment of the life of the soil used, the type of organic system that was used, which can vary according to external factors (sunlight, temperature, rain), storage and transport, which directly influence the nutrient content in plants (Azevedo, 2006).

> Most countries have adopted evaluation systems to scientifically estimate the potential risk to human health from the presence of chemical substances in food. (*Food and Drug Administration*, 2012) Risk management approaches vary depending on the origin of the chemical product.
>
> (*Food and Drug Administration*, 2012) For the *Food and* Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), exposure assessment should be expanded to take into account differences in dietary habits between countries. These organizations also recommend that countries carry out analyses based on the total diet study (TDS) to assess the exposure of the general population and vulnerable groups, such as children, to chemical contaminants. Furthermore, the EDT method estimates the dietary intake of chemical elements and nutrients through direct analysis of prepared food samples that reflect the average dietary habits of population groups *(*FOOD AND DRUG ADMINISTRATION, 2012).

The performance of organic production systems should be conventional, according to Preston (2008), where the degree to which they essentially control the aforementioned external factors is lower than in laboratories. In this way, it is possible to verify the aspects that hinder planning and effective studies, the results of which can be presented in a systematized way and compared to the results of different studies.

The results of studies comparing organic and conventional foods were summarized in two major reviews carried out in 2009.

According to Uauy (2009):

> organic food is far superior to conventional products in nutritional terms. The other is more favorable (Lairon, 2009), but still signals controversy in the field of study. Researchers from the UK's *Food Standards Agency* (FSA) claim that there is no evidence of health benefits in the consumption of organic food compared to conventional food in terms of nutritional value. They therefore state that these foods are not relevant to public health.On the other hand, the *Agence*

> *Françoise de Sécurité Sanitaire des Aliments* (AFSSA) carried out an evaluation of studies on the nutritional quality of organic food compared to conventional food and found opposite results: higher dry matter content in tubers, roots and leaves; higher iron and magnesium content in vegetables such as potatoes, cabbage, carrots, beets, leeks, lettuce, onions, celery and tomatoes; more vitamin C in potatoes, leeks, cabbage and celery; higher amounts of beta-carotene in tomatoes, carrots and organic milk; higher amounts of phytochemicals in apples, peaches, pears, oranges, onions, tomatoes, potatoes, peppers, olive oil (phenolic compounds), wine (resveratrol) and tomatoes (salicylic acid) (Lairon, 2009).. The French study also highlights the higher content of polyunsaturated fatty acids in organic milk, eggs and meat, since the pasture-based diet and free-range rearing advocated in organic animal management result in meat and milk with lower levels of saturated fat (Lairon, 2009). Both reviews confirm the increased content of nitrates in foods of conventional origin (UAUYM 2009).

In terms of sensory aspects, i.e. analyzing the taste of organic food, research suggests that it is tastier (Prescott, 2002). However, analyzing all the sensory aspects of quality is highly complex, due to the subjective (*Food and Agriculture Organization*, 2000) Another aspect that should be highlighted is durability, due to nitrogen-based fertilization, which is generally used in conventional agriculture and ends up promoting a significant increase in the water content of vegetables, making these foods more perishable (AZEVEDO, 2006).

> There is also the issue of the price of organic products. Azevedo (2006) highlights the inherent price variants involved in the food production process. In simple terms, it is claimed that the added value, which can vary from 20 to 100% more for organic products compared to those of conventional origin, is caused by the law of supply and demand. In view of the low demand compared to conventional food, the organic product is not yet competitive on the large market. However, other aspects of marketing need to be analyzed in order to boost the marketing of organic products, since the price makes accessibility difficult. Among other things, it is necessary to understand the confrontation between the large marketing circuit (supermarkets) and the short circuits (fairs and direct sales). (AZEVEDO, 2006)

It should be noted that organic production ends up requiring more labor. Therefore, by purchasing this type of food, consumers are helping to strengthen this type of diet and become socio-environmentally aware, knowing that by looking for organic products, they are playing a decisive role in this transition.

The food in question is something that is part of human daily life, and the question that must be asked is: What is the value of our health? Is it really worth buying an organic product or not? In general, it's a subjective question where it's up to each consumer to define their needs and possibilities at the time.

ORGANIC PRODUCT LEGISLATION WORLDWIDE

This topic explores three different countries' legislation: Japanese, American and European Union. Let's take a look at each one below.

JAPAN

> The JAS (Japanese Agricultural Regulations) certification is issued by Ecocert Japan and has a high level of reliability from the Japanese accreditation body MAFF (Ministry of Agriculture, Forestry and Fisheries). In Japan, Ecocert is the global company offering local and international certification for organic products. Japan is the largest market in Asia and consumers are aware of organic products and their production methods.
>
> Japan produces rice, tea, sake and rice vinegar, but it is also a major importer of a wide variety of organic foods. It is the largest

Journal of Agricultural Sciences Research ISSN 2764-0973 DOI https://doi.org/10.22533/at.ed.973562507015

> importer of organic products in the region, with price premiums reaching between 20% and 50% more than conventional products (BRASIL, 2007b).

Japan completes the domestic supply of its organic market with products from Argentina and Australia, USA. However, according to data from Japan, retail sales have been falling significantly since production standards were introduced (JAS/2001). Some products have been labeled "green" along the way, so they no longer appear in official statistics, although consumption is on the rise (FONSECA, 2005).

It should be noted that according to the Japanese Ministry of Agriculture, supermarkets and restaurants are gradually taking over the sale of organic products, with the participation of consumer cooperatives and direct sales.

EUROPEAN UNION

Yussefi and Willer (2007) analyze the growth of organic production in the European Union, which has been outstanding over the years, averaging 30% by 2001. All this expansion has made Europe the continent with the second largest area of certified organic production worldwide. One of the aspects of this growth has been public incentives, with public policies aimed at encouraging organic production in some countries on this continent.

> Following the regulation of production in the sector by EEC standard 2092/91, Europe adopted subsidy policies for the conversion of conventional systems to organic systems through EEC regulation 2078/92. Another fact that shows Europe's interest in the organic sector is its large participation in international trade. Some countries need to import to meet domestic demand, such as Germany and the United Kingdom, but some countries also participate in the export market with these goods, such as Spain and Italy (OLIVEIRA, 2003).

Furthermore, in 2018, the European Parliament approved the new Regulation for the production and labeling of organic products in the EU - Regulation 2018/848. The new rules came into force on January 1, 2021 and, as it is a Regulation, its application is mandatory and uniform in the European Union.

With the new rules, millions of small farmers around the world could suffer. The new regulation could bring unnecessary costs to cooperatives and cooperative federations and to those who wish to fall within the scope of the regulation.

New EU requirements. There is also a risk that the system will be weakened as groups will have to spend their scarce resources on expensive registration and administration processes, rather than on the training and support farmers need. In addition, the new regulation would create artificial management structures that only exist on paper, which may be more difficult to control. (FNS SUPPLEMENTAL NUTRITION ASSISTANCE PROGRAM, 2013)

According to European regulations EC 834/2007 and 889/2008, which establish guidelines and technical standards for the production and marketing of organic products in the European Union, covering the scope of primary production and also the processing of organic products.

UNITED STATES

> In the USA, the *United States Department of Agriculture* (*USDA*) is the public agency responsible for agriculture in the United States. Its aim is to develop and implement policies related to agriculture, support farmers and ranchers, promote trade in agricultural goods, ensure food safety, protect natural resources, support rural communities and ensure that the needs of the American people are met. *Regenerative Organic Certified (ROC),* a new certification that uses the United States Department of

Journal of Agricultural Sciences Research ISSN 2764-0973 DOI https://doi.org/10.22533/at.ed.973562507015

> Agriculture (USDA) organic certification as a baseline, adding additional requirements involving soil health, animal welfare and **social** justice. USDA (UNITED STATES DEPARTMENT OF AGRICULTURE).

Some of the changes to the ROC are shown below

> 1) The ROC is set to become the new standard in organics, replacing the USDA organic seal. Over the years, many industry observers have become very frustrated with the USDA because organic rules are not being enforced and believe that the integrity of the seal has been damaged.
>
> 2) Reasons for this frustration include: allowing hydroponics in organics, which violates the local organic food law, and "factory farms" that don't fully respect new animal welfare standards.
>
> Another important component of the ROC is social justice. Among other things, this requirement calls for fair payments for farmers, good working conditions and wages.
>
> Many workers from Latin America with agricultural work visas in the US work in conditions that are analogous to modern slavery. Therefore, for companies that really want to express their commitment to farm workers, obtaining ROC certification is one way to achieve this goal.
>
> From now on, any brand that is interested in applying for certification must sign up to the ROC newsletter. It should be noted that, after 50 years, the US Egg Products Inspection Act (EPIA) has begun to be modernized. The information was released on (9/9/2020) by the FSIS (Service of Inspection and Safety Food), of the USDA (UNITED STATES DEPARTMENT OF AGRICULTURE).

From agreement with measures adopted by the US Department of Agriculture, which since 21/05/2021, the country has begun to forgive the debts estimated at four billion dollars of ethnic minority farmers, with the aim of minimizing racial discrimination.

> The American Rescue Plan, which became law in March, ordered the USDA to pay off all debts held by "socially disadvantaged" minority producers. The measure faced opposition from some white producers and raised concerns among banks (MONEYTIMES, 2021). In October 2002, the National Organic Program (NOP) was launched, which determines the technical regulations and guidelines for the entry of organic products into the United States. The program is regulated by the United States Department of Agriculture (USDA). It should be emphasized that the United States also has an equivalence agreement between its standard and that of Canada, through which any organic product certified under the COR (*Canadian Organic* Regime) standard can enter the American market and vice versa (OIA BRASIL, 2021).

The Organic NOP certification is granted by the International Agricultural Organization S.A. (OIA).

ORGANIC PRODUCT LEGISLATION AT BRAZIL

It was only in 2003 that Brazil passed Law No. 10.831, which establishes organic farming in the country and sets out the guidelines for the regulatory framework, providing for different types of alternative systems - ecological, biodynamic, natural, regenerative, biological, agroecological, permaculture and others. This legislation and the institutionalization of public policies aimed at sustainability have made Brazil one of the countries that has expanded the most in terms of organic marketing (SAMBUICHI, 2017).

The main existing laws in Brazil are highlighted below. The intention is not to exhaust and analyze each law, but rather a brief analysis.

1. Ordinance No. 331, OF NOVEMBER 9, 2012 - This ordinance

appointed the following bodies and entities as members of the National Commission for Agroecology and Organic Production (CNAPO).

2. Ordinance No. 52, OF MARCH 15, 2021 - This ordinance established the Technical Regulations for Organic Production Systems and the lists of substances and practices for use in Organic Production Systems.

"There are high expectations of a positive impact on the development of Brazilian organic production, as the new text is more up-to-date, with clearer language, the incorporation of new substances and practices into the positive lists, expanding the technological options available to producers and better adapting the text to the principles of organic production," explains MAPA's Organic Production coordinator, Virgínia Lira).

This ordinance has brought about a number of changes, some of which I'll mention below for information purposes:

1. Article 15 of the new regulation states that during the conversion period, products and by-products from the production unit cannot be marketed as organic.

2. This new regulation includes an item on the certification of inputs.

From now on, inputs produced in organic production systems, in accordance with the Technical Regulation, can receive organic certification.

3. As far as general requirements are concerned, Article 29 has been included, which states that the maximum age for entry for non-organic poultry is 15 days and for non-organic laying poultry, 35 days.

4. With regard to animal nutrition, the animals are allowed to consume food produced on the production unit itself during the period of simultaneous conversion of the area and herbivores, after the conversion period has ended.

5. Art. 97 of the new Technical Regulation states that plant production must be carried out using soil, preferably in the natural environment.

6. Finally, the section of the new regulation relating to seeds and seedlings has been improved and is more detailed.

3. Law 10.831 - December 23, 2003 - Law 10.831 in question, of December 23, 2003, established what an organic production system is and defined its purposes. It is probably the most important milestone with regard to organic products in Brazil.

The law also defined that organic products to be marketed must be certified by an officially recognized body. Certification is divided into two types: audit certification and participatory certification. In addition, in the case of family farmers who sell their produce directly to consumers, they are exempt from certification, provided they have registered with MAPA and have their own social organization and control processes. Under the law, product traceability and free access to production or processing sites must be guaranteed.

4. Decree 6.323 - This decree was a more detailed regulatory instrument, covering issues relating to: General provisions, regarding labor relations, production, conversion, parallel production, technical production regulations and good practices, quality information (labeling, identification in direct sales, advertising and publicity); control mechanism, inputs, organic conformity assessment bodies (participatory guarantee systems and certification by audit, inspection, etc.).

5. Normative Instruction No. 46 - Normative Instruction No. 64 of December 18, 2008 was initially created and replaced by Normative Instruction No. 46 of October 6, 2011. This same Normative Instruction was later modified by Normative Instruction No. 17 of 2014, which amended various articles and provisions of IN 46. This IN

established the Technical Regulations for Organic Production Systems, as well as the lists of substances and practices permitted for use in Organic Production Systems.

It is worth mentioning that Normative Instruction no. 46 defined that every farmer in conversion or organic must keep an organic management plan (pmo) containing various pieces of information about the management and internal organization of production, inputs, among other aspects. It also established the conversion periods for the various animal and plant species.

6. Normative Instruction No. 54 - Normative Instruction No. 54, of October 22, 2009, established the structure, composition and attributions of the organic production commissions, both at the national level (CNPORG - National Organic Production Commission) and in the states (CPORGs - State Organic Production Commissions).

According to this regulation, the purpose of the organic production commissions is to assist in the actions necessary for the development of organic production, based on integration between the various agents in the organic production network, from the public and private sectors, promoting the participation of society in the planning and democratic management of public policies.

7. IBAMA Normative Instruction no. 17 of 01/05/2009 - Instituted the administrative procedures for the environmental re-evaluation of pesticides, their components and the like within the scope of IBAMA.

8- Normative Instruction no. 18 - Normative Instruction no. 18, of May 28, 2009, established the technical regulations for the processing, storage and transportation of organic products. Normative Instruction no. 18 established a list of permitted products for sanitizing equipment and facilities and set parameters for separating organic and non-organic production in the same area.

It is also worth mentioning that Normative Instruction 18 prohibits the use of ionizing radiation, microwave emissions and nanotechnology at any stage of the production process and establishes that the ingredients used in the processing of organic products must come from production originating from the Brazilian Organic Conformity Assessment System.

9 - Normative Instruction no. 19, of May 28, 2009 - Approved the organic quality control and information mechanisms. This IN established the organic conformity assessment mechanisms and details the creation and operation of the SPGs (Participatory Guarantee Systems) and their participatory conformity assessment bodies (OPAC). It also refers to the creation and operation of conformity assessment bodies (OAC - Certifying Bodies) and Social Control Organizations (OCSs).

10 - Normative Instruction no. 50, of November 5, 2009 - This Normative Instruction instituted the single official seal of the Brazilian Organic Conformity Assessment System (SISORG), establishing the requirements for its use on organic products.

ORGANIC PRODUCT CERTIFICATION PROCESSES IN THE WORLD

Over the last three decades, organic or ecological production has grown significantly worldwide, both in terms of the area under cultivation and the number of farmers who identify with this way of producing ecologically.

In this sense, we must bear in mind the effects produced by the increasing incorporation of new technologies into agri-food systems, the impacts of which have been felt in the growing distance between the consumer and

The impacts have been felt in the growing distance between consumers and the production of their own food, increasing suspicions about food manipulation, which have ended up becoming certainties in the face of recent global episodes (mad cow

Journal of Agricultural Sciences Research ISSN 2764-0973 DOI https://doi.org/10.22533/at.ed.973562507015

> disease, dioxin poisoning, avian and swine flu, and more recently, the Spanish cucumber crisis3). As a result, citizens are constantly concerned about the safety and quality of the products they consume (BECK, 1998; DÍAZ MÉNDEZ and GÓMEZ BENITO, 2001; CALLEJO, 2005;
>
> AGUILAR CRIADO, 2007), as well as their origin.
>
> The fact is that organic products, as Barbosa and Lages (2006) mention, are considered "goods of belief", since they have quality attributes that cannot be identified by simple observation. It is therefore through the implementation of control and certification processes that we can ensure the presence of attributes, which are largely intangible, verifying that the product conforms to certain technical standards, possessing the attributes of value on which its distinctive character is based (ALLLAIRE and SYLVANDER, 1997; MINETTI, 2002).

Organic products are accredited by the *International Federation of Organic Agriculture Movements* (IFOAM), which is the international federation that establishes the various movements related to organic agriculture.

> In other words, the regulation of organic products is carried out by IFOAM, the *International Federation of Organic Agriculture Movements*, which is the world body that establishes basic official rules that create an "international guarantee system for organic products" and also promotes movements to spread the adoption of systems based on the principles of organic agriculture (IFOAM, 2007). In order to accredit certifiers, IFOAM relies on the support of IOAS (2007), which ensures the standardization of certification programs at an international level (IFOAM, 2020).

When referring to standardization, it is important to note that each country must adhere to its internal legislation and regimes. Example: In the United States, there is a new certification model called ROC - *Regenerative Organic Certified* - which uses the US Department of Agriculture's organic certification as a basis and then adds other criteria for soil, animal and worker health and well-being.

> In Japan, for example, JAS certification is issued by Ecocert Japan and has a high level of reliability from the Japanese accreditation body MAFF (Ministry of Agriculture, Forestry and Fisheries). In Japan, Ecocert is the global company that offers local and international certification for organic products (INFOAM, 2020).

Some of the international certifiers operating in Brazil are: BCS Oeko Garantie (Germany); Ecocert Brasil (France); Organización Internacional Agropecuária (Argentina); Instituto de Mercado Ecológico (Switzerland); FVO Brasil (United States); Imaflora (United States); SkalBrasil (Netherlands) and AB (France).

> "The certification of organic products is recognition that the product has been produced in accordance with organic production standards. The standards for organic farming can be established by producer associations that organize a certification system, with rules and procedures, and begin to certify member producers against these standards. However, when the country establishes official regulations for organic production, then the private standards must at least meet the official standards, although they can add special procedures. The certifier can use private standards or official standards for its activities, or it can use internationally accepted standards, such as those established by IFOAM (INTERNATIONAL FEDERATION OF ORGANIC AGRICULTURE MOVEMENTS, 2000) or the Codex Alimentarius (ORGANIZATION OF THE UNITED NATIONS FOR
>
> AGRICULTURE AND FOOD, 2001). However, in the countries where the product will be marketed, regulatory demands must always be taken into account, because certification is a message addressed to the consumer. "

ORGANIC PRODUCT CERTIFICATION PROCESSES AT BRAZIL

The Brazilian experience is an undisputed international benchmark, particularly since it was enshrined in law as a form of certification recognized as equivalent to third-party certification in terms of its effects and application. The subject has aroused a great deal of interest and has led to a great deal of academic production (BUAINAIN and BATALHA, 2007; MEDAETS and FONSECA, 2005; MAGNANT, 2008).

According to Souza (1998), one of the ways in which consumers can be guaranteed the quality of a product and producers can protect themselves from unfair competition is through an organic certification label. In other words, the seals certify the origin of the organic product and help the consumer when making a purchasing decision, reducing information costs for society and increasing the efficiency of the organic food market.

> In this sense, the certification of organic products is a requirement of Law 10.831, of 23 December 2003, which in its article 3 states that organic products must be certified by an officially recognized body in order to be marketed. This law was only regulated in 2007 by Decree 6.323 issued by the Federal Executive. The Law and the Decree now outline a series of measures for the certification of organic products, which is carried out in two stages (MAPA, 2018).

According to the procedures by which a certifier, accredited by the Ministry of Agriculture, Livestock and Supply (MAPA) and accredited by the National Institute of Metrology, Standardization and Industrial Quality (Inmetro), must ensure in writing that a given product complies with Brazilian legislation and organic production practices. These laws must comply with

In other words, products included in the Brazilian Organic Conformity Assessment System must also comply with the rules for labeling organic products and bear the seal of this system. Certification thus takes the form of a seal affixed to or printed on the product's label or packaging**.**

> In addition, organic products must contain at least 95% organic ingredients, according to MAPA, and products with less than 70% of these ingredients cannot obtain organic certification and consequently do not bear the national "Sisorg" label, which helps consumers recognize organic products sold in markets and specialized stores (MAPA, 2018).

MAPA establishes three ways for organic producers to join the National Register of Organic Producers, all of which are certification mechanisms:

> Certification by Audit given by a public or private certifier accredited by the Ministry of Agriculture; the Participatory Guarantee System, which is a model of collective responsibility that can be formed by producers, consumers, technicians and other interested parties; or Social Control in Direct Sales, an exception to the obligation to certify organic products for family farming. The latter is provided that it is accredited by a social control organization registered with an official inspection body (MAPA, 2018).

Decree 6.323/07 is fundamental, as it lists the various places where inspection can and should be carried out, as well as determining the spaces, from handling to the final stages of sale of the products, which are described in detail in its article 58, transcribed below:

> The inspection and surveillance referred to in this Decree will be carried out in production units, commercial and industrial establishments, cooperatives, public bodies, ports, airports, border posts, vehicles and means of transport and any other environments where the production, processing, handling, industrialization, packaging, packaging, transport, distribution, trade, storage, import and export of organic products takes place. (IPDE, 2011)

Art. 62 of the same decree states that the inspection and surveillance referred to in this Decree shall be carried out by public servants of a higher level, trained and authorized by the competent body, with professional training compatible with the activity performed.

> One way of proving that a product really does have the attributes of an agricultural system is through organic certification. According to the Institute for the Promotion of Organic Development (IPD Orgânico) (2011), since 2011 legislation has required producers to register with the National Register of Organic Producers of the Ministry of Agriculture, Livestock and Supply (MAPA) in order to be considered a certified organic producer. Thus, producers wishing to obtain certification and the organic product guarantee seal must comply with a set of legal requirements stipulated by Federal Law 10.831. In this way, the quality of organic products is guaranteed by the Brazilian Organic Conformity Assessment System - SISORG, for which MAPA is responsible. (BRASIL/MAPA, 2012).

In order to obtain the certification seal, these accreditation and/or certification bodies for organic products seek to monitor the entire production process, i.e. from the processing of raw materials to the final product - in accordance with the relevant and appropriate regulations. In the absence of any non-compliance with the necessary requirements, the producer necessarily obtains the right to use the seal of quality from the certifier that accredited and certified him, and this process promotes the quality control required by the basic principles imposed by the organic agricultural paradigm (LAGES; BARBOSA, 2008).

Thus, organic production in Brazil has been growing, but still at a slow pace (TERRAZZAN; VALARINI, 2009). However, Law 10.831 essentially seeks to support producers of these products, providing support for the growing demand for organic products, according to data from the Institute for the Promotion of Organic Development (IPD Orgânico, 2011).

> Some of the national certifiers operating in Brazil are: Instituto Biodinâmico (IBD); Associação de Agricultura Orgânica (AAO); Fundação Mokiti Okada (MOA); Associação dos Produtores de Agricultura Natural (APAN); Associação Orgânica de Santa Catarina; Associação de Agricultura Orgânica do Paraná (AAOPA); Centro de Assessoria e Apoio aos Trabalhadores Rurais (CEPAGRI); Associação de Agricultores Biológicos (ABIO); Associação de Agricultura Natural de Campinas e região (ANC); FSCBrazil; Coolméia Cooperativa Ecológica; Associação de Certificação de Produtos Orgânicos do Espírito Santo - Chão Vivo; Instituto Holístico de Agricultura Orgânica (IHAO); Minas Orgânica; Rede Ecovida de Agroecologia (ECOVIDA) and Terra e Saúde.

CERTIFIED ORGANIC PRODUCTS OF ANIMAL ORIGIN

With regard to certified organic products in Brazil, organic producers must register with the National Organic Producers Body, which is only possible if they are certified by one of the three aspects described below:

> **"Certification by Audit** - The SisOrg seal is awarded by a public or private certifier accredited by the Ministry of Agriculture. The conformity assessment body complies with internationally recognized procedures and criteria, in addition to the technical requirements established by Brazilian legislation."

> **"Participatory Guarantee System** - This is characterized by the collective responsibility of the system's members, who can be producers, consumers, technicians and other interested parties. To be legal, a GSP must have a legally constituted Participatory Conformity Assessment Body (Opac), which will be responsible for issuing the SisOrg."

> **"Social Control in Direct Sales** - Brazilian legislation has made an exception to the obligation to certify organic products for family farming. However, accreditation

> with a social control organization registered with an official inspection body is required. With this, family farmers become part of the National Register of Organic Producers."

It's important to note that the Ministry of Agriculture is responsible for looking after, managing and supervising the certification bodies, which, after having been authorized by MAPA, will certify organic production and will have to update the information on Brazilian producers in order to feed the national register of organic producers. Before these bodies receive their accreditation from the Ministry, they will go through Inmetro's accreditation process.

> A 2017 survey by the Brazilian Council for Organic and Sustainable Production (Organis) showed that only 8% of consumers identify organic products at the time of purchase by the seal on the label, 37% recognize them from other information on the packaging, 27% by other means at the place of purchase and 8% get information from friends or family. Among consumers who identify the organic seal, 95% reported that the certification influenced their decision to buy and 86% consider the seal to be more reliable than other sources of information (MANGIOLI, 2020).

The consumption of organic products could bring good profits for farmers, as it could reach a global financial turnover of around US$ 211 billion in 2024, according to observations by the American consultancy **BCC Research**.

> It is worth emphasizing that, for the entire organic market, and not just beef, data from Organis (Organic Promotion Association) shows that, in 2020, the sector in Brazil recorded growth of 30% in relation to 2019, with a turnover of around R$ 5.8 billion. Stores offering meat are a picture of this growth: organic meat counters are an increasingly common sight in supermarkets and specialized boutiques.

CONCLUSION

It can be concluded that the Organic Certification Processes in Brazil seek to focus on the issue of organic food, which is gradually growing nationally and also worldwide. However, in order to guarantee the quality and origin of these products, we have some specific legislation that establishes different certification processes, which is the procedure by which a certifier, duly accredited by the Ministry of Agriculture, Livestock and Supply (MAPA) and "accredited" by the National Institute of Metrology, Standardization and Industrial Quality (Inmetro), ensures in writing that a given product, process or service complies with organic production standards and practices.

In this way, the food produced by the organic system cannot contain artificial inputs such as agrotoxins, hormones, antibiotics, chemical fertilizers, veterinary drugs and genetically modified organisms, but must enable broad actions that seek to conserve natural resources, taking into account the ethical aspects present in this place such as the internal social relations of the property and also the treatment of animals.

The quality of organic food in the Brazilian context makes it possible to group together the essential aspects in choosing those that are most suitable for human health, and aspects related to nutritional, health and environmental quality. Because of this, quality food must be consumed, and this habit should be increasingly incorporated worldwide.

In short, it can be said that certifications make it possible to use an instrument whose application is beneficial to the consumer, not only in terms of the quality of the agri-food product, but essentially in the production processes that generated it, from the perspective of choice and respect for and protection of the environment as a whole, animal welfare, fair trade, etc. With regard

to organic products, whose qualities are not initially perceptible, this standardization requires an external entity to certify them, i.e. a certification that respects the criteria established in the legislation. (LOZANO CABEDO, 2009)

REFERENCES

ABPA.RelatórioAnnualde2018.Disponívelem: http://abpabr.com.br/storage/files/relatorio-anual-2018.pdf. Acesso em 05 de maio de 2021.

ABRAS.Setordeorgânicoscresce30%noBrasilem2020. https://www.abras.com.br/clipping/geral/72392/setor-de-organicos-cresce-30-no- brasil-em-2020

ALLAIRE, G. e SYLVANDER, B. **Qualité spécifique et systèmes d'innovation territoriale. In: Cahiers d'Economie et Sociologie Rurales**, n. 44, p. 29-59. 1997.

ALMEIDA, V. E. S.; CARNEIRO, F. F.; VILELA, N. J. Agrotóxicos em hortaliças: segurança alimentar, riscos socioambientais e políticas públicas para promoção da saúde. **Tempus: Actas em Saúde Coletiva,** Brasília, DF, v. 4, n. 4, p. 84-99, 2009.

ALTIERI, Miguel. **Bases científicas para uma agricultura sustentável**. São Paulo. Expressão popular, 2012.

Anualpec. **Anuário da pecuária brasileira.** São Paulo: Instituto FNP. 2017.Recuperado em 13 de novembro de 2019

APPLEBY, MC, Mench JA, Olsson IAS, Hughes BO. **Animal Welfare,** 2nd Ed., Wallingford:Cabi, 2011.

ASSIS, R. L.; Globalização, **Desenvolvimento Sustentável e ação local:** o caso da agricultura orgânica. **Cadernos de Ciência & Tecnologia,** Brasília, v. 20, n. 1, jan./abr. 2003, p. 79-96.

ASSOCIAÇÃO Brasileira de Pecuária Orgânica (ABPO). **Entrevista com o presidente Leonardo Leite de Barros.** Período de 03 a 10 de Maio de 2012. Campo Grande – MS, 2012.

ASSOCIAÇÃO Brasileira de Pecuária Orgânica (ABPO). **Entrevista com produtores de carne orgânica.** Período de 03 a 10 de Maio de 2012. Campo Grande – MS, 2012. AZEVEDO, E. **Alimentos orgânicos: ampliando conceitos de saúde humana, social e ambiental.** Tubarão: Unisul, 2006.

AZEVEDO, E, Rigon SA. **Sistema alimentar com base no conceito de sustentabilidade.** Em: Taddei JA, Lang RMF, Longo-Silva G, Toloni MHA, eds. Nutrição em saúde pública. São Paulo: Rubio; 2010. Pp. 543-60.

BARROS, J. D. S.; SILVA, M. F. P.; **Práticas Agrícolas sustentáveis como Alternativas ao Modelo Hegemônico de Produção. Sociedade e Desenvolvimento Rural on line** – v.4, n.2; 2010.

BAUDRY, J. et al. Association of frequency of organic food consumption with cancer risk findings from the NutriNet-Santé prospective cohort study. **JAMA Internacional Medicine, Chicago**, v. 178, n. 12, p. 1597-1606, 2018. Disponível em: <Disponível em: https://bit.ly/3kqpTX4 >. Acesso em: 27 agosto. 2021.

BOAVENTURA, Edivaldo M. **Metodologia da pesquisa:** monografia, dissertação e tese. São Paulo: Atlas, 2004.

BONTEMPO, M. **Alimentação Orgânica. Medicina Natural.** São Paulo: Nova Cultural, 1999.

BONTEMPO, M. **Alimentação Orgânica. Medicina Natural.** São Paulo: Nova Cultural, 1999. CASTANEDA DE ARAUJO, Marcelo. Ambientalização e politização do consumo e da vida cotidiana: uma etnografia das práticas de compra de alimentos orgânicos em Nova Friburgo/RJ. Dissertação de mestrado. Rio de Janeiro: CPDA/UFRRJ,2010.

BORGUINI, R.G.; TORRES, E.A.F.S. Alimentos orgânicos: qualidade nutritiva e segurança do alimento. **Segurança alimentar e nutricional.** Campinas, 2006.

BORGUINI, R. G. **Tomate (Lycopersicum esculentum Mill) orgânico: o conteúdo nutricional e a opinião do consumidor.** Piracicaba, 2002. Mestrado (Engenharia Agronômica)ESALQ/USP.Disponívelem: http://www.teses.usp.br/teses/disponiveis/11/11141/tde-12022003-16554 7/. Acesso em: 30 junho de 2021.

BOURN D, Prescott J. A comparison of the nutritional value, sensory qualities, and food safety of organically and conventionally produced foods**. Crit Rev Food Sci Nutr**. 2002;42(1):1-34.

BRACALE, R., Vaccaro, C.M., 2020. Changes in Food Choice Following Restrictive Measures Due to Covid-19. **Nutrition, Metabolism and Cardiovascular Diseases** S0939475320302209. https://doi.org/10.1016/j.numecd.2020.05.027 Acesso em 22.06.2021

BRASIL. **Ministério da Agricultura, Pecuária e Abastecimento (MAPA).** Disponível em: . Acesso em: 01 de julho de 2021

BRASIL**. Ministério da Agricultura, Pecuária e Abastecimento. Informações técnicas.** Brasília, DF, 2017. Disponível em: <Disponível em: https://bit.ly/3ltszo3 >. Acesso em: 27 de agosto. 2021.

BUAINAIN, A. M.; BATALHA, M. O. (orgs). Cadeia Produtiva de Produtos Orgânicos. Brasília: Ministério da Agricultura, Pecuária e Abastecimento (MAPA); Secretaria de Política Agrícola (SPA); Instituto Interamericano de Cooperação para a Agricultura (IICA). **Série Agronegócios,** Vol. 5, 2007

BUAINAIN, A. M. e BATALHA, M. O. (Coord.). Cadeia Produtiva de Produtos Orgânicos. Ministério da Agricultura, Pecuária e Abastecimento MAPA, Secretaria de Política Agrícola **SPA, Instituto Interamericano de Cooperação** *para a Agricultura IICA*, Brasília: IICA, Vol. 5, 2007. (Série Agronegócios).

CALDAS E.D. & Souza L.C. 2000. Avaliação de risco crônico da ingestão de resíduos de pesticidas na dieta brasileira. **Rev. Saúde Pública** 34(5): 529-537

CALEMAN, Silvia Morales de Queiroz. **Falhas de Coordenação em Sistemas Agroindustriais Complexos: uma aplicação na agroindústria da carne bovina**. Tese (Doutorado) - Universidade de São Paulo-USP, São Paulo, São Paulo, 2010.

CANTARUTTI T.F.P. 2005. **Risco tóxico de resíduos de pesticidas em alimentos e toxicidade reprodutiva em ratos wistar**. Dissertação (Mestrado em Farmacologia)- Programa de Pós-Graduação em Farmacologia. Setor de Ciências Biológicas da Universidade Federal do Paraná, Curitiba, 2005.

CASTANEDA DE ARAUJO, Marcelo. **Ambientalização e politização do consumo e da vida cotidiana:** uma etnografia das práticas de compra de alimentos orgânicos em Nova Friburgo/RJ. Dissertação de mestrado. Rio de Janeiro: CPDA/UFRRJ,2010.

CERTIFIED HUMANE, **Veja oito aspectos de bem-estar animal para frangos de corte**, 2020 – Disponível em: <https://certifiedhumanebrasil.org/bem-estar-animal- para-frangos-de-corte/>. Acesso em: 22. agosto de 2020.

Chekima, B., Oswald, A.I., Wafa, S.A.W.S.K., Chekima, K., 2017. Narrowing the gap: factors driving organic food consumption. @ **J. Clean. Prod.** 166, 1438–1447. https://doi.org/10.1016/j.jclepro.2017.08.086 Acesso em 21.06.2021

CONNER, D., & Christy, R. (2004) The organic label: how to reconcile its meaning with consumer preferences. **Journal of food distribution research,** 35 (1), 40-43.

CONTERATO, M. A.; FILIPI, E. E. **Teorias do Desenvolvimento.** SEAD. Porto Alegre: Editora UFRGS. 209

CURL CL, Fenske RA, Elgethun K. Organophosphorus pesticide exposure of urban and suburban pre-school children with organic and conventional diets. **Environ Health Perspect**. 2003;111(3):377–82

DANGOUR AD, Dodhia SK, Hayter A, Allen E, Lock K, Uauy R. **Nutritional quality of organic foods:** a systemic review. Am J Clin Nutr. 2009;90(3):680-5. Tese (Doutorado) - Universidade de São Paulo-USP, São Paulo, São Paulo, 2010.

DAROLT, M. R. Estado e característica atual da agricultura orgânica no mundo. **Revista Brasileira de Agropecuária,** ano I, n.9, 2000.

DÍAZ MÉNDEZ, C.; GÓMEZ BENITO, C. Del consumo alimentario a la sociología de la alimentación. In: **Distribución y Consumo,** n. 60, p. 5-23. 2007.

DOURADO, N. P. Indicadores de sustentabilidade em agroecossistemas: uma análise comparativa. **Sustentabilidade: Diálogos Interdisciplinares,** 2, 1-15, 2021.

DUNCAN, I. J. H.; FRASER, D. Understanding animal welfare. In: APPLEBY, M. C.; HUGHES, B. **O. Animal welfare.** London: Ed. Cab International, 1997. p. 19-31.

EMBRAPA, **Produção de Frango de Corte.** p.01 , 2003.Disponível em:< http://www.cnpsa.embrapa.br/SP/aves/Importancia-economica.html>Acesso em: 20 agosto de 2021.

EPA (Environmental Protection Agency). Pesticide safety for farmworkers. Washington DC: **United Sates Environmental Agency, Office of Pesticide Programs,** 1985.

FAO - FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS;

WHO - WORLD HEALTH ORGANIZATION. Safety assessment of foods derived from genetically modified animals, including fish. Rome, 2003. (**Food and Nutrition Paper,** 79). Disponível em: <Disponível em: https://bit.ly/3kE7KoC >. Acesso em: 18 agosto. 2021.

FAO – FOOD AND AGRICULTURAL ORGANIZATION. The second report on the state of the world's plant genetic resources for food and agriculture. Roma: **Comission on Genetic Resources for Food and Agriculture**, 2010.

FAO. Disponível em: http://faostat.fao.org. Acesso em 05 de out de 2021.

FAWC (Farm Animal Welfare Council). Farm Animal Welfare in Great Britain: **Past, PresentandFuture.**Disponívelem: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31929 2/Farm_Animal_Welfare_in_Great_Britain_-_Past Present_and_Future.pdf. Acesso em 12.09.2021

FIBL & IFOAM – Organics International. (2020). The World of Organic Agriculture Statistics and Emerging Trends 2020. Edited by Helga Willer, **Bernhard Schlatter,** Jan Trávnícek, Laura Kemper and Julia Lernoud. http://www.organic- world.net/yearbook/yearbook2020.html Acesso em 22.06.2021

FLORES A.V., Ribeiro J.N., Neves A.A. & Queiroz E.L.R. 2004. **Organoclorados:** Um problema de saúde pública. Ambient. Soc. 7(2).

FONSECA, M. F. de A. C. **A institucionalização dos mercados de orgânicos no mundo e no Brasil:** uma interpretação. Trabalho de Conclusão de Curso (Doutorado em Sociologia)- Universidade Federal Rural do Rio De Janeiro, Seropédica, 2005.

FOODandDrugAdministration.TotalDietStudy.Disponível em: http://www.fda.gov/Food/FoodSafety/FoodContaminantsAdulteration/TotalDiet Study/default.htm Acessado em 23 de agosto de 2021

FOOD and Agriculture Organization. Influence de L'Agriculture Biologique sur L'Innocuité et la Qualité des Aliments. **Vingt-Deuxième Conférence Régionale de la FAO pour L'Europe**; 2000 Jul 24-28; Porto, Portugal. Disponível em: http://www.fao.org/docrep/meeting/X4983F.htm Acessado em 25 de agosto de 2021.

GALINDO, E. P. **Compra de produtos agroecológicos pelo PAA. Desafios do Desenvolvimento,** Ano 10, ed. 80, jun. 2014. Disponível em: < https://bit.ly/2moJCOG>. Acesso em: 13 junho. 2021

GARCIA,L.A.F. **Economias de Escala na Produção de Frangos de Corte no Brasil**. Piracicaba, 2004. Tese (Doutorado) – Universidade São Paulo.

GHINI, R.; BETTIOL, W.; HAMADA, E. Diseases in tropical and plantation crops as affected by climate changes: current knowledge and perspectives. **Plant pathology, v. 60,** p. 122-132, 2011.

GLIESSMAN, S. R. **Agroecologia:** processos ecológicos em agricultura sustentável. Trad. Maria José Guazzelli. Porto Alegre, UFRGS, 2000. 653p.

HASIMU, H., Marchesini, S., Canavari, M., 2017. A concept mapping study on organic food consumers in Shanghai, China. **Appetite** 108, 191–202. https://doi.org/ 10.1016/j.appet.2016.09.019

HOWARD, S. A. **Um testamento agrícola.** 2 ed. São Paulo, SP: Expressão popular, 360 p., 2012.

IBL & IFOAM – Organics International. (2018). The World of Organic Agriculture Statistics and Emerging Trends 2018. **Edited by Helga Willer and Julia** Lernoud. http://www.organic-world.net/yearbook/yearbook-2018.html Acesso em 22.06.2021

IDEC – INSTITUTO BRASILEIRO DE DEFESA DO CONSUMIDOR. Quer pagarquanto? **Revista do Idec,** São Paulo, n. 142, p. 16-20, abr. 2010.

IFOAM – **Organics International.** (2020). The World of Organic Agriculture Statistics and Emerging Trends 2020. Edited by Helga Willer, Bernhard Schlatter, Jan Trávnícek, Laura Kemper and Julia Lernoud. http://www.organic-world.net/yearbook/yearbook- 2020.html

IFOAM-INTERNATIONALFEDERATIONOFORGANICAGRICULTURE MOVEMENTS. **The principles of organic agriculture.** Bonn, 2005.

IPEA. 2020**. Demanda crescente estimula a produção orgânica no Brasil e no mundo..** Disponível em: https://www.ipea.gov.br/

IPCC – INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE. **Fourth assessment report**. 2007. Disponível em: . Acesso em: 26 de agosto de 2021.

JENSEN TK, Giwercman A, Carlsen E, Scheike T, Skakkebaek NE. **Semen quality among members of organic food associations in Zealand, Denmark.** Lancet. 1996;347(9018):1844.

KAZIOSKI, G. V., CIOCCA, M. L. S. **Energia e Sustentabilidade em Agroecossistemas.** Ciência Rural, Santa Maria, v. 30, n.4, 2000, p.737 – 745

LAGES, A. M. G.; BARBOSA, L. C. B. G. A **comercialização dos produtos orgânicos na feira agroecológica de Maceió/AL: uma avaliação sob a lógica da teoria dos custos de transação.** In: 46º Congresso da Sociedade Brasileira de Economia, Administração e Sociologia Rural. Rio Branco - AC, 2008. Anais... Rio Branco: SOBER, 2008.

LAIRON D. **Nutritional quality and safety of organic food.** A review. Agron Sustain Dev. 2009;30(1):33-41.

LIMA et alii, Sandra Kitawa.2020. TD 2538 – **Produção e Consumo de Produtos Orgânicos no Mundo e no Brasil**. Disponível em: IPEA.GOV.BR

LINDER, N. S., Uhl, G., Fliessbach, K., Trautner, P., Elger, C. E., & Weber, B. (2010) **Organic labelling influences food valuation and choice.** Neuroimage, 53, 215-220.

LOZANO CABEDO, C. **Los atributos de los alimentos ecológicos**: distinción, calidad y seguridad. In: SIMÓN, X.; COPENA, D. (Coords.), *Construindo un rural agroecológico*, Vigo, Universidad de Vigo, Servizio de Publicacións, p.317-334. 2009.

LU C, Toepel K, Irish R, Fenske RA, Barr DB, Bravo R. Organic diets significantly lower children's dietary exposure to organophosphorus pesticides. **Environ Health Perspect**. 2006;114(2):260–3

MADAIL, J. C. M.; BELARMINO, L. C.; BINI, D. A. Evolução Da Produção E Mercado De Produtos Orgânicos No Brasil E No Mundo. **Revista Cientifica da Ajes,** [S.L], v. 2, n. 3, 2011. Disponível em:. Acesso em: 30 de junho 2021.

MANTECA, X.; VELARDE, A.; JONES, B. Animal welfare components. In: SMULDERS, F.; ALGERS, B. **Welfare of production animals: assessment and management of risks.** Wageningen, 2009. p. 61-77.

MAPA. 2021. **Manual de certificação de produtos orgânicos.** https://www.organicsnet.com.br/certificacao/manual-certificacao/

MAZZOLENI, E. M.; NOGUEIRA, J. M. Agricultura orgânica: características básicas do seu produtor. **Revista de Economia e Sociologia Rural.** Rio de Janeiro, v. 44, n. 2, p. 263-293, 2006.

MAZZUCO, H. Ações sustentáveis na produção de ovos. **Revista Brasileira de Zootecnia.** Viçosa, ISSN 1806 – 9290, v. 37. 2008.

MEIRELES, L.R.; RUPP, L.C.D. **Agricultura Ecológica - Princípios Básicos.** 205. Disponível em:< http:/www.centroecologico.org.br/agricultura.php>. Acesso em: 19 agosto de 2021.

MINISTÉRIO DA AGRICULTURA, PECUÁRIA E ABASTECIMENTO. Disponível em. https://www.gov.br/agricultura/ptbr/assuntos/sustentabilidade/organicos Acesso em 22.06.2021

MIYASAKA, S., NAKAMURA, Y. e OKAMOTO, H. **Agricultura natural 2.** ed. Cuiabá, SEBRAE/MT, 1997.

MONEYTIMES, Disponivel em: https://www.moneytimes.com.br/usda-prepara- perdao-em-dividas-de-produtores-de-minorias-nos-eua-a-partir-de-junho/ Acesso em 07.07.2021

MORAES, André Steffens. **Pecuária e conservação do Pantanal: análise econômica de alternativas sustentáveis – o dilema entre benefícios privados e Sociais.** Tese (Doutorado). Recife: Universidade Federal de Pernambuco, Recife: PE, 2008.

MUÑOZ, C. M. G.; GÓMEZ, M. G. S.; SOARES, J. P. G.; JUNQUEIRA, A. M. R.

Normativa de Produção Orgânica no Brasil: a percepção dos agricultores familiares do assentamento da Chapadinha, Sobradinho (DF). **Revista de Economia e Sociologia Rural,** Piracicaba, v. 54, n. 02, p. 361-376, abr/jun. 2016. Disponível em: . Acesso em: 05 out. 2021

NEVES, M. F.; Zylbersztajn, D; Machado Filho, C. P.; & Bombig, R. T. (2002). **Collective Actions in Networks:** The Case of Beef in Brazil. In. Trienekens, J. H. & Omta, S. W. F. (ed.). Paradoxes in Food Chais and Networks. Wageningen Academic Publishers, p. 742 – 750.

OLIVEIRA, L. H. S. de. **Mercado de Produtos Orgânicos na Europa: Um Estudo Exploratório de Alternativa de Investimentos para o Agronegócio Sustentável Brasileiro.** 2003. 136 f. Trabalho de conclusão de curso (Mestrado) – Universidade FederaldePernambuco,Recife,2003.Disponívelem:< http://www.repositorio.ufpe.br/handle/123456789/4156 >. Acesso em 02/07/2021.

ORGANIS. 2018. Disponível em: https://afrebras.org.br/mercado-global-de-alimentos- organicos-e-bebidas-triplicara-ate-2024/ **Organização Pan-Americana da Saúde.** 1997. Manual de vigilância da saúde de populações expostas a agrotóxicos, p. 1-72.**OIA BRASIL.** Disponível em: https://oiabrasil.com.br/organicosAcesso em 07.06.2021

PENTEADO, Silvio Roberto. **Série produtor rural: Agricultura orgânica.** 2 ed. USP: Esalq, 2011. 1-40 p.

PENTEADO, S.R. **Implantação do cultivo orgânico:** planejamento e plantio. 2. ed. Campinas: Via Orgânica, 2012

PORTAL SÃO FRANCISCO. **Produtos orgânicos.** Disponível em: . Acesso em: 01 julho. 2021

POWLSON DS, Addiscott TM, Benjamin N, Cassman KG, Kok TM, Grinsven H, et al. When does nitrate become a risk for humans? **J Environ Qual.** 2008;37:291-5.

PRIMAVESI, A. A alimentação no século XXI. In: Congresso Brasileiro de Horticultura Orgânica, Natural, Ecológica e Biodinâmica, 1, Piracicaba, 2001. Anais Botucatu, Livraria e Editora Agroecológica, 2001. p. 7-12.

RAMOS, Fabio Sampaio Vianna. Qualidade na Cadeia da Carne Bovina: o Caso da Carne Orgânica. Rio de Janeiro, 2006. **Dissertação. Pós-Graduação em Desenvolvimento, Agricultura e Sociedade,** Instituto de Ciências Humanas e Sociais, da Universidade Federal Rural do Rio de Janeiro, RJ, 2006

RIGBY, D.; CÁCERES, D. **Organic farming and the sustainability of agricultural systems. Agricultura**l Systems, Amsterdam, v. 68, p.21-40, 2001.

ROSA.S.P,**FrangodeCorte,SistemadeProdução**.EMBRAPA,2013. Disponívelem:<https://www.agencia.cnptia.embrapa.br/gestor/frango_de_corte/arvor e/CONT000fc6f3kwv02wx5eo0a2ndxy2p18gdt.html>. Acesso em: 28 agosto de 2021

RUMIATO, A. C.; MONTEIRO, I. Contaminants in food and nutritional guidance: theoretical reflection. **Revista de Salud Pública, Bogotá,** DC, v. 19, n. 4. p. 574-577, 2017.

SAMINÊZ, T. C. O. Agricultura orgânica: mercado em expansão. **Revista Brasileira de Agropecuária**, ano I, n.9, 2000

SILVANO, J. **O projeto da Nestlé para lançar seu leite orgânico no Brasil em 2019**. Organicsnet, Rio de Janeiro, 7 jun. 2018. Disponível em: . Acesso em: junho. 2021

SCHMITT, C. J. Encurtando o caminho entre a produção e o consumo de alimentos. **Revista Agriculturas.** Rio de Janeiro, v. 8, n. 3, set. 2011.SOARES,J.P.G.;AROEIRA,L.J.M.;FONSECA,A.H.F.; FAGUNDES, G.M., SILVA, J.B. **Produção orgânica de leite: Desafios e perspectivas.** In: Marcondes, M.I. et al., (Org.). Anais do III Simpósio Nacional de Bovinocultura Leiteira e I Simpósio Internacional de Bovinocultura Leiteira. 1 ed. VIÇOSA: Suprema Grafica e Editora, 2011, v.1 , p. 13-43.

SOUZA, M. C. M**. Algodão orgânico: o papel das organizações na coordenação e diferenciação do sistema agroindustrial do algodão.** SP: FEAC, 1998. Originalmente apresentada como dissertação de mestrado, Universidade de São Paulo - Faculdade de Economia, Administração e Contabilidade, 1998.

SPERB, P**. Como o MST se tornou o maior produtor de arroz orgânico da América Latina**. BBC Brasil, maio 2017. Disponível em: . Acesso em: 23 junho. 2021.

STATE. **Journal of Nutrition Education,** v. 26, n. 1, p. 26-33, 1994. ISSN 0022-3182. Disponível em: < ://WOS:A1994NT42700005 >. Acesso em 23.06.2021

STORSTAD, O.; BJORKHAUG, H. Foundations of production and consumption of organic food in Norway: Common attitudes among farmers and consumers? **Agriculture and Human Values,** v. 20, n. 2, p. 151-163, 2003. ISSN 0889-048X. Disponível em: < ://WOS:000184065400005 >. Acesso em 23.06.2021

TENG, C.-C., Lu, C.-H., 2016. **Organic food consumption in Taiwan: motives, involvement, and purchase intention under the moderating role of uncertainty.** Appetite 105, 95–105. https://doi.org/10.1016/j.appet.2016.05.006. Acesso em 23.06.2021

WILLER, H.; LERNOUD, J. (Eds**.). The world of organic agriculture. Statistics and emerging** TERRAZZAN, P.; VALARINI, P. J. **Situação do mercado de produtos orgânicos e as formas de comercialização no Brasil.** Informações Econômicas. São Paulo, v. 39, n. 11, p.27-41, 2009.

SUINOCULTURA INDUSTRAL, **O que é a suinocultura orgânica 2016,** Disponível em:https://www.suinoculturaindustrial.com.br/imprensa/o-que-e-asuinocultura- organica-/20030819-115203-0518. Acesso em 05 de out de 2021.

USDA – UNITED STATES DEPARTMENT OF AGRICULTURE http://www.usda.gov. Acesso em 05 de out de 2021.