FERTIMANURE

Innovative nutrient recovery from secondary sources – Production of high-added value **FERTI**lisers from animal **MANURE**

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D1.3. REPORT ON THE **BBF REGULATORY FRAMEWORK** IN THE **EU** & **CELAC** COUNTRIES

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Content

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Abbreviations

ABP	Animal By-product
BioAbfV	Bioabfallverordnung
BBF	Bio-based fertilising/bio-based fertiliser
CE	Conformité Européenne
CMCs	Component material category(ies)
DG	Directorate-General
DüG	Düngegesetz
DüMG	Düngemittelgesetz
DüV	Düngeverordnung
EBIC	European Biostimulants Industry Council
EC	European Commission
EoW	End-of-waste
EU	European Union
FPR	Fertilising Products Regulation
Ha	Hectares
Kg	Kilogram(s)
MS	Member States
Mt	Metric tonnes
NFRV	Nitrogen Fertiliser Replacement Value
OMFD	Other means of plant defense
PFC	Product Function Categories
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
SMEs	Small and medium-sized enterprises
TMF	Tailor-made fertilisers

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1. Executive summary

The main aims of the H2020 project FERTIMANURE focus on the development of production methods as well as the scaling-up of the production and use of biobased fertilisers (BBFs) derived from livestock manure, which shall be tailored for specific crop needs that will prove competitive in today's market. The project description also touches aspects of the treatment of the raw material. However, such raw material and most of the semi-processed products are neither with their product characteristics nor legally comparable to defined mineral fertilisers.

This document looks at both the current and the impending regulation in order to provide a full picture on how the EU regulates certain fertiliser products. This document will pay special attention to the legislation that is relevant for processed biobased materials derived from manure in order to be used with the same rights and obligations that apply for mineral fertilisers. The relevant sections of Regulation (EC) 2019/1009 (also referred to as Fertiliser Products Regulation - FPR) have been summarised to provide an overview of the regulation. There are many similarities between the two regulations that will be highlighted in this document as well as the differences. There was a clear need for a drastic update to the regulation surrounding fertiliser products and in order to avoid such a gap in the regulation in future; it is likely that Regulation (EC) 2019/1009 will be adapted further and added to as the production of fertilisers further progresses.

Specific legislation framework regarding CELAC countries has been developed specially for Argentina and Chile as participants in FERTIMANURE.

Finally, this document provides a comparative analysis of the environmental legislation of the Argentine Republic and the EU and Chile and the EU, including the background of both and the Latin American regional blocks to which Argentina is a member (Mercosur), and others to which it is not a member, but which are considered for the comprehensive analysis (CAN).

2. Introduction

As populations increase and climate change becomes more apparent it is important to promote sustainable agriculture worldwide to efficiently reduce greenhouse gas emissions. For this to occur there is a need for more sustainable nutrient management, which will be essential to food security and improving water quality globally. This has become increasingly more important in European Union (EU) policies.

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This document aims to determine the differences between the EU fertiliser regulations (EC) No 2003/2003 and (EC) 2019/1009, as well as compare the old regulation to the environmental regulations in Argentina and Chile.

The (EC) 2019/1009 regulation will come into effect in June 2022 and will change the way manufacturers, importers, and distributors achieve Conformité Européenne (CE) certification along with the requirements regarding labelling their products. The new regulation will increase the market within the EU by enabling products such as bio-stimulants, organic fertilisers, and organo-mineral fertilisers to be bought and sold if they meet the environmental and safety standards.

In Argentina, Resolution No. 264, which is the regulation for the registration of fertilisers, amendment, substrates, conditioners, protectors, and raw materials was sanctioned in 2011 and defines the subjects to be registered (Importers, exporters, distributors, processors, and fractionators), the forms of registration, payment of duties and classifies all products. There was a need to expand the requirements and controls for the marketing of compost. This was done under the Joint Resolution 19/19, where the general criteria and minimum requirements are underlined.

In Chile discussions on the law No. 20.089 where rules on the composition, labelling and marketing of fertilisers has begun. It is currently in the second legislative process. The Chilean regulation Law Decree No. 3,557 / 1981 which establishes provisions on agricultural protection of the Ministry of Agriculture has been analysed.

Therefore, the H2020 project FERTIMANURE focuses on the development of production methods and the scaling-up of the production of biobased fertilisers (BBFs) derived from livestock manure, which will be tailored to specific crops and will prove to be competitive in today's market.

3. European regulatory framework

More sustainable nutrient management is essential to food security and to improve water quality globally, as well as the sustainable use of nutrient resources. This dual importance has come to the forefront of European Union (EU) policies. First, losses of nitrogen (N) and phosphorus (P) to inland and coastal waters cause eutrophication, which may then lead to hypoxic conditions in aquatic ecosystems. In the EU, legislation has been put in place to try to reduce nutrient losses from urban and rural areas to achieve "good ecological status" of all water bodies as stated in the Water Framework Directive.

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In most of the EU countries following the Urban Wastewater Treatment Directive, regulations to restrict wastewater nutrient discharges have gradually become more stringent as new environmental goals have been formulated.

Though this has resulted in significant reductions in the anthropogenic load of N and P to e.g., some water areas like the Baltic or Mediterranean Sea, nutrient enrichment continues to be a major issue, and the sea still remains one of the largest nutrient-induced hypoxic zones in the world. Air quality legislation also helps in the decrease of N and P particles such as Directive 2008/50/EC, which has air quality objectives for PM2.5 (fine particles).

Further reduction in the nutrient load will require more focus on nutrient losses from agricultural areas. Part of those losses are related to the sub-optimal use of organic waste, particularly manure. As animal husbandry farms have become larger, the manure is more concentrated in the landscape, which has often led to nutrient overapplication on fields close to where manure is produced and stored. This increases the risk for larger losses of both N and P to water bodies from those areas and estimating nutrient budgets at various scales is considered an essential component of efforts to reduce those losses.

Additionally, even though N, P, potassium (K), secondary and micronutrients are essential inputs to ensure high yields in agriculture, many farms are dependent on nutrient sources that are not renewable. This includes synthetic N fertilizers produced using fossil fuels to fix atmospheric N into crop available N13 and P fertilizers produced from geopolitically concentrated phosphate rock deposits. As such, mined P is subject to variability in price and physical availability on the global market. In response, the EU has listed P as critical raw material, which is a clear signal that the union welcomes management strategies that decrease food system vulnerability to fluctuations in the availability (physical or price) of synthetic P fertilizers.

Historically, animal, and human excreta recycling to supply crops with nutrients was a common and necessary agricultural practice, but the need for agricultural specialisation, urbanisation and the availability of synthetic fertilizers have all contributed to less efficient recycling and a heavy dependency on synthetic fertilizers. Finding ways to best utilize nutrient-rich organic waste will need to be an important part of sustainable nutrient management in the EU.

The Animal By-product (ABP) regulation (EC) No 1069/2009 lays down health rules regarding animal by-products and derived products not intended for human consumption. It sets out the requirements for the movement, processing, disposal of ABPs. ABPs include animal feed, organic fertilisers and soil improvers and technical products. Producers of ABPs and derived products must comply with the legislation from the start to the end of the manufacturing chain. This affects BBFs and TMFs to be used as fertilisers as they have to reach the last stage in order to have the CE mark. They must have documentation showing a record of the products dispatched, transported, or received. Derived products which comply with other pieces of EU legislation can be sold when they reach the of the

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manufacturing chain. ABPs are graded in three categories depending on the level of health risk they pose to humans and animals. The category determines how they should be disposed of or recovered.

Society faces challenges with the affordable and stable availability of these fertilising products (N and P more acutely) to all farmers, especially in developing countries, but with global significance from a long-term perspective. At the same time, as we mentioned before, all regions of the world are also faced with water pollution associated with the loss of N and P from poor waste management (i.e., eutrophication and associated algal toxicity and hypoxia).

Principles of circular economy (although not synonymous with sustainability) can be helpful in guiding the types of transformations needed in our organic waste management system (e.g., for P), and circular economy has even been explicitly taken up as a framework by the European Union.

Still, large-scale adoption of circular economy principles and effective organic waste recycling like safe application at the right time, in the right amount, and the right place, has yet to become a reality.

Transportation costs and logistics are often cited as major barriers to increasing the recycling needed to achieve such a circular economy. This is particularly true with excreta as it is bulky and heavy and with high water content, and areas of waste production like cities and concentrated livestock, are increasingly far from areas of crop production because of land use specialization, and the nutrient to mass ratio is thus often unfavourable.

The distance at which it is economically viable to transport excreta to agricultural crop land depends on a myriad of local factors, including the dry matter content of the excreta product, laws on treatment and application, the price of alternative nutrient sources and energy/fuel, the economy of intensive livestock farming, feed conversion, as well as infrastructure and farming bio geophysical conditions. As such, reported acceptable distances vary greatly within the literature.

But transportation is only one of the many factors that drive or inhibit recycling, including potential contaminants and social acceptance. Although the ensemble of these distance ranges is broad, for the most part the distances are shorter than what would be required to ensure total recycling within a country. Finding ways to minimize transportation distances will thus be a critical part of moving toward a more circular organic waste economy regardless of location.

Since the manufacture and transportation of mineral fertilizers are activities that require large amounts of fossil energy, the dependence that agriculture has on fertilizers based on mineral reserves (mainly P, N, and K) should be considered as a very serious threat to human food security and climate change.

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According to the latest published figures on population growth and estimated demand for nutrients in the future, depletion of phosphate is expected to occur within a maximum of 300 years. At the same time, the agricultural demand that exists for mineral fertilizers is constantly growing. The main reason is the increase in the world population, together with the increase in meat consumption and the popularity of energy crops. Despite these negative perspectives, the processing or elimination of waste streams causes uncontrolled dispersion in the environment of a large amount of minerals. Thus, a new global effort is needed to draw a new scenario where improved nutrient use efficiency and, at the same time, reduced nutrient losses provide the bases for a more circular economy, to produce more necessary inputs, as food or energy, as the same time as decreasing environmental impact.

Livestock farming systems Total animal production (slaughter) in EU countries for the main livestock categories now accounts for 15% of the world total, with pig meat being the most important (20% of world production). Livestock farming systems vary from country to country, and sometimes from region to region as well, due to the range of landscape, climate, and cultures within Europe.

Farming systems for cattle falls into three main groups: veal, beef and milk production. The opportunities for waste management are greatest with cattle kept indoors for at least part of the year.

In many European countries, liquid manure systems are dominant especially for veal and beef production. Farms systems using bedding (and producing solid manure) are more common in Scandinavia, France, and many Eastern European states. Pigs respond adversely to extreme climatic conditions: cold dramatically decreases the food conversion ratio of growing finishing animals and hot weather disturbs reproductive performance. Pigs are generally raised in indoor housing with manure collected mostly as slurry. Only in the UK, Norway and some Eastern European countries is there a significant proportion of solid manure from pig farming. Poultry production systems, from a manure management point of view, can be broadly classified into egg production (laying hens) and meat production (e.g., broiler, turkey, ducks etc.). Housed systems can be divided into caged systems (e.g., battery for egg production) and non-caged systems (e.g., deep litter or aviary systems). Deep litter systems are usually ventilated and thus produce a very dry material (poultry manure).

Broadly, we can distinguish three waste categories:

- Liquid manure. (slurry) Housing system collecting all excreta in liquid form; the animals are kept on sloping solid floors that are regularly swept clear of any excreta. Some dilution can be expected from wash water.

- Mixed manure. Housing systems producing solid and liquid manure streams; animals are kept on bedding material, but liquids are drained from the bedding and collected elsewhere.

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- Solid manure. Housing types producing only solid manure; animals are kept on bedding material which is collected with all excreta as solid or farmyard manure (FYM).

Liquid manure/slurry is mostly stored in concrete tanks. Lagoons and lined ponds are especially reported from Greece, Italy, Spain, Portugal. The tanks are mostly uncovered, except in Finland, Netherlands, and Switzerland. The storage capacity for liquid/manure/slurry is around 6 months in many countries, longer especially in Scandinavian countries and shorter in some Southern and East European countries. For solid manure, the storage capacity varies from 2 to 12 months. Storage is also a mode of treatment because it enhances the timeliness and convenience of disposal.

Products that are used to improve plant growth are referred to in EU regulation as “fertilising products” (Mihai ŢURCANU, Europarl, 2019). Nitrogen, phosphorous and potassium are the most common fertilisers used to improve plant growth. As the world population continues to rise the use of fertiliser products has also risen due to the higher crop yields, they facilitate. However, there have also been concerns regarding the security of the supply as well as the impact they have on the environment. In 2003 regulation (EC) No 2003/2003 came into force and aimed to ensure an internal market for free trade of fertilisers. This regulation did harmonise the EU market for fertilisers and liming materials however the main focus was on mineral fertilising products and lacked regulation on any new types of fertilisers (Mihai ŢURCANU, Europarl, 2019).

The facultative Fertilising Products Regulation (FPR) was published in the EU Official Journal in June 2019 and will come into force on 17th July 2022. This will significantly change the way manufacturers, importers, and distributors are able to reach Conformité Européenne (CE) for free trade of fertilising products certification as well as the requirements with regards to labelling of the products. This new regulation will broaden the market within the EU by enabling products such as bio-stimulants, organic fertilisers and organo-mineral fertilisers, soil improvers and growing media to be bought and sold provided they meet the environmental and safety standards of the new regulation. Any products that comply with the new criteria will benefit from the single market and wastes will also be automatically awarded End-of-Waste status if criterions of EU/2019/1009 are met (Dijk, 2019).

The new regulation will provide a clear structure (Figure 1) that must be adhered to with regards to what the product contains and of which component materials the fertilising product can be manufactured. This will directly impact how the product is categorized on the market. This is a huge change in the regulation as the 2003/2003 regulation raw materials and additives were not included in the regulation, only the characteristics of the final product. The diagram below from Fertilizers Europe shows how the regulations differ for inorganic fertilising products.

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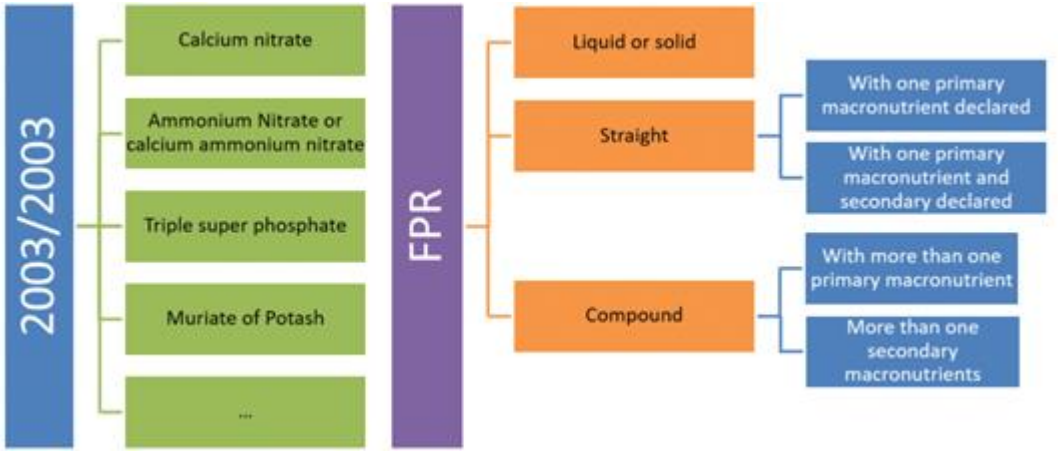

Figure 1. EU Fertilizing Product Regulation Source: Fertilizers Europe, 2019

The new regulation (FPR) will not replace any national legislation already in place although Member States may alter their current national legislation as a result of the new Fertilising Product Regulation. The new EU regulation is facultative: the manufacturer chooses which regulation will be followed: EC/2019/1009 or national regulations for quality of fertilising products. A CE marked fertilising product has free trade within each EU Member State. The purpose of the new regulation is to create increased harmonisation on free trade of fertilising products between Member States and so it will be the decision of the manufacturer whether or not the product requires the CE mark. Without the CE mark a product will not be permitted on the EU internal market however this will not impact their ability to trade on the national market or on other European markets based on mutual recognition for fertilisers with regular production. In order to allow companies to be ready for the implementation of the FRP there is a three-year delay between publishing and implementing the regulation. The new regulation also allows for more products to be added in the future as developments in the fertilising products industry take place.

3.1 Relevance to FERTIMANURE

The FPR of course is relevant for FERTIMANURE in its entirety. The most relevant aspects to organic and organo-mineral fertilisers can be found in the following sections / pages of the FPR (version EN) (Table 1):

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Table 1. The most relevant aspects to organic and organo-mineral fertilisers can be found in the following sections/pages of the FPR (version EN)

Page number	Section
21	Article 19 = End-of-waste status *(relevant for manure)*
37	ANNEX I = **Product Function Categories (PFCs) of EU fertilising products** => PART I = **DESIGNATION OF PFCs** => 1. Fertiliser => A. Organic fertiliser / B. Organo-mineral fertiliser
38	=> PART II = **REQUIREMENTS RELATED TO PFCs** => PFC 1: FERTILISER => PFC 1(A): ORGANIC FERTILISER
39-41	=> PFC 1(A): ORGANIC FERTILISER
41-43	=> PFC 1(B): ORGANO-MINERAL FERTILISER
57	ANNEX II = **Component Material Categories (CMCs)** => PART I = **DESIGNATION OF CMCs** => PART II = **REQUIREMENTS RELATED TO CMCs**
66-67	=> **CMC 11: BY-PRODUCTS WITHIN THE MEANING OF DIRECTIVE 2008/98/EC**
68-70	ANNEX III = Labelling requirements => PFC 1: FERTILISER
70-74	=> PART II = **PRODUCT-SPECIFIC LABELLING REQUIREMENTS** => PFC 1: FERTILISER

3.2 Summary of Regulation (EC) No 2003/2003

The European Union (EU) regulations regarding nutrients provides guidance and legislation over a broad spectrum including marketable nutrients and their use in crop and livestock farming, animal manure and organic waste treatment, water and air pollution, the treatment of food waste, wastewater treatment plants and end-of-waste as well as secondary raw materials (The RISE Foundation, 2016). We have included a table from a report put out by the RISE Foundation as it summarises the EU legislation and guidance impacting on nutrient flows and management in the EU, as well as added some further EU legislations in a further table which also have an impact on the quality of fertiliser products. However, for the purposes of this summary only legislation regarding fertiliser products and the production and distribution of fertiliser products will be addressed (Table2 and 3).

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Table 2. EU legislation and guidance impacting on nutrient flows and management in the EU (The RISE Foundation, 2016)

Category	Main EU legislation and guidance	Date
Fertiliser Manufacture & trade	**Critical raw materials list** (CRM). List of 20 raw materials for which "supply security is at risk and economic importance is high". Phosphate rock was added to the list in 2014.	2014
	Fertiliser regulation EC (2003/2003) (under revision) – The current version defines and lists inorganic fertilisers and micro-nutrients and regulates their market placement.	2003
Nutrient use and management in crop and livestock production	**CAP**: DP (indirectly through greening), RD (indirectly through agri-env-climate measures and directly through WFD measure), and Cross Compliance (area "environment, climate change, good agricultural condition of land)	2013
	Nitrates Directive (91/676/EEC) – limit of 170 kg N/ha/yr from livestock manure in NVZ ,	1991
	Sludge Directive (86/278/ EEC) – regulates the use of sewage sludge in agriculture	1986
Biodiversity	**Habitats Directive** (92/43/EEC)	1992
	Birds Directive (79/404/EEC)	
Treatment of animal manure and organic wastes	Animal by-product regulation (1069/2009/EU) implemented by the 142/2011/EU regulation – regulates the disposal of animal-by-products.	2009
Containment of water pollution	**Nitrates Directive** (91/676/EEC) – limits nitrates in water to 50 mg/l	1991
	Water framework Directive (2000/60/EC) – establishes a framework for the protection of surface and groundwater in the EU	2000
	Urban Waste Water Directive (91/271/EEC) – requires the collection of waste water and the implementation of secondary treatment for agglomerations with more than 2000 person equivalents. More advanced treatments for populations > 10000 person equivalents	1991
	Groundwater Directive (2006/118/EC) – sets a quality standard of 50 mg/l of nitrates	2006
	Surface Water Directive (75/440/EEC)	
	Drinking Water Directive (98/83/EC) – maximum allowed concentration of nitrates in water of 50 mg/l and guide level of 25 mg/l	1998
	Bathing Water Directive 76/160/EEC amended by 2006/7/EC	2006
	Directive on Dangerous Substances 76/464/EEC = 2006/11/EC	2006
	Marine Strategy Framework Directive 2008/56/EC	2008
	Air Quality Directive (2008/50/EC)	2008
Containment of air pollution	**Industrial Emissions Directive** (2010/75/EU) - (replaces IPPC Directive 96/61/EC) best available practices for intensive rearing of poultry and pigs	2010
	EU National Emissions Ceilings Directive (2001/81/EC) (under revision) – sets emissions ceilings for several air pollutants including NH_3 and NO_x	2001
Waste and food waste	**Hazardous waste directive** (91/689/EEC)	1991
	Waste Framework Directive (2008/98/EC)	2008
	Landfill Directive (1999//31/EC)	1999
	Waste Shipment regulation (96/61/EC)	1996
Non-regulatory nutrient management	EMAS – Eco-management and Audit Scheme (voluntary)	
	Stockholm convention on persistent organic pollutants	2004
	Eco-labels	
	Best Environmental Management Practices	
General Initiatives	Bioeconomy communication	2012
	Circular Economy Package	2015

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Table 3. Further EU legislation and guidance guidance impacting on nutrient flows and management in the EU

Category	Main EU legislation and guidance	Date
Chemicals	**Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)** EC (1907/2006)	2006
Food and feed safety	**Laying down the methods of sampling and analysis for the official control of feed** EC (152/2009) – Establishes the sampling methods of analysis of feed control purposes.	2009
	General Food Law Regulation EC (178/2002) – General principles and requirements concerning food and feed law. Covers all sectors of the food chain, including feed production, primary production, food processing, storage, transport and retail sale.	2002

3.2.1 Scope

The 2003 regulation for free trade of fertilisers established a single legal instrument for the identification, traceability, labelling and packaging of fertilisers in the EU. This instrument acts as a guideline for manufacturers on the technical requirements that fertilisers have to fulfil to be marketed in the EU to bear the label EC FERTILISER. The initial reason for which the Commission decided to regulate fertilisers in 2003 was to foster a stronger internal market. The disparity of requirements in Member States was considered to be hindering trade. By establishing “EC fertilisers”, the Commission harmonised the technical criteria for a range of fertilisers, put in place tolerance levels in the declared nutrient contents by manufacturers (Annex 2) and outlined the procedure for Member States wanting to restrict the EC approved fertilisers that are placed on their national market.

The 2003 regulation covers 5 types of fertilisers listed in Annex 1 of the regulation, namely:

A. Inorganic straight primary nutrient fertilisers
B. Inorganic compound nutrient fertilisers
C. Inorganic fluid fertilisers
D. Inorganic secondary nutrient fertilisers
E. Inorganic micro-nutrient fertilisers
F. Liming material

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As such, the mineral fertilisers studied in the Fertimanure project would fall under categories A (NH4SO4, NH4NO3, NH4OH, NH4PO4), B (NPK fertilisers) and C (for liquid concentrates). The regulation defines inorganic fertilisers as "(...*) fertilisers in which the declared nutrients are in the form of minerals obtained by extraction or by physical or chemical industrial processes*" (EC2003/2003, Article 2, paragraph e).

Two observations can be made from this definition. First, the regulation exclusively covers inorganic based fertilisers but does not include references to organic fertilisers nor to biowaste in any form. This means that the regulation forbids manufacturing of fertilising products based on nutrients from vegetable or animal origin and therefore were exempt from any market access advantage. Second, this definition is the only way that the regulation mentions the process for obtaining a fertiliser. This means that the regulation focuses on the characteristics of the end product (nutrient content, solid or fluid state) rather than on the processes or primary material used for the making of the product.

3.2.2 Product requirements

In order for a product to be listed in Annex 1 and to benefit from the access to the free market, fertilisers have to fulfil three general conditions. First, the product has to provide nutrients in an effective manner. Second, it has to be possible to deliver sampling, analysis and test methods for the product. Finally, the product should not induce any adverse effect on human, animal, or plant health nor on the environment.

For each product listed in Annex 1 of the 2003/2003 regulation, the legislation details the minimum and maximum levels of nutrients content as well as the legal expression of the nutrients. There are no criterions for contaminants.

Manufacturers have to precisely identify the EC fertilisers on the package or accompanying documents of the product. The compulsory identification markings for fertilisers from the categories A, B and C are outlined in Article 9 and are the following:

- Designation of the type of fertiliser
- Nutrient and micro-nutrient content specified in words as well as in chemical symbols
- Quantities of fluid fertilisers, expressed by mass
- Net mass
- Name and address of manufacturer

For fluid fertilisers, indications on storage, temperature, instructions on prevention of accidents during storage are mandatory as well. For the other types of fertilisers, the directions for storage and handling use, indications on the use suitable for the soil and crop conditions as well as trade description of the product are optional markings.

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Regarding packaging, EC fertilisers should be equipped with a closing device designed as such that when opened, the packaging should bear the mark of opening and be irreparably damaged.

The regulation foresees tolerance levels to allow for deviations in manufacturing as established by Annex 2.

3.2.3 Obligation for manufacturers

Besides ensuring products fulfil the requirements for the internal market, manufacturers are expected to keep the records and documentations on the origin of fertilisers for as long as the product is available, up until two years after it has been removed from the market. The intention here is to guarantee the traceability of the end product. Records on the origin of components and processes of obtention are not mentioned.

Annex 5 of the regulation outlines the technical documents that manufacturers have to provide in case they wish to see a new type of product listed in Annex 1 and marked as an EC fertiliser.

3.2.4 Art. 15 Safeguard clause

Member States are not allowed to restrict EC fertilisers on their national market on grounds of composition, identification, labelling or packaging. However, they do have the possibility to temporarily prohibit or restrict certain products if they observe that the fertiliser poses a risk to the human, animal, plant and environmental health. The Commission has 90 days after notification from the Member State to adopt a decision on the restriction.

3.2.5 Further observations

Regulation (EC) No 2003/2003 has partially harmonised the internal market conditions where fertiliser products are available. However, this regulation only covers products that are mined or chemically produced and does not cover products from organic materials. This means that almost half of the fertilisers currently available on the European Union (EU) market are not covered by Regulation (EC) No 2003/2003 (Nakarnil & Chatain, 2018). The number of fertilising products on the EU market that are produced from organic waste streams (or at least a combination of organic and inorganic materials) is increasing

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(Someus, 2019). These products, as well as other products such as soil improvers, are currently not covered by EU regulation. This is because the current regulation (Regulation (EC) No 2003/2003) only regulates products that are considered mineral fertilisers and so recovered fertiliser products do not fall under this regulation.

The 'Revision of the Fertilisers Regulation (EC) No 2003/2003' roadmap by the European Commission DG Internal Market, Industry, Entrepreneurship and SMEs Directorate General on Chemicals and Plastics (GROW.DDG1.D.2) points out that the current regulation also fails to address concerns such as environmental and material safety concerns in inorganic fertilisers. Certain levels of elements such as Cadmium and Uranium can be potentially toxic and are components of phosphorites and are not limited by the 2003 regulation. These elements have potential to present a risk to the health and/or safety of humans, animals, plants, and the environment as they build up. However, the 2003 regulation does not cover this risk (European Council of the European Union, 2019).

3.3 Summary of Existing Case Study Member State Regulations

The partners involved in this project have been selected due to their relevant expertise and knowledge around the project area. Partners from 5 Member States have contributed to this task by providing information on the Member States selected as case studies (France, Spain, Belgium, Germany, and the Netherlands). Each of these case studies is focused on different combinations of input streams, existing/innovative technologies, and consequently different final products. In France, the main innovation will consist of building mobile pilots that will be placed on different farms in order to identify the benefit these technologies could provide to farmers in a similar environment. The main innovations in Spain will include using freeze concentration to recover nutrient concentrates from animal manure as well as membrane contactors to produce ammonium nitrate and ammonium sulphate from animal manure. The case study from Belgium provides an overview of existing and foreseen ammonium scrubber systems in Flanders and Southern parts of the Netherlands. It can also provide an insight into the logistics and economics of centralised upcycling scrubber waters. In Germany the main innovation includes binding nitrogen in the solid manure before the drying process using a high-performance natural zeolite additive. The German case study also covers low energy and high efficiency removal of NH3 as solid salt from the TCR-gas without use of external chemicals. The Dutch case study will provide a control of

- Biological acidification process & control of P release
- N-stripper and type of acid used (H2SO4 or HNO3)
- Heater reactor (40-50 ºC)

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Despite the 2003 fertilisers regulation proving to be effective with regards to ensuring an internal market in fertilisers, there is a gap when it comes to the introduction of new types of fertilisers and is mainly only addressing mineral fertilisers (Halleux, 2019). As a result of this, Member States have developed their own policies/regulations. The following sections detail regulations put in place by case study Member States of the FERTIMANURE project alongside the EU legislation.

3.3.1 France

In 2015 the concept of a circular economy took off due to the legislation around “Energy Transition for Green Growth”. This led to the expansion of a number of national legislative texts and working groups looking to clarify the conditions and modalities for returning various organic fertiliser to the soil. The waste prevention measures outlined in the Waste Framework Directive includes an increase in the role of the producer responsibility with regard to waste. From a legislative point of view, as the producer of waste is responsible until its final disposal or recovery, even when the waste is transferred for treatment to a third party (Article L541-2 of the Environmental Code), meaning that compost that is spread on a farmer's land is under the responsibility of its producer even if it is standardised.

Currently, waste status can be awarded to any sewage sludge, effluents, or organic by-products by providing a spreading plan for the product as raw matter. Alternatively, the product can be transformed in order to comply with standards. France is the 2nd largest producer of compost in Europe with nearly 2.5 metric tonnes (Mt) of compost produced annually. An online report on the waste management in France by Knight, 2016 states that “anaerobic digestion and composting contribute significantly to the achievement of recycling targets at French and European levels. In France, recovery methods concern different types of waste from manure to organic fractions from municipal waste”. The report goes on to mention that France was also one of the first countries to introduce a product status (later becoming “end-of-waste” status) through the Rural Code and the French compulsory standards NFU 44-051 and NFU 44-095. The development of composting and more recently for anaerobic digestion has been strongly supported by the introduction of this status (FNADE, 2014). It has also contributed to the improvement of the quality of compost (whose improvement, recognised by all, is a constant motivation for operators). This end-of-waste (EoW) status is now reachable by any high-quality compost, regardless of raw materials, provided that the final compost meets accurate and controlled requirements (FNADE, 2014). As the regulations currently stand, compliance with a mandatory standard does not signify removal from waste status. That is to say that a compost conforming to NF

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U44-051 or NFU 44-095 standards has an administrative status of waste (contrary to what was previously allowed).

In terms of waste, France is following both European legislation and the demands of the Environment Grenelle. This dual pressure is leading to the implementation of innovative policies and high performance regulatory, financial, and organisational instruments (Knight, 2016).

3.3.2 Spain

The current regulation in Spain specifies rules for fertiliser products based on or incorporating humic acids, amino acids, alginic acid, etc. The European Biostimulants Industry Council (EBIC) states that “most fertilisers must be registered prior to marketing, with clear dossier requirements. It also mentions a group of products called "other means of plant defence". Legislation ORDEN APA/1470/2007 covers the regulation on these products. If a product is in line with provisions in this ORDEN, no registration is necessary prior to marketing (European Biostimulants Industry Council, 2019).

The manufacturer must carry out analytical monitoring of the final product at least every six months to ensure that the guaranteed levels are maintained.

In the case of products with organic components, the manufacturer must ensure that the composition, richness and other guaranteed characteristics of the final product are maintained, and that the product continues to meet the conditions specified in the regulations referred to in Annex V of Regulation (EC) No 2019/1009, by means of control analyses at least quarterly in such cases.

The manufacturer of products with organic components shall ensure during the process that the raw materials comply at all times with the legal requirements to which they are subject due to their origin and nature.

Only micro-organisms that have been shown, either alone or in combination with a fertiliser, to stimulate biological processes in the plant may be used in the preparation of fertiliser products. This is irrespective of the nutrient content, its tolerance of abiotic stress or the quality of the crop, so long as it improves the plant's efficiency in nutrient absorption or use.

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3.3.3 Belgium

In all Member States, the Nitrates Directive is perceived as a successful legislative tool to reduce the loss of nutrients and to allow for the application of recycled nutrients over unprocessed manure or chemical fertilisers. In Belgium, the implementation of the Directive into national legislation is moving towards stricter monitoring and higher fines.

In Flanders, manure use and management is strictly regulated by the manure decree and the manure action plans.

All famers with a production of at least 300 kg P2O5 have to submit a manure declaration.

The whole region of Flanders is designated as a nitrate vulnerable zone, which means that the maximum application standard for manure is 170 kg N per ha, in line with the Nitrate Directive. Derogations can be granted: 200 kgN/ha for winter wheat followed by a catch crop, triticale and beets and 250 kg N/ha for grass and maize, provided that all derogation conditions are met.

As the nitrate concentration in the surface water has not shown a decrease in the past years, the sixth manure action plan aims to realise additional reductions in the nutrient losses by area and sector related measures. It established four different area types where specific measures apply such as the obligation to sow a catch crop and/or a phased reduction in active N-usage. It also focuses on the 4 “J” principle (J from “Juist”, which means correct): correct timing, correct dose, correct type of manure and correct technique. This 4 “J” principle is implemented by measuring, controlling (amongst others by determining the nitrate residue) and, by incentivising (good practices).

The implementation of the Nitrates Directive via the Flemish Manure decree since 1991 is rated as having a neutral effect. Digestate products resulting from co-fermented animal manure with plant-based input streams are considered as ‘animal manure' and are therefore limited in Nitrate Vulnerable Zones (NVZ) to 170 kg N/ha/y.

3.3.4 Germany

The German legal regulation with regard to the application of fertilisers consists of the Fertiliser Law (Düngemittelgesetz (DüMG)). The purpose of the law is to regulate the nutrient supply to plants, maintain or improve the soil fertility, avoid any risks to human’s or animal’s health, ensure a sustainable and resource efficient use of nutrients and implement regulations from the EU with regard to the aforementioned issues. In order to enforce the Fertilising Law, two ordinances are applied i) Fertilisation Ordinance (Düngeverordnung (DüV)) and ii) Fertiliser Ordinance (Düngemittelverordnung (DüMV)). The Fertiliser Act

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(Düngegesetz (DüG)) stipulates the following: (a) fertiliser is to be used solely in accordance with good agricultural practice; (b) fertilisers are to be compatible with the type, quantity and timeline related nutritional needs of the plants in question; and (c) fertiliser use is to take into account available soil nutrients, the organic substances in the soil, and local and cultivation related conditions (Umweltbundesamt, 2019).

The Fertilisation Ordinances regulate the application of fertilisers. The objective is to balance the nutrient supply by the farmer and nutrient demand by the crops. For the application of manure, for example, thresholds for nitrogen are applied. The load of nitrogen on arable land must not exceed 170 kg N/Hectares (ha). In addition, the time for the application is restricted. After the harvest of the main crop until January 31st it is prohibited to spread out the manure to the fields. For phosphorus, no general threshold exists. To determine the right amount for supply the phosphorus content in soil has to be analysed and both balanced with the demand by the crops.

Although there are noted differences between plant protection products and plant strengtheners in Germany, they are both covered under the plant protection law. Products categorised as plant aid agents (Pflanzenhilfsmittel) and soil improvers (Bodenhilfsstoffe) are covered by the Fertiliser Law (Düngemittelgesetz (DüMG)).

The legal basis for the production, buying and selling, and use of fertilisers, soil improvers, plant aid agents (Pflanzenhilfsmittel) and growth media is the Fertiliser Law (Düngegesetz - DüG) and the respective Fertiliser Regulation (Düngemittelverordnung (DüMV)). The Fertiliser Regulation establishes the requirements for commercialising a fertiliser. Fertiliser must only be used according to good agricultural practice (GAP) and must be adapted to the plant's needs in terms of type, amount and required time of presence of a certain nutrient. When using fertilisers, the nutrients present in the soil must be considered (European Biostimulants Industry Council, 2019). The surface water quality requirements are also specified in the regulation. The distribution regulation (Verbringungsverordnung) regulates placement on the market, transport, and delivery of industrial fertilisers as well as related intermediate markets. Plant strengtheners are considered substances and mixes including microorganisms that are intended to maintain plant health in general and are not considered plant protection products. Plant strengtheners can, however, protect plants from non-parasitic impairments and are not governed by the German Fertiliser Law (DüG). Soil improvers are substances without any significant nutrient or microorganism content that aims to influence the biological, chemical, or physical properties of the soil in order to improve growth conditions for the crops or promote a symbiotic assimilation of nitrogen. Plant aid agents are also substances without significant nutrient content however they are intended to act chemically or biologically on plants to achieve a plant-structural, production-

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technical, or use-technical benefit. Plant aid agents are considered separate to plant strengtheners and fall under the Fertiliser Regulation (DüMV). Each fertilising product has to match one of the three categories or respectively one of the listed types of fertilisers. For this, requirements regarding nutrient content and plant availability of nutrients have to be met.

Thresholds for heavy metals and organic pollutant content are given (see Table4). The last criterion is the so-called positive list. There are educts or respectively raw materials listed which are allowed for the production of fertilisers, soil improvers and plant growth substrates. Any other material is not allowed.

Table 4. Thresholds for pollutants in accordance to German Fertiliser Ordinance (DüMV)

Parameter	Unit*	Threshold
Arsenic	mg/kg (DM)	40
Lead	mg/kg (DM)	150
Cadmium[1]	mg/kg (DM)	1.5
Chromium (total)[2]	mg/kg (DM)	300
Chromium (Cr^{VI})	mg/kg (DM)	2
Nickel	mg/kg (DM)	80
Mercury	mg/kg (DM)	1.0
Thallium	mg/kg (DM)	1.0
Perfluorinated tensides	mg/kg (DM)	0.1

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Sum of dioxins and dl-PCB (WHO-TEQ 2005)[3]	ng(kg (DM)	30

[1]above 5 % P_2O_5 the threshold for Cd is 50 mg/kg P_2O_5

[2]labeling requirement only

[3]not applied for manure and digestate from biogas plants (without organic waste)

*DM refers to dry matter

Table5 shows the requirements for the fertilising products obtained from the pilot plants within this project.

Table 5. Fertilising products and their requirements

Fertilising product	Category in DüMV	Minimum content	Main Components/Educts
Ammonium nitrate	Nitrogen fertiliser	20% N	N (total), NH4-N, NO3-N
Ammonium phosphate	Mineral multi-nutrient fertiliser	3% N[2], 5% P_2O_5[3]	
Ammonium sulfate	Nitrogen fertiliser	20% N	N (total), NH4-N
Ammonium sulfate solution	Nitrogen fertiliser	5% N, 6% S	NH4-N, S (water soluble)
Ammonium water[1]	-	-	-
Biochar	Plant growth medium	80% C	Wood, Lignite, Leonardit or Xylith
Biostimulants[1]	-	-	-
P-rich organic amendment,	Organic fertiliser (single nutrient)	3%	Manure solid or liquid

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Nutrient rich concentrate, Soil conditioner, Dried organic P-rich fertiliser	Organic fertiliser (multi-nutrients)	1% N, 0.3% P_2O_5, 0.5 K_2O	Manure solid or liquid
	organo-mineral fertiliser (single nutrient)	3%	Manure solid or liquid
	organo-mineral fertiliser (multi-nutrient)	1.5% N, 0.5% P_2O_5, 1.0 K_2O	Manure solid or liquid
Phosphoric acid[4]	-	-	-

[1]Not listed
[2]N-Species: N (total), NH4-N, NO3-N and ureic nitrogen
[3]Water soluble phosphate, neutral ammonium citrate soluble phosphate as well as water and neutral ammonium citrate soluble phosphate
[4]Listed as digestion agent for raw phosphate and therefore an educt* for fertiliser production
*substance that has been extracted from a mixture as opposed to a product created by chemical reaction

Manure itself is a raw material for the production of organic and organo-mineral fertiliser. Both, the solid and the liquid phase of the manure can be used for this purpose. The resulting products are fertilisers with a combination of N, P and K or only with one macronutrient. The requirements are also listed in Table5.

3.3.5 The Netherlands

In the Netherlands the whole country is designated as a Nitrate Vulnerable Zone. The current legislation is defined in the Six Action Plan Nitrates Directives (2018-2021). The maximum application standard for manure and digestate is 170 kg N per ha which is in line with the value mentioned in the Nitrates Directive. The amount that can be applied is based on the total nitrogen content of manure or digestate or other organic product. The Netherlands has a derogation for dairy farms with more than 80% grassland. They are allowed to apply higher manure/digestate application rates on grassland: 230 kg N as manure per ha on sandy soils and 250 kg N as manure per ha on clay soils.

Furthermore, total nitrogen application standards (manure/digestate/organic plus mineral fertilisers) for different crop-soil combinations have been set as a maximum of nitrogen

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application. For this calculation on the effectiveness of the nitrogen must be taken into account. The effectiveness is defined for different types of products in terms of Nitrogen Fertiliser Replacement Value (NFRV).

Besides the N application standards for manure and for N total (manure + fertiliser) also application standards are defined for phosphate. The phosphate application standards depend on the soil phosphorus status and crop type. In principle, the phosphorus status of all soils are assumed to be high. If the farmer can prove (by a certified sampling and laboratory tests) that the status is lower than high then he is allowed to apply more phosphate at that field. If the soil phosphorus status is neutral, the phosphate application rate is 95 kg P2O5 per ha for grassland and 70 kg P2O5/ha for arable land.

There is strict legislation regarding the periods when manure and fertilisers can be applied (Rijksdienst voor Ondernemend Nederland). This legislation identifies what type of fertiliser can be applied during a set period. These periods not only depend on the amount of fertiliser being applied but also the type of soil they are being applied to. The table below outlines the specifics of this legislation. There are additional points to consider that are not included in the table. For example:

- Sewage sludge on soil for cultivation of fruit/vegetable in contact with soil and eaten raw > 10 months before harvest.
- Low-nitrogen sewage sludge can always be applied provided it is not mixed, it is delivered directly from the producer with no more than 1 carrier and is applied on the day of delivery.

There is also legislation on the way fertilisers are applied that is dependent on the type of fertilisers being applied and onto what type of soil they are being applied to Table 6.

Table 6. Type of fertilisers being applied and type of soil in Netherlands

Type of fertiliser	**Approved period for application**
Slurry on grassland	Feb 16 - Aug 31
Slurry on arable land	Feb 16 - Sept 15
Solid manure on grassland	Feb 1- Aug 31
Solid manure on arable land	All year
Sewage sludge on arable land	>3 weeks before harvest
Sewage on pasture	Before/after grazing period

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Sewage sludge on soil for planting fruit/veg	Before/after growth period
Other organic matter	All year round (providing the top layer of soil is not saturated with water or irrigated.

The information in the table above (Table 6) has been gathered from RVO.nl | Rijksdienst", 2020.

3.4 Summary of Regulation (EC) No 2019/1009

The new (EU) 1009/2019 Regulation will replace (EC) No 2003/2003 by July 17, 2022. This regulation will apply directly to all Member States. The Regulation (EC) No 2003/2003 will be withdrawn on July 16, 2022 (European Parliament, Council of the European Union, 2019).

The replacement of the current regulation (Regulation (EC) No 2003/2003), is seen by the European Commission as an expansion of its scope to cover secondary raw material-based products, i.e., recovered and bio-based fertilising (BBF) products. On June 5th 2019 the European Parliament and the Council of the European Union approved the new regulation for EU Fertilising Products (Regulation (EU) 2019/1009).

The current EU regulation does not cover ‘national fertilisers’. These are fertilising products that are marketed by Member States in accordance with their own national legislation. The level of this legislation across Member States varies. The key areas of the new include the opening of the single market to bio-based fertilisers and tailormade fertilising products. This will reduce barriers in place and encourage the production of new and innovative fertiliser products from organic materials and inorganic secondary raw materials. The new regulation will also have strict guidelines on the labelling requirements of all EU fertiliser products to encourage harmonisation among products being traded within the EU (European Parliament, Council of the European Union, 2019). Only producers that can demonstrate the compliance of their product to these guidelines will be eligible to affix the CE mark to their product. Although any product on the EU market must be CE marked, it is optional if manufacturers only wish to market their products on a national level. Where this is the case, regulation 2019/1009 does not apply.

The regulation will divide products into categories based on their Product Function Categories (PFC). These categories will be subject to specific safety and quality requirements adapted to their different intended uses (European Parliament, Council of the

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European Union, 2019). New limits on the number of contaminants in the fertilising products will also be set out (See Table4; Someus, 2019).

Table 7. Limits of contaminants in fertilising products

Type of Fertiliser	**Maximum Cadmium Limit**
Organic fertilisers, inorganic soil improver and other bio-fertilisers	2 mg/kg dry matter
Organic soil improver and liming materials	2 mg/kg dry matter
Inorganic macronutrient and organo-mineral fertilisers less than <5% P2O5 content by mass	3 mg/kg dry matter
Inorganic macronutrient and organo-mineral fertilisers above >5% P2O5 content by mass ('phosphate fertiliser').	60 mg/kg phosphorus pentoxide (P2O5)
Low cadmium content organo-mineral fertilisers	20 mg/kg phosphorus pentoxide (P2O5)
Inorganic micro-nutrient fertilisers	200 mg/ kg total micro-nutrient content

The new regulations will remove barriers for producers of organic and recovered fertilising products and therefore encourage their production. The new regulation will also increase harmonisation of quality standards for all types of fertilising material that can be traded across the European Union (European Parliament, Council of the European Union, 2019). It will also provide farmers with more choices and reduce the environmental and health risks for the consumers by putting in place a maximum Cadmium limit of <1,5 mg/kg in organic fertiliser and other biofertilisers. This will guarantee a high level of soil protection whilst reducing health and environmental risks. Regulation (EU) 2019/1009 will allow producers to adapt their manufacturing process in order to comply with the new limits. The new regulation will also encourage the production of fertilising products from recycled materials which, in turn, helps to develop the circular economy, resulting in a lower dependence on imported nutrients.

There will be no changes when it comes to mutual recognition. There may be a cost increase due to regulation 2019/1009 and therefore could be a reason for free trade of fertilising products based on mutual recognition. This will also provide a good level of protection for the health and safety of humans and the environment is uniform.

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3.4.1 Art. 4 Product requirements

The new regulation states that in order to comply, an EU fertilising product must meet a number of requirements set out in Annex I, II and III of the regulation document. The requirements in Annex I include details on the claimed function of the product as well as the mode of action. In cases where the product contains a substance for which there are regulated maximums the product must comply with additional regulations such as Council Regulation (EEC) No 315/93. Annex II covers component material category(ies) and states that “an EU fertilising product shall consist solely of component materials complying with the requirements for one or more of the component material category(ies) (CMCs) listed in this Annex”. These CMCs include, but are not limited to, virgin material substances and mixtures, fresh crop digestate, polymers (nutrient and other), and by-products within the meaning of Directive 2008/98/EC. There are many details laid out in Annex III of the regulation that set out the requirements for labelling the product. These requirements cover the claimed function of the product, the mass or volume of the product, instructions for intended use (application rates, timing, and frequency) as well as storage recommendations. Any relevant information regarding managing risk to human, animal or plant health is also required on the labelling. The regulation also states that the labelling of the product shall not claim that it is ‘sustainable’ or ‘environmentally friendly’ unless the product complies with legislation or standards that permit it to do so. The Commission aims to publish a document providing guidance for manufacturers and market surveillance authorities with regards to label requirements. The document will also include clear information and examples regarding the visual appearance of the requirements. This will be published by 16 July 2020 (European Parliament, Council of the European Union. 2019).

Any aspects of EU fertilising products that are not covered in Annex I or II must not present a risk to human, animal or plant health or the safety of the environment.

3.4.2 Art. 5 Market availability

Only fertilising products that comply with this regulation may be made available on the EU market.

3.4.3 Art. 6 Obligations of manufacturers

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The obligations of manufacturers of fertilising products requires manufacturers to ensure they have been designed and manufactured in a way that meets the requirements mentioned above and set out in Annex I and II of the regulation document. It is also the responsibility of the manufacturer to provide technical documentation in addition to ensuring any relevant assessment procedures are carried out. Only once it has been demonstrated by a conformity assessment procedure may manufacturers draw up an EU declaration of conformity and affix the CE marking. All technical documentation and the EU declaration of conformity relating to a product must be kept by manufacturers for a minimum of 5 years from the point at which the product is placed on the market. If requested, the manufacturers are granted permission to make a copy of the declaration available to other economic operators.

Manufacturers may carry out sample testing of the fertilising products once available on the market in order to investigate, and, if necessary, recall any non-conforming EU fertilising products to ensure any and all distributors are informed of any such monitoring. In order to ensure this can be done effectively it is the responsibility of the manufacturer to ensure the packaging of the products clearly displays a type number and batch number or method of identification. If the product(s) are supplied out of packaging, then a document must accompany the product detailing all the required information. In order to further increase the traceability of the product, manufacturers are required to include their name, registered trading number or trademark along with a postal address on the packaging of the product.

Any and all of this information can be requested by a national authority and should be provided in order to ensure risks posed by any EU fertilising product are eliminated.

3.4.4 Art. 8 Obligations of importers

Before an imported fertilising product is placed on the market, the necessary conformity assessment procedure must have been carried out by the manufacturer. It is the obligation of the importer to ensure that the manufacturer has not only completed this assessment but also drawn up the technical documentation that is required by this legislation to accompany the product. Similar to the obligations of the manufacturer, the importer must indicate their name, registered trade name or trademark and postal address on the packaging of the product for traceability purposes. It is the responsibility of the importer to ensure that the product is handled correctly whilst under their care in order to avoid altering the compliance of the product to this regulation. The importers, as with the manufacturers, are responsible for taking immediate corrective measures if any products are considered to be non-compliant with the regulations.

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Importers are also required to keep the technical documentation and the EU declaration of conformity for 5 years after the EU fertilising product covered by those documents has been placed on the market. If requested the manufacturers are granted permission to make a copy of the declaration available to other economic operators.

3.4.5 Art. 9 Obligations of distributors

The obligation of distributors is very similar to that of the importers. Distributors must ensure any EU fertilising product made available on the market has the required accompanying documentation. This includes batch numbers, trademarks and technical documentation as detailed in the summary of Article 6 and 8.

This information must be provided in a language that is understood by the end user. As with manufacturers and importers, distributors also hold responsibility to withhold a product from the market if they consider or have reason to believe a fertilising product does not conform with the requirements of this regulation. If there is a risk to human, animal, or plant health and/or safety or the environment the distributor is required to inform the manufacturer or importer of such risk, as well as notifying the market surveillance authorities.

If the product has already been made available on the market at the time of concern, the distributor must take corrective measures to bring the product in line with conformity. Should the product need to be withdrawn or recalled, it is the responsibility of the distributor to do so.
Distributors must also ensure storage or transport conditions of the EU fertiliser product do not jeopardise its compliance with the requirements of this regulation.

If there is concern or reason to believe a product presents risk to the health and safety of humans, animals, plants and/or the environment immediate action must be taken to inform the relevant authorities of the Member States in which the product is available on the market. This includes providing details of any non-compliance and any corrective measures taken or to be taken.

If requested to do so, distributors must provide their national authority with all information and documentation necessary to demonstrate the conformity of the fertilising product. The distributor must cooperate with any action taken to eliminate risks presented by the product they have distributed.

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3.4.6 Art.11 Packaging and repackaging by importers and distributors

Importers and distributors who under Article 10 are not considered to be manufacturers but package or repackage an EU fertilising product need to follow certain regulations. These regulations require the importers and distributors to ensure their name, registered name or registered trademark are clearly stated on the packaging as well as the postal address where the product was packaged or repackaged. The address must be preceded with a statement indicating whether the product has been packaged or repackaged. Importers and distributors, as with manufacturers, must also ensure they keep any technical documentation and EU declaration of conformity relating to a product for a minimum of 5 years from the point at which the product is placed on the market.

3.4.7 Art. 17 General principles of CE making

The CE marking shall be subject to the general principles set out in Article 30 of Regulation (EC) No 765/2008.

3.4.8 Art. 18 Rules and conditions for affixing the CE marking

The following rules and conditions need to be met when affixing the CE marking: It has to be affixed visibly, legibly and indelibly to the packaging of the EU fertilising product or, alternatively when there is no packaging, to a document accompanying the EU fertilising product and it has to be affixed before the product is placed on the market. Under Annex IV where it is required, the CE marking needs to be followed by the notified body's identification number. This number needs to be affixed by the body itself or, under its instructions, by the manufacturer or their authorised representative. In order to ensure the correct application of the rules around the CE marking Member States need to build upon existing mechanisms and take appropriate action in the event of improper use.

3.4.9 Art. 19 End of waste status

The Regulation defines criteria for which material is considered waste, as defined in Directive 2008/98/EC. It can cease to be waste if it is contained in a compliant EU fertilising product. In these cases, in order for the material to be considered compliant with the conditions set out in Article 6 of Directive 2008/98/EC the recovery process from this Regulation should be performed whilst the material is still considered to be waste. The

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material will cease to be classified as waste from the moment that the EU declaration of conformity was drawn up.

3.4.10 Chapter IV. Notification of conformity assessment bodies - Art. 20-36

The Commission and other Member States must be notified of anyone that has been authorised to carry out third-party conformity assessment tasks. Subsidiaries or subcontractors may only undertake tasks connected with conformity assessments if it is agreed to by the client.

Member States must have a designated party that is responsible for setting up and executing any procedures necessary when assessing and notifying conformity assessment bodies. The notifying authority must take full responsibility for the tasks performed by the designated body.

There must be no conflict of interest within the notifying authority with regard to the conformity assessment bodies. The impartiality and objectivity of the notifying authority must also be safeguarded as well as the confidentiality of the information the notifying authority obtains.

A conformity assessment body must be a legal personality and be independent of the organisation or the EU fertilising products it assesses. This means that they are not involved in the design, manufacturing, or distribution of fertilising products in order to maintain independence of judgement in relation to conformity assessment activities. A conformity assessment body must be able to perform the technical and administrative tasks associated with the conformity assessment activities in a way that is suitable to ensure there is access to all necessary equipment or facilities.

Member States are obliged to make the Commission aware of any changes made to the notifying authority, who will then make this information publicly available. Any doubts expressed by the Commission or brought to the attention of the Commission regarding the competence of a notified body must be fully investigated. If requested by the Commission, the Member State in question must provide any and all information relating to the body concerned. The Commission will notify the relevant Member State of their conclusion and appropriate action will be taken.

It is presumed that if a conformity assessment body demonstrates conformity with the Official Journal of the European Union then this conformity will reach the requirements set out in Article 24 of chapter IV.

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The Commission will assign a single identification number to a notified body even where the body is notified under several Union acts. The list of these bodies will be made publicly available by the Commission who must be made aware of any changes in order to ensure the list is kept up to date.

Changes that the Commission must be made aware of include cases where a notifying authority no longer meets the requirements laid out in Article 24 and/or a failure by the notifying authority to fulfil its obligations. The action taken following these changes depends on the severity of the failing but can result in the notifying authority being restricted, suspended, or withdrawn. The Commission and Member States must be immediately informed. The files of the body that are restricted/suspended/withdrawn must either be processed by an alternative notifying body or kept available for the responsible notifying and market surveillance authorities at their request.

Any unnecessary economic burdens associated with conformity assessments must be avoided. If a notified body finds a manufacturer has not met technical specifications, they can demand the manufacturer in question to take appropriate action prior to a decision of approval being made. In the case where the notifying body discovers an EU fertilising product does not comply, but an approval has already been granted the notifying body holds the right to suspend or withdraw the approval until corrective action is taken.

There must be an appeals procedure in place for the notified bodies should they object to the decision made.

Notified bodies must inform the notifying authority if any certificate or approval decision is refused, suspended, or withdrawn. Any circumstances that affect the conditions under which a certificate or approval decision is granted must also be brought to the attention of the notifying authority. The notifying authority must be made aware of any information received from market surveillance authorities regarding the conformity assessment activities.

When requested, any conformity assessment activities carried out, including cross-border activities and subcontracting, must also be made available to the notifying authority.

Coordination and cooperation between all bodies notified in this regulation will be ensured by the Commission. In the case of group work all notified bodies must participate directly or through a designated representative.

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3.4.11 Art. 37 Union market surveillance and control of EU products entering the market

EU fertilising products will be covered by Articles 16 to 29 of Regulation (EC) No 765/2008.

3.4.12 Art. 38 Dealing with EU fertilising products presenting a risk

Evaluations in line with the requirements of this regulation may be carried out should any market surveillance authorities have sufficient reason to believe any EU fertilising product does in fact pose risk to the health and/or safety of humans, animals, plants or the environment. Corrective action is required to take place within a reasonable period of time outlined by the market surveillance authorities depending on the level of risk presented. The corrective action may require the product to be withdrawn or recalled from the market.

If the non-compliance is thought to not be restricted to a national territory the Commission and other Member States must be informed of the results of the evaluation as well as any required action as a result. The action requested by the market surveillance must be taken without delay. If corrective action is not taken the market surveillance authorities have the right to take all appropriate provisional measures to prohibit or restrict the EU fertilising product being made available on the national market, to withdraw or http://citethisforme.com/recall the EU fertilising product from that market. The Commission must be notified of any such action. Any objection to this action must be raised within 3 months of the action being issued.

Any Member State that has not initiated the procedure outlined in this article must inform the Commission as well as other Member States of any information relating to the non-compliant product.

3.4.13 Art. 40 Compliant EU fertilising products which present a risk

If, despite being compliant with article 38, an EU fertilising product presents a risk to the health and/or safety of humans, animals, plants or the environment, the Member State must take immediate action to ensure that the risk is not present at the time of the product being made available on the market. If this is not satisfactory the product shall be withdrawn from the market. The Commission along with other Member States must be informed of the risk and details such as the necessary identification information of the product in question. The Commission will enter consultation with the Member States in order to evaluate any national measures that may be required. Any decision made by the Commission will be immediately communicated to all Member States and relevant economic operator(s).

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3.4.14 Art. 42 Amendments of Annexes

The following section has been summarised from Regulation EC No 2019/1009 written by the European Council of the European Union, 2019. The full text can be found at page 30-32 of the regulation under Article 42. (see European Parliament, Council of the European Union. (2019) in references)

The Commission can adopt delegated acts in accordance with Article 44 amending Annex I. With the exception of the cadmium limit values and the definitions, or other elements relating to the scope of product function categories. Amending Annexes II, III and IV for the purposes of adapting those Annexes to technical progress and of facilitating internal market access and free movement for EU fertilising products: (a) which have the potential to be subject to significant trade on the internal market and (b) for which there is scientific evidence that they (i) do not present a risk to the health and/or safety of humans, animals, plants, or the environment and (ii) ensure agronomic efficiency.

When under Annex I new contaminant limits are introduced, the Commission will take into account the scientific opinions of the European Food Safety Authority, the European Chemicals Agency or that of the Commission's Joint Research Centre. Where delegated acts in order to add or review component material categories are adopted so as to include materials that can be considered to be recovered waste or by-products within Directive 2008/98/EC, those delegated acts will explicitly exclude such materials from component material categories 1 and 11 of Annex II. When adopting delegated acts in particular animal by-products, by-products within Directive 2008/98/EC, and recovered waste, in particular from the agricultural sector and the agro-food industry, as well as materials and products already lawfully placed on the market in one or more Member States will be prioritised.

The Commission will assess struvite, biochar, and ash based as component materials after 15 July 2019. If the assessment concludes that the criteria in point (b) of paragraph 1 are fulfilled, it will adopt delegated acts pursuant to paragraph 1 to include these in Annex II. It may only adopt component material categories that cease to be waste following a recovery operation if recovery rules in Annex II ensure that the materials comply with the conditions set out in Article 6 of Directive 2008/98/EC. The Commission can add microorganisms or strains of microorganisms, or additional processing methods to the component material category for such organisms after having verified which strain of the additional microorganism fulfils the criteria in point (b) of paragraph 1 on the basis of the following data: (a) name of microorganism, (b) taxonomic classification: genus, species, strain and procurement method, (c) scientific literature reporting about safe production, conservation and use of the microorganism, (d) taxonomic relation fulfilling the requirements for a

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Qualified Presumption of Safety as established by the European Food Safety Authority, (e) information on the production process, including, where relevant, processing methods such as spray drying, fluid-bed drying, static drying, centrifugation, deactivation by heat, filtration and grinding, (f) information on the identity and residue levels of residual intermediates, toxins or microbial metabolites in the component material and (g) natural occurrence, survival and mobility in the environment.

Polymers referred to in the second point of component material category 9 in Part II of Annex 11 will be assessed as well as the methods used to verify compliance of the same criteria will be tested by 16 July 2024. Delegated acts which have the following criteria will be adopted: (a) the polymer is capable of undergoing physical and biological decomposition in natural soil conditions and aquatic environments across the EU, decomposing only into carbon dioxide, biomass and water, (b) the polymer has at least 90% of the organic carbon converted into carbon dioxide in a maximum period of 48 months after the end of the claimed functionality period of the EU fertilising product indicated on the label, and as compared to an appropriate standard in the biodegradation test and (c) the use of polymers does not lead to the accumulation of plastics in the environment.

The Commission may only adopt delegated acts pursuant to paragraph 1 amending Annex II to add derived products within the meaning of Regulation (EC) No 1069/2009 in the component material categories where an end point in the manufacturing chain has been determined in accordance with Article 5(2) of that Regulation.

“By 16 July 2022, the Commission will adopt delegated acts in accordance with Article 44 supplementing point 3 of component material category 11 in Part II of Annex II to this Regulation by laying down criteria on agronomic efficiency and safety for the use of by-products within the meaning of Directive 2008/98/EC in EU fertilising products” (European Parliament and Council, 2019). These criteria will consider product manufacturing practices, technological advancements, and the latest scientific evidence.

The Commission can adopt delegated acts in accordance with Article 44 amending Annex I, except for cadmium limit values, and Annexes II, III and IV in the light of new scientific evidence. This will be done where, using a risk assessment and where an amendment is shown to be necessary to ensure that any EU fertilising product complying with the specification of the Regulation does not present a risk to the health and/or safety of humans, animals, plants, or the environment.

3.4.15 Art.50 Biodegradability review

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The Commission will carry out a review by 16 July 2024 in order to assess the possibility of determining the criteria of the biodegradability of mulch films as well as the possibility of incorporating them into component material category 9 in Part II of Annex II.

3.5 Comparison between both legislation packages

The proposal for a Regulation of the European Parliament and of the Council which sets out rules for making CE marked fertilising products available on the market is part of the Action Plan for the Circular Economy (COM (2015)0614 final) (Lohan, 2016). The proposal aims to develop an internal market for fertilising products (including organic and organo-mineral fertiliser products, liming materials, growing substrates, agronomic fertiliser additives, plant biostimulants and fertiliser blends).

The section above presented an overview of the most relevant sections/articles from the 2019 legislation (Regulation (EU) 2019/1009) regarding the inclusion of fertiliser products into the EU market. As the intention of the Action plan for the Circular Economy (COM (2015)0614 final) is the inclusion of organic fertilisers and organo-mineral fertilisers, liming materials, additives, bio stimulants and blends, changes between both legislation packages are prominent. Certainly, the most remarkable change between 2003 and 2019 is the harmonisation of alternative fertiliser products. Nevertheless, changes in requirements, market, obligations of manufacturers, importers and distributors, packaging, and compliance, among others, resulted in a new set of regulations to be followed.

Table 8 below presents a comparison between both legislation packages based on observations and complementary documents to be consulted for further guidelines. A degree of change evaluation between documents is presented as well.

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Table 8. Comparison between 2003 and 2019 fertiliser regulation

A	No remarkable changes
B	Minor
C	Radical change. Discordance between the 2003 and 2019 regulation

Articles from 2003 regulation	Articles from New EU regulation	Observation	Complementary documents/legislation	Degree of change
Article 6, Article 9, Article 17	Article 4 Product requirements	It is compulsory to indicate the content of nitrogen, phosphorus and potassium, micro-nutrients and nomenclature. (P2O5, K2O) Both legislation packages lead to a direct reference to Annex I. Noticeable changes in the 2019 Annex I include the inclusion of organic fertilisers, organo-minerals, inorganic fertilisers, liming materials, soil improvers, inhibitors, biostimulants and fertiliser products blends. If compiled, requirements from Annex I (both 2003 and 2019), the fertiliser can be designed with "EC" letters, allowing it to be sold throughout the EU. This designation guarantees minimum nutrient content and safety. Further legislation must be analyzed (e.g. packaging, waste directives, chemical registration, etc.).	Based on Hukari(2015) Sewage Sludge directive*Dir. 86/278/EEC; Organic Products Regulation, Reg. (EC) 834/2007; Annex 1 of fertilisers regulation, Annex ll of the production, labelling and control of organic products; Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Reg. (EC) 1907/2006	**C**
Article 1, Article 2, Article 27	Article 5 Market availability	Both legislative packages apply to products which are placed on the market designated as "EC fertiliser". Guidelines to obtain conformity must be followed in both legislations. Contents from the fertiliser should be expressed by the Member States. A new section of market surveillance is included in the 2019 regulation.	Based on Hukari(2015) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Reg. (EC)1907/2006 - Classification, labelling and packaging of substances and mixtures(CLP/GHS), Reg. (EC) 1272/2008 - The Mutual Recognition Regulation, Reg. (EC) No 764/2008 - Shipment of waste regulation, Reg. (EC) 1013/2006 - Waste Framework Directive (WFD), Dir. 2008/98/EC	**B**

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Article 2, Article 3, Article 4, Article 7, Article 8, Article 9, Article 27	Articles 6/8/9 Obligations of manufacturers/ importers/ distributors	Regulation (EC) No 2003 only covered characteristics such as specific nutrient levels in the final product. The 2019 regulation will go beyond this and cover input materials as well as end characteristics. There will also be maximum limits set on the level of elements such as cadmium (a heavy metal found in phosphate) and other contaminants. The harmonisation the 2019 regulation aims to generate will be optional in the sense that Member States will be able to continue implementing their own additional national regulation. If the manufacturer wishes to benefit from free circulation on the market they will be required to demonstrate the product meets the standards set by the regulation in order to bear the CE marking. Any product that does not bear the CE marking will maintain rights to circulate within the national market. The new regulation will reduce the red tape for importers and distributors as long as the manufacturers comply with the regulations and opt to bear the CE marking on their products. The new regulation also encourages circular farming and so the distribution and importing of raw materials will now also be possible on the free market providing their fertilising products meet the standards of regulation (EC) 2019/1009. The EU imports approximately 85% of its phosphate (Michalopukos, 2018) and so the introduction of limits on the level of cadmium could severely impact the availability of phosphorus that complies with the 2019 regulation as phosphorus from different regions contains different levels of contaminants.	Regulation (EU) 2019/1020 Regulation (EC) No 470/2009 Regulation (EC) No 396/2005 Procedure 2016/0084(COD)	**B**

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Annex IV	Article 11 Packaging and repackaging by importers and distributors	The 2003 regulation does not make a reference to importers and distributors. In Annex IV under point 6 it only mentions "Instructions for taking, preparing and packaging the samples". The 2019 regulation does not go into as much depth for importers & distributors. The comparison would maybe apply better to Articles 6, 8 and 9.		**C**
Nothing mentioned	Article 17 General principles of CE making	2019 Regulation states: "The CE marking shall be subject to the general principles set out in Article 30 of Regulation (EC) No 765/2008."	Article 30 of Regulation (EC) No 765/2008 (setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93)	**C**
Nothing mentioned	Article 18 Rules and conditions for affixing the CE marking	The 2019 regulation states the rules and conditions when affixing the CE marking. The 2003 regulation only makes reference to marking the words "EC fertiliser" in Article 9.		**C**
Nothing mentioned	Article 19 End of waste status	The category of waste appears for the first time on the legislation package. As intended, the promotion of waste-based fertilisers is prominent.	Directive 2008/98/EC (on waste and repealing certain Directives)	**C**
Nothing mentioned	Chapter IV. Articles 20-36 - Notification Bodies	The introduction of notified bodies is new to the 2019 regulation. The notified bodies are to be considered as an officially designated conformity assessment body by the national authority. Their role is to ensure fertilising products conform with the procedures set out in the 2019 regulation.	List of Notified Bodies can be found on a public database called NANDO; https://ec.europa.eu/growth/tools-databases/nando/index.cfm	**C**

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Article 6 Compulsory Statements	Article 3 Union market surveillance and control of EU products entering the market	The 2019 regulation states the following "Articles 16 to 29 of Regulation (EC) No 765/2008 shall apply to EU fertilising products". The 2003 regulation had to come up with separate rules as the directive only came into existence in 2008. It makes comments on how nitrogen, phosphorus, potassium, calcium, magnesium, sodium, sulphur, etc. in the nutrient fertiliser should be labeled by Member States.	2019 regulation states that Articles 16 to 29 of Regulation (EC) No 765/2008 shall apply, which is "setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93".	**C**
Article14, Article 15	Article 38 Dealing with EU fertilising products presenting a risk	The standard of dealing with EU fertilising products that present a risk to the health and/or safety of humans, animals, plants or the environment in regulation 2019/1009 closely mirror those of the 2003 regulation. The 2019 regulation offers more detail in terms of the procedure for dealing with the product presenting the risk but the end result is the same. Both legislation documents encourage operators to take immediate measures and notify competent authorities to act promptly.	Annex 1 of fertilisers regulation, Annex ll of the production, labelling and control of organic products; Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Reg. (EC) 1907/2006	**A**
Chapter I Adaptation of the Annexes Article 31 New EC fertilisers and Article 32 Committee procedure	Article 42 Amendments of Annexes	In the 2003 regulation there is no direct mention of amendments to Annexes. It only states that the Commission shall be assisted by a committee with regard to Decision 1999/468/EC. The 2019 regulation states that the Commission can adopt delegated acts depending on certain criteria for each Annex.	The 2003 regulation makes reference to Articles 5 and 7 of Decision 1999/468/EC (laying down the procedures for the exercise of implementing powers conferred on the Commission). The 2019 regulation makes reference to Directive 2008/98/EC (on waste and repealing certain Directives) and Regulation (EC) No 1069/2009 (laying down health rules with regard to animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002).	**C**

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Nothing mentioned	Article 50 Biodegradability review	The 2019 regulation states "By 16 July 2024, the Commission will carry out a review in order to assess the possibility of determining biodegradability criteria of mulch films, and the possibility of incorporating them into component material category 9 in Part II of Annex II." There is no mention of biodegradability in the 2003 regulation.	Organic Products Regulation, Reg. (EC) 834/2007; Annex 1 of fertilisers regulation, Annex ll of the production, labelling and control of organic products	**C**

3.6 Anticipated Supplementary Member State Regulations and Requirements

So-called 'national fertilisers' are not affected by the existing EU regulation when they are placed on the market of the Member States. In this case they must instead demonstrate they are compliant with their respective national legislation. The level of detail in the national legislation varies across member states. Fertilisers can be marketed by producers as 'EC fertilisers' or as 'national fertilisers. The 2019/1009 regulation aims to harmonise the regulation across Member States. However, national regulations in Member States will still be in force and are not optional to 2019/1009. They have the option to implement the requirements of the EU-level regulation alongside their national regulations. The requirements addressed in the 2019/1009 regulation may be enforced by all EU Member States. The usage of the CE mark is decided by the manufacturer and therefore the Regulation should therefore not apply to products that are not CE marked when made available on the national market. The anticipated changes for each Member State case study involved in the FERTIMANURE project are outlined below.

3.6.1 France

- In view of the introduction of mutual recognition, if non-EC products comply with the national criteria of the Member State in which they are produced they can be placed on the market of any other Member State so long as they are compliant with the national criteria.
- There would be some possible contradiction with the Nitrates Directive, with the maximum quantities of used fertilisers for a total/almost total substitution of mineral fertilisers.
- Exemptions from marketing authorisation (and experimental application) in France are possible in certain cases for new fertilisers, in particular:

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- "Waste, residues or effluents from the facilities defined in Articles L. 214-1 and L. 511-1 of the French Environmental Code which are disposed of agricultural land as fertilising materials must be described in a spreading plan guaranteeing the absence of harmful effects on human and animal health and on the environment". So, BBF from manure will have to be analysed physically, chemically and biologically to demonstrate their harmlessness.
- "fertilisers, their adjuvants and growing media must comply with a specification approved by regulation guaranteeing their effectiveness and safety". So, commercially formulated fertilisers or tailor-made fertilisers (TMF) will need to have a specification approved by regulation.

3.6.2 Spain

The new European fertiliser regulation will cover organic, organo-mineral, biostimulants, microorganisms, etc as well as mineral fertilisers. The new regulation will enable Member States to be guided by a uniform regulation for the future commercialisation of products such as biostimulants, microorganisms, and organic products to be developed rather than diverging regulations set out by individual Member States. It will be necessary to review the final Component Material Category 10 (CMC10) list of animal by-products that are at the end of this project.

3.6.3 Belgium

The latest proposals from Flanders to add the liquid fraction of digestate as a fertiliser will be considered for approval by the Joint Research Centre (JRC) in 2020. However, the legislation depends on the input materials and this limit does not apply to digestate which was obtained from feedstocks other than manure. For these reasons, the overall effect is considered as neutral as it will depend on the type of feedstock to be digested. The national legislation in Belgium will adapt in order to be in line with the 2019/1009 regulation but no significant changes are planned.

3.6.4 Germany

The last changes of the German Fertilisation Ordinance (DümV) were adopted in order to align with the Nitrate Directive of the EU after a complaint from the EU Commission in the European Court of Justice during the period of 2016 to 2018. At the end of March 2020, the

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Fertilisation Ordinance, which was subsequently revised again, was adopted by the Federal Council (Umweltbundesamt, 2019).

Regulation (EC) No 2019/1009 is not meant to replace the national regulations but establish optional harmonisation. This means that fertiliser producers are free to marketise their products according to the national or European regulations. On the other hand, it was announced that the German Biowaste Ordinance (BioAbfV) will be adapted to include soil additives (e.g., green waste chips) and not only fertilisers in the sense of the German Fertilisation Ordinance (DümV) (Bundesgütegemeinschaft Kompost, 2020). In this context it is improbable that the DümV will change before 2022 specifically to align with the European Fertiliser Regulation. Nevertheless, there is possibility for change to the national legislation as the EU regulation develops.

3.6.5 The Netherlands

There is an anticipated change to the national legislation in the Netherlands as a result of Regulation (EC) No 2019/1009. How this change is, becomes clear at the end of 2021. This 2019/1009 regulation is dealing with the trade of products within Europe (CE labelling of products to enable distribution across borders without country specific legislation). Manure products are used in the region itself and when they are transported across borders as manure products they will be sanitised and follow the rules of registered manure transport of the importing EU Member State or have to bear a CE mark.

There is potential for recovered ammonium or phosphate to be used as CMCs to produce the PFCs, but it will depend on the characteristics of the new resources and if they qualify to become part of the CE marking process.

3.7 Conclusions

The 2003/2003 regulation will be repealed and replaced by the 2019/1009 regulation in order to allow harmonisation of free trade of fertilising products between Member States by presenting a compliance criterion that sets out the safety and quality specifications and a conformity assessment required for a product to be on the free EU market. Regulation (EC) No 2019/1009 will also provide rules and requirements regarding safety, quality and labelling specifications that are common for all fertilising products across the EU market. This regulation will expand the 2003/2003 regulation as it will also cover products such as organic and organo-mineral fertilisers, soil improvers, inhibitors, plant biostimulants, growing media or blends that are not currently covered by the 2003/2003 regulation and offer an opportunity to include these products on the open market as a result. Another introduction as a result of the 2019/1009 regulation will be the limits for toxic contaminants

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such as cadmium. This is the first regulation of this type developed within the Circular Economy Package of the European Commission and will warrant for a high level of health-related risks, soil protection and reduce environmental risks. The 2019/1009 regulation will come into force in 2022 but the changes have been published in advance to allow producers of fertiliser products to adapt their current manufacturing process to comply with the new limits. The new regulation will provide manufacturers with the opportunity to modify their products to requirements to bear the CE mark and enter the open market. The alternative is that the products comply with only the national legislation and are restricted in terms of EU countries they can distribute the product to.

The national legislations within the Member States were already in existence when the 2003/2003 regulation was put in place. The 2003/2003 regulation was a first attempt at harmonising the different national legislations of the Member States. The Member States participating in the FERTIMANURE project have added regulations regarding other types of fertilisers that do not fall under the 2003 EU Regulation. Some countries such as France have also updated their waste legislation to include compost and rules on how to dispose of it.

The 2019/1009 regulation is intended to bridge the gaps between EU and national legislation. Whilst many Member States will continue to enforce their existing national legislation, the 2019/1009 regulation could reduce the need for (additional) national legislation and stimulate an increased harmonisation across the EU.

4. Argentina regulatory framework

The growing number of inhabitants and the need to generate food more quickly have increased the models of exploitation that, in other historical moments, were unthinkable for Argentina. The law has played a fundamental role in the corporate order at the local, national, and international level in the links with foreign states and supranational in the emergence of entities made up of several states.

From the point of view of science and industry, the law has lagged somewhat behind in its function as a tool for containment and regulation since, in general, technological scientific advances follow one another, generating a change in the dynamics of the subjects involved or even with the environment. The law provides a legal framework whose purpose is to order the novelty in order to generate order in the linking of the subjects or objects referred to, protecting the shared social ideal to achieve adherence in the participants.

With the advent of intensive livestock farming, enormous advances have been made in the scale of production of these, generating situations that did not exist until now.

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It should be noted that neither the Argentine National Constitution nor the federal laws that we will analyse contain a definition of the word "environment", although it is incorporated by the Environmental Framework Law No. 11723 (1995) of the Province of Buenos Aires, which describes it as a "system made up of natural, cultural and social factors, interrelated with each other, which condition the life of man while being constantly modified and conditioned by him".

This space incorporates concepts, problems, questions, knowledge, actions and other issues that until that moment were not a variable to be taken into account, but that, due to their social, environmental, ethical, sustainability impact, etc., had to be compiled and regulated by law.

In this sense, we could say that the law is reactive, since it provides a legal framework, that is, it orders a situation that already exists. The law can never be prior to action on novel issues, which is why criticism of the question that laws are insufficient or do not take into account all variables is incorrect from the moment of their conception.

From a philosophical point of view, the law expresses or orders through a legal framework something that already exists. It does not do futurology, but gives legal tools for the new situation created in the interaction of subjects, and of these subjects with objects, to generate an ethical dynamic, which adjusts to the moral values of the historical moment in which the law was created, in a determined geographical space, and with a detailed study of a determined act, situation, or action.

If we take this into account, we can understand that the law is a living element, in constant change and adaptation to the new reality or the new social vision about a subject, and even more in relation to the new facts of a scientific or productive nature.

4.1 Argentinean legislation

The Argentine legislation, due to its way of structuring, has the National Constitution as its supreme rule. Any law, rule, ordinance, etc., dictated within the national territory, cannot be in essence, contrary to what is expressed at the constitutional level. It is a generic framework that indicates at the level of the Magna Carta, the social agreement and the main features of the freedoms and obligations of those who develop in the country.

Likewise, the Constitution itself incorporates the ratified international treaties as superior regulations, and any regulation must be adapted to its framework agreement.

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Under the National Constitution we have the national laws, and then the provincial laws, ordinances, and resolutions.

It should be noted that Argentina is a Federal Republic, which is why the provinces that make it up have a certain amount of autonomy in the enactment of their laws and must maintain the essence and spirit of the National Constitution, the Provincial Constitution, international treaties, and national laws.

From the general point of view, the National Constitution in its reform of 1994, has incorporated through article 41 the idea of support and preservation of the environment.

It states: "All inhabitants have the **right to** a healthy, balanced **environment** suitable for human development and for productive activities to meet present needs without compromising those of future generations; and they have the duty to preserve it. ¨

Although the idea of the environment was incorporated at a constitutional level in 1994, environmental law dates back to the 19th century.

In 1886 the Mining Code was sanctioned, and in 1891 National Law 2797 was passed to regulate environmental issues - which is still in force - adding a number of regulations in terms of the initial preservation of the environment.

Later, the norms and treaties linked to the United Nations World Conference on the Human Environment (1972) and the Stockholm Declaration, the United Nations Environment Program (1982) in Nairobi-Kenya, and the United Nations Conference on Development and the Environment (1992) in Rio de Janeiro would be added.

Already in 1990, the majorities of the Argentine provinces had incorporated some kind of legislation linked to the principle of environmental protection, regulating environmental protection or generating a framework for environmental impact assessment; beyond that, by the very section 41 of the National Constitution, it is indicated that "... It corresponds to the Nation to dictate the norms that contain the minimum requirements of protection and to the provinces the necessary ones to complement them, without them altering local jurisdictions. ¨

The Federal Council for the Environment (COFEMA) has also issued Resolution 92/0515, article 1 of which states ..."The *minimum budget is understood to be the basic threshold of environmental protection that corresponds to the Nation and which governs uniformly throughout the national territory as a non-derogable floor that guarantees every inhabitant a minimum of environmental protection, regardless of where he is. It includes those concepts and guiding principles of environmental protection and the technical standards that set values that ensure minimum levels of quality.* The regulation of the exploitation and use of natural resources are powers reserved by the Provinces and therefore, not delegated

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to the Nation. Consequently, the object of the laws of minimum requirements must be that of minimum environmental protection of the resource and not that of its management, which is the exclusive power of the provinces.

The mandate of Article 41 of the Constitution is granted to the "Nation" and consists of the dictation of "norms". In accordance with the provisions contained in section 75, subsections 32, 76 and 99, second paragraph of subsection 3 of the National Constitution, it should be understood that the reference to the "Nation" is to the National Congress, the only power with legislative powers. Consequently, the concept of norms corresponds to that of laws, which by their nature are dictated by the National Congress.

Any interpretation made must have a restrictive character which implies that its objective must maintain a direct and concrete relationship with the aim of environmental protection without distorting the competences reserved to the provinces, emptying sections 122 and 124 of the National Constitution of their content.

From the interpretative point of view, various scenarios are generated in terms of the scope of the minimum budgets enshrined and the competences assigned at the constitutional level.

One part of the doctrine interprets that the provinces lose their capacity to dictate norms of an environmental nature, generating gaps in the law and even interpreting that the provincial norms in force should be reconsidered and in such a case ratified by the National Congress; and another which sustains that since these norms of minimum protection had been dictated by the National Congress, they would only be considered repealed in those parts which were opposed to national laws, supplementing them in the rest.

With the passage of time, it has been almost unanimously agreed that the National Congress should issue clear rules that serve as a framework, and that the provinces should issue additional rules that do not contradict the spirit of the national regulations.

In environmental matters the legislation will then be concurrent. The Nation approves the laws that contain the minimum requirements of protection, and the provinces can increase but not diminish the protectionist demands, leaving the latter to the discretion of the local Legislative Power; bearing in mind that both the administration and the jurisdiction in environmental matters will remain in the provincial orbit.

That is why Art. 41 concludes with the phrase "without altering the local jurisdictions" which is a textual reproduction of the former Art. 67 subsection 11 (now Art. 75 subsection 12) applicable to private law codes.

All administration and jurisdiction in environmental matters is provincial, but legislation is primarily federal and subsidiarity local. This is undoubtedly an important

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advance towards concerted federalism, although in certain cases difficulties may arise in implementation, as well as in enforcement.

Years later Argentina would incorporate International Treaties such as the United Nations Framework Convention on Climate Change - which was received into local legislation by Law 24,295 -, the Kyoto Protocol - received by Law 25,438 -, and the Mercosur Framework Agreement on the Environment - incorporated by Law 25,841 -.

The Federal Council for the Environment (COFEMA), which is made up of the federal government, the provinces and CABA, is responsible for coordinating environmental policy in the country.

4.2 National environmental legislation applicable throughout the republic

As for national legislation, we have ten minimum standards for environmental protection:

- Law 24,051 Hazardous Waste (17/12/91)
- Law 25612 on the Integral Management of Industrial Waste and Service Activities (29/07/09),
- Law 25670 on minimum budgets for the management and elimination of PCBs (19/11/02) - regulated by decree 853/07-,
- **Law 25675 General of the Environment (28/11/02),**
- **Law 25688 Environmental Water Management System (03/01/03),**
- Law 25831 regime of free access to public environmental information ((7/01/04),
- Law 25916 on the Integral Management of Household Waste (07/09/04),
- Law 26562 on minimum environmental protection budgets for the control of burning activities (16/12/09)
- Law 26331 on minimum budgets for the environmental protection of native forests (26/12/07) - regulated by decree 91/09
- Law 26639 minimum budget regime for the preservation of glaciers and peri glacial environment (28/10/2010) - regulatory decree 207/2011
- and Law 26815 on minimum environmental protection budgets for forest and rural fires (16/01/2013)

Without detriment to the amount of general regulations enunciated above, the closest to the subject of excreta are Laws 25675, or General Environmental Law, Law 25688 Environmental Water Management Regime, and Law 25831 Regime of Free Access to Public Environmental Information.

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Dr. Pablo LORENZETTI, refers to the definition approved at the "Oslo Symposium" in 1994 and officially adopted by the 3rd Session of the Commission for Sustainable Development (CSD III) in 1995 on sustainable consumption, meaning the use of goods and services that meet basic needs and lead to a better quality of life, minimizing the use of natural resources and toxic materials, as well as the emission of waste and pollutants on the life cycle, so as not to endanger the needs of future generations.

The Argentine legislation has been adopting issues that not only ensure the maintenance of the environment but has incorporated the idea of sustainability as an element of standards or care to sustain over time the environment and the economic operations that are made in the territory, so as to ensure not only environmental quality, but predictability in the development of farms.

From the technical point of view, we are working to ensure that the management of waste from intensive animal production in the country does not have a negative impact on the environment.

Through the State Agencies, the operation of the productive systems is verified by means of the qualification so that their productions are sustainable, although there are no clear norms in the country that promote the joint task of all the involved ones, which, added to the lack of data collection or technical developments, generates a disparate fulfilment in the primary idea.

With the development of agricultural intensification such as fattening of poultry or breeding, such as dairy, pig breeding, feedlot, poultry, etc.; the accumulation of excreta and slurry has been increasing, as well as the problems in their treatment to be reused or dispersed in the environment without a negative impact.

The indices of organic matter, nutrients such as N and P, salts, heavy metals such as Cu, Zn and Fe, antibiotics, pathogens such as *Escherichia coli,* have been increasing and the regulations try to preserve not only the degradation of the space to avoid fly breeding, unpleasant smells, etc., but also try to preserve the water that can be degraded by the interaction with the indicated elements.

Although the process generates a material that can be contaminating, its correct handling allows the reuse and exploitation of this material, once the elements that are harmful to the environment have been degraded.

The objective of the laws is to order the processes that promote, regulate, and establish guidelines to correctly implement the handling, treatment and reuse of excreta and other contaminating elements resulting from the intensive agro-industrial production process.

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Among the national laws and regulations, we find the following, which have been chronologically ordered according to their sanction or emission, to understand the evolution of the idea of environmental care in the country.

Resolution 410/18, repealing Resolution 97/2001.

Resolution 97/2001 of the National Ministry of Development and Environment validated the regulation for the Sustainable Management of Mud generated in Liquid Effluent Treatment Plants. It regulated the treatment of mud emitted by liquid effluent treatment plants, such as: raw, organic, inorganic, treated, biosolids or waste, indicating processes, values, jurisdiction, typologies and characterizations of the mud, forms of use and its final disposal, including to agricultural soils. According to the following flow chart, the categories of muds are defined (Figure 1 and Tables No. 17-18-19-20-21-22-y 23).

In order to formulate a technical norm of national reference and to adapt to the scientific and technical advances occurred since its sanction and to the changes in the jurisdictional scenario of application of the norm, the Res. 97/01 was repealed, and Resolution 410/18 is currently in force. The new regulation is described in Figure 2 and Tables Nª 1,2,3,4,5,6, and 7)

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ANEXO II

DIAGRAMA DE FLUJO

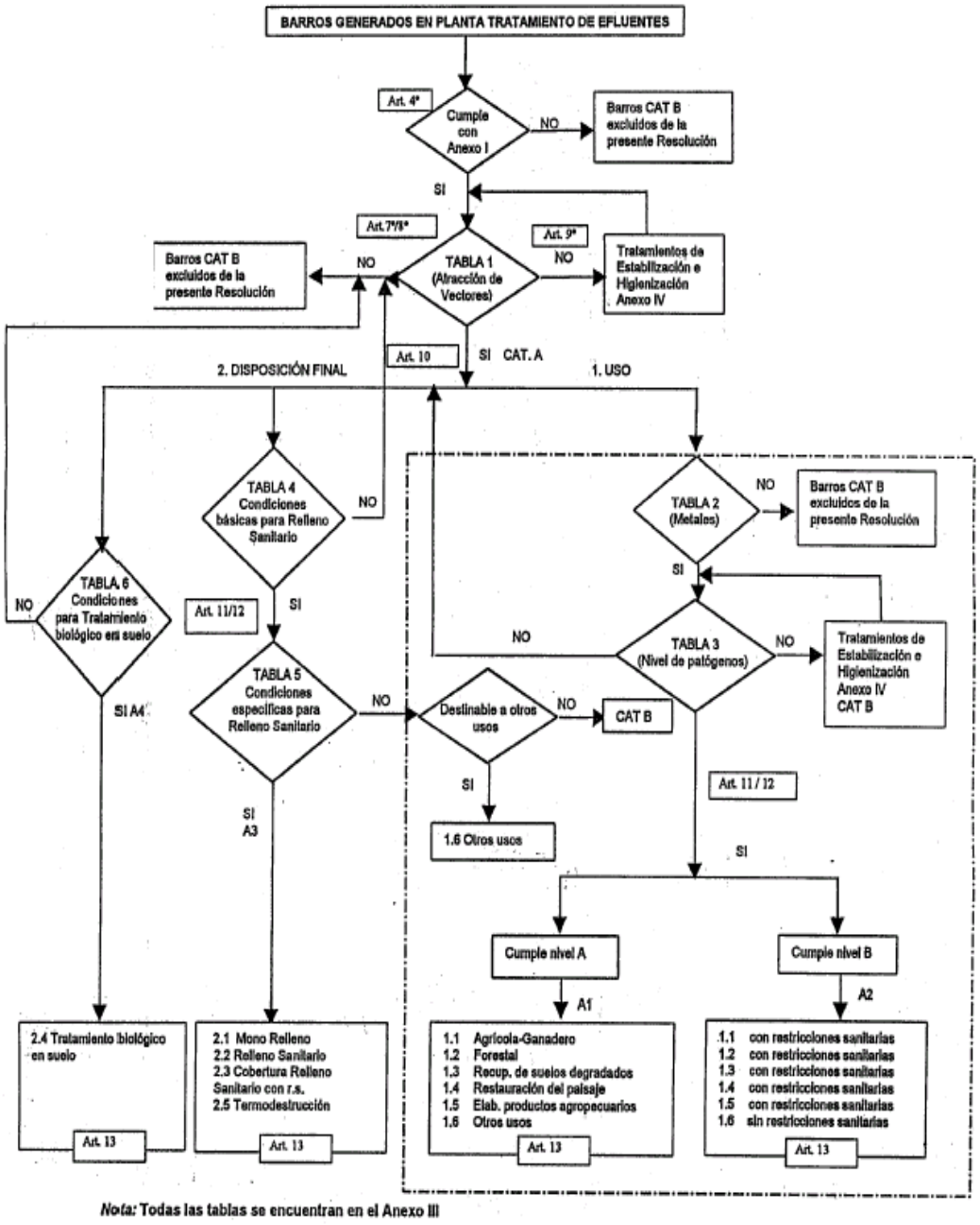

Figure 2. Sludge generated in plant by effluent treatment

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generator must demonstrate, by means of a sworn statement to the Authority of Application describing the generation process, that the muds generated by it do not contain the compounds or characteristics of origin listed below. The indicated Resolution typifies in its art. 8 en:

- Category A: Includes those sludges that comply with all the limit values established for the parameters referred to in Table No. 1 of ANNEX III.

- Category B: Includes those muds in which any of the parameters exceeds the limit value established in Table No. 1 of ANNEX III, which are excluded from this standard and must be treated in accordance with the provisions of current regulations.

It is indicated that the muds that do not comply with the Table Nº 1 of ANNEX III, can be transformed into muds of Category A with the treatments indicated in ANNEX IV destined to modify their quality in terms of the reduction of the potential of attraction of vectors.

Article 10 indicates that Category A muds are characterized, for the purpose of defining their typology and their suitability for use and final disposal, in accordance with the limit values of the parameters and indicators, according to the methods of extraction, medium and analytical techniques of Tables No. 1 to 6 of ANNEX I.

And in Article 11 the different types of clay are identified as follows:

Type A.1: Biosolids. They do not exceed any of the limit values in Tables Nos. 1, 2, and Level A in Table No. 3 of ANNEX III.

Type A.2: Biosolids. They do not exceed any of the limit values in Tables Nos. 1, 2 and Level B of Table No. 3 of ANNEX III.

Type A.3: do not exceed any of the limit values in Tables 1, 4 and 5 of ANNEX III.

Type A.4: do not exceed any of the limit values in Tables 1 and 6 of ANNEX III

Type A.5: They do not exceed any of the limit values in Tables 1, 4, and 5 of

In Annex 3, Title 4, Article 12 of the same, the suitability for each category of quality of mud is mentioned and the form of use and final disposal is described in accordance with the regulations issued by the APPLICATION AUTHORITY of Law No. 20,466:

Forms of Use

1.1 Agricultural/Livestock

As fertilizers or amendments in extensive and intensive crops and in natural and cultivated pastures

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And in the following point, it indicates other uses not contemplated in the previous numbers, and for which specific regulations must be established: elaboration of elements for construction, use as a combustible material for energy recovery, among others.

2.4 Biological treatment in soils (*Landfarming*)

It includes the controlled application of mud on the surface horizon of the soil or on the soil itself, accompanied by continuous monitoring and appropriate management to give rise to biological processes that degrade and transform the organic constituents and immobilize the compounds or inorganic elements present in the mud.

Then, in TITLE V: DIFFERENTIAL APPROPRIATIONS FOR USE AND FINAL PROVISION, Article 13 states: ¨ The following qualifications are established for the muds typified in Article 11 and the forms of use and final disposition described in Article 12, which are subject to the restrictions established in this regulation, without prejudice to the particular provisions that may be established in the future and to those provided by the APPLICATION AUTHORITY of Law 20.466, for those uses oriented to the use of muds as improvers of the quality of the soils in general, or as agricultural inputs:

Type A.1 muds are suitable for all uses without sanitary restrictions. Muds of TYPE A.2 are suitable for all uses with Title VI sanitary restrictions; for use 1.6 no such restrictions are required. Muds of TYPE A.3 are not suitable for use except for use 1.6 and as long as adequate treatment ensures stabilization of contaminants in the matrix of the resulting product or of the waste generated, as appropriate. They are suitable for final disposal forms 2.1, 2.2, and 2.3. For the latter, the health restrictions of Title VI regarding exposure to the public are observed. Muds of TYPE A.4 are not suitable for use; they may be destined for final disposal for form 2.4. Muds of TYPE A.5 are not fit for use; they can be made available for form 2.1 and 2.2. Final disposal forms are subject to the general restrictions set out in Article 24.

Law 25,612

Sanctioned on 3/7/2002. Law on the Integral Management of Industrial Waste

In its article 1 it indicates: ¨Las provisions of the present law establish the minimum budgets for environmental protection on the integral management of waste of industrial origin and service activities, which are generated throughout the national territory, and are derived from industrial processes or service activities.

An industrial process is any activity, procedure, development or operation of conservation, repair or transformation in its form, essence, quality or quantity of a raw material or material for obtaining a final product by using industrial methods.

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A service activity is understood to be any activity that complements the industrial activity or which, due to the characteristics of the waste it generates, can be assimilated to the previous one, based on the levels of risk determined by the present one. ¨

This law regulates the handling and treatment that must be observed for industrial and service waste. Although it does not directly indicate those generated by the handling of excreta, intensive livestock, or organic amendments, we understand that as all waste from agro-industrial exploitation, they are duly covered by the regulations.

It has partial enactment incorporating the points referred to criminal liability. Among the ítems it addresses, it cites

- Industrial waste
- Control and audit
- The generators of this type of waste
- The technologies
- Transport
- The treatment and final disposal
- Civil liability
- Administrative responsibility
- Criminal liability
- Jurisdiction

The sanction of the referred law has deepened the normative chaos that regulates the disposition of the residues coming from industrial and service activities, since it has not joined criteria.

Law 25,675

The Environment Law was passed on 6/11/2002 and partially promulgated by decree 2413 on 27/11/2002. Its spirit is to protect the environment and guarantee its care by using the education and participation of the citizen, in order to mitigate the impact and environmental damage that can be caused by the population.
Their goals are:

- ✓ Ensure the quality of environmental resources.
- ✓ To improve the quality of life of present and future generations.
- ✓ To promote social participation in environmental matters.
- ✓ Promote the rational and sustainable use of natural resources
- ✓ Maintain the balance of ecological systems.
- ✓ Ensure the conservation of biological diversity.
- ✓ To prevent the dangerous effects that man generates on the environment.
- ✓ Promote behavioral change through environmental education.
- ✓ Organize environmental information and ensure free access to it.
- ✓ Establish a federal system to implement environmental policies.

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- ✓ Establish procedures to minimize and prevent environmental risks and emergencies and to restore damage caused by environmental pollution.

In its art. 1 it states: ¨La this law establishes the minimum budgets for the achievement of a sustainable and adequate management of the environment, the preservation and protection of biological diversity and the implementation of development sustainable¨. It incorporates the idea not only of the preservation of the environment, but also adds the concept of sustainability to the projects.

The objectives of the law coincide with the recommendations contained in the document prepared by the International Union for Conservation of Nature and Natural Resources (IUCN), with the advice, cooperation and financial support of the United Nations Environment Program (UNEP) and the World Wide Fund for Nature (WWF), published by the magazine "Ay RN", FARN, Editorial La Ley, January 1985, vol.

One of the drawbacks is the lack of articulation between public bodies.

The law incorporates as the object of the right to information all reports, data, research linked to the state of the environment and natural resources, as well as environmental impact statements of public or private works planned or in process of execution and public and private plans and programmes for the management of the environment and natural resources and the actions or protection measures referred to therein. They introduce 3 pillars on which the care of the environment is based

- Environmental education
- Environmental training
- Citizen participation

The penalty for environmental damage is to repair it (mitigation and/or restoration measures), returning things to their previous state. If this is not possible, whoever generated the damage will be liable to fines in monetary amounts.

Law 25,688

Environmental Water Management System. Sanctioned on 28/11/2002

The present law states in its article Nro. 1: ¨This law establishes the minimum environmental budgets, for the preservation of the waters, their development and rational use¨.

It incorporates as two central ideas to avoid water pollution, and the rational use; being understood by the same the correct use and the persuasion so that the resource is not wasted.

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The Law understands "water" to mean that which forms part of the set of natural or artificial, surface and underground water courses and bodies, as well as those contained in aquifers, underground rivers and atmospheric water; and it is applicable to those in the public and private domain, generating a current that makes it increasingly difficult to distinguish the line between public and private law, especially bearing in mind that this is a common, scarce and elementary good.

It grants the National State exclusive competence over all that pertains to substantive legislation (National Constitution, article 75, paragraph 12). In relation to waters of a private nature, it covers the basic principles related to it. In relation to public waters, it includes the power to determine which will have such character.

The provinces are given exclusive power to legislate on the regulation of the use of public water. To this end, they are empowered to establish the modes and forms according to which individuals shall acquire the corresponding rights of use. As regards private waters, the competence of the provinces is limited to such measures of police power as may be necessary to maintain the exercise of the right of ownership, within the limits of reasonableness.

Among the subjects to which the Law is circumscribed we find

- the abstraction and diversion of surface water
- stagnation, change in flow or deepening of surface water
- the abstraction of solid or dissolved substances from surface waters in so far as such action affects the status or quality of the water or its run-off
- the placement, introduction, or discharge of substances into surface water in so far as this action affects the status or quality of the water or its flow
- the placing and introduction of substances in coastal waters, in so far as such substances are placed or introduced from land, or have been transported into coastal waters for the purpose of being deposited there, or installations which in coastal waters have been permanently erected or moored
- the placement and introduction of substances into groundwater
- groundwater abstraction, lifting, and conveyance above ground, including diversion
- the stagnation, deepening and diversion of groundwater, using facilities intended for or suitable for such actions
- actions likely to cause permanently or to a significant extent alteration in the physical, chemical, or biological properties of the water
- the artificial modification of the atmospheric phase of the hydrological cycle.

The Law incorporates the idea of inter-jurisdictionally of waters and their basins, for whose resolution of conflicts it stipulates the creation of water basin committees whose task will be to collaborate in environmental management, as well as to advise the competent authority.

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Likewise, the Water Environmental Management Regime provides that the use of water must have the permission of the competent authority, indicating that whoever uses it must do so in conformity with the regime indicated *above, and* must request the required authorization, even in cases where provincial regulations do not specify it.

According to this Regime, the national authority should

- determine the maximum limits of pollution and protection of aquifers
- to define guidelines for the recharge and protection of aquifers
- set environmental water quality parameters and standards.

Law 25,831

Law on free access to public environmental information. Sanctioned on 26/11/2003.

Article 1 states: ¨The present law establishes the minimum requirements for environmental protection in order to guarantee the right of access to environmental information held by the State, both at national and provincial levels, at municipal level and in the City of Buenos Aires, as well as by autonomous entities and companies providing public services, whether public, private or mixed. ¨

This Law introduces the human right to environmental information, which is incorporated among the fourth-generation rights, since the right to enjoy a balanced and sustainable environment, cited as third generation, had been incorporated previously.

In this way it is understood that the individual not only enjoys the right to develop in an environment preserved from contamination, but also has the right to have public access to the state of the environment, generating a true democratization in the unrestricted access of the referred information.

According to section 2 of Law 25,831: "Environmental information is understood to be all information in any form of expression or support related to the environment, natural or cultural resources and sustainable development. In particular: a) The state of the environment or any of its natural or cultural components, including their reciprocal interactions, as well as the activities and works that affect or may significantly affect them; b) The policies, plans, programs and actions referred to the management of the environment. ¨

Based on the fact that any work or activity that may significantly degrade the environment, any of its components, or affect the quality of life of the population, shall be subject to an environmental impact assessment procedure, prior to its execution, through the submission of an Affidavit in which the work is stated - called Environmental Impact Study -, which shall be approved or rejected by the enforcement authority through the relevant Environmental

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Impact Statement. The access to the information contained therein, and the reports related to it issued by the competent authority, must be of a public nature, of unrestricted access and free of charge.

4.3 National regulations of the national service of health and agri-food quality (senasa) and good practices of excreta management.

Although they are not considered legal norms, the GMP emanate from the Ministry of Agroindustry of the Nation, and they compile a cumulus of advice for the correct management of agro-industrial productions.

Good Management Practices or GMP are a variety of ways of working in the field of animal production, since they lead to achieving the production objective sought while respecting the original characteristics of the environment and the health of the people involved.

Its application aims to facilitate the understanding of the processes and variables that impact on the environmental management of the modern productive process, as well as the technological alternatives available for different problems and scales of production; to contribute to the awareness of producers about the potential environmental impact of projects, and to provide knowledge of responsible environmental management at the international level in order to contribute to future legislative processes to be addressed by the corresponding authorities of the country.

It is important to note that the Good Practices are essentially voluntary recommendations that the producer may choose to adopt. However, many times some of these GMPs are converted into specific terms of a Provincial or National Legislation or Regulation, as they prove their effectiveness in protecting the environment, in addition to their positive effect on production results. An example of this is the series of GMP guide manuals published by INTA and FAO for the production of feedlot, dairy, laying and broiler birds and pigs as Environmental Management.

BIRDLIFE (laying birds and broilers)

Annually, 1,400,000 tons of laying bird guano and 3,600,000 tons of broiler chicken litter are generated in Argentina and distributed mainly in the provinces of Buenos Aires and Entre Rios. Santa Fe, Córdoba and Mendoza contribute with smaller quantities.

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The addition of material to form the chicken litter adds 1.7 million tons to the volume of waste. In terms of volume of dead animals, ranges from 4 to 7.5 % are generally representative of production conditions in the country.

Worldwide, methods of dead animal disposal include burial in covered graves, incineration, and rendering (industrial processing of dead animals and remains from the meat processing industry for various purposes). While in some countries such as Chile and the United States the use of these materials for animal feed is permitted, in the country it is explicitly prohibited in Resolution SAGPyA2 No. 1.389/2004.

Also, composting of farm mortality along with some of its excreta has been gaining acceptance, as the final product is suitable for field application as an organic amendment.

In addition, experiences have been made in the country of piling up and composting chicken and guano litter, making it even more necessary to disseminate and demand the implementation of the INTA and Ministry of Agriculture protocols, which establish the conditions for their correct treatment, as well as to evaluate the operational and labour aspects of this practice. Among the common treatment systems are listed composting, exceptionally, anaerobic digestion to obtain energy and special interest is shown in the so-called technique of densification of biomass (palletisation) especially with the beds of broiler chickens.

SENASA has generated several national resolutions in the different years to legalize and organize the poultry activity in continuous growth. Resolution 614/1997 set the requirements for the qualification of new poultry production establishments and the hygiene standards for the management of waste derived from them. It also requested the re-registration of existing farms and fixed distances between poultry establishments. These new requirements were taken with the aim of reaching the international market, for which it was necessary to ensure the sanitary quality of the poultry products from their origin obeying the concept of total quality. The Resolution 468/98, arises a year later and turns out to be an extension to the qualifications that raised the 614/1997. A sort of gap between the need to legislate and the urgency of change, as opposed to the real possibilities of carrying out the requirements of the control bodies.

In 2010, SENASA abrogated both resolutions and Resolution 542 was issued. This resolution defines the requirements on facilities, biosecurity, hygiene and sanitary management for the registration and sanitary qualification of poultry production establishments. Amendment 106/13 regulated the disposal of waste generated by such establishments, generating the health certificate for the removal of bedding, guano, and dead animal waste for transport. On the other hand, Resolution No. 423/14 established in a general way the mandatory registration in the National Sanitary Registry of Agricultural and Livestock Producers (RENSPA) of all livestock producers in the country, this includes birds, pigs, feedlots, dairy farms, and other marketable species. Resolution 1/2018

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establishes the unique procedure for registration and accreditation of private veterinarians, authorized by this National Service to perform the tasks inherent to the different Sanitary Programs authorized by the National Directorate of Animal Health.

The above-mentioned resolutions were repealed, and Resolution 16.899/2019 and its five annexes entered into force. This resolution is made up of 5 annexes and arises from the need to simplify, unify and overcome previous regulations, update procedures, increase biosecurity requirements and raise awareness of the alarm and control systems established for the qualification and operation of poultry farms. Considering that Argentina is a country free of avian influenza and has a large number of confined animals with a high health status, and in view of the high international requirements for exportable products, this legislation aims to tighten controls to prevent the entry of the disease, and allow a possible eradication in case of an eventual entry of the same. It also requires producers to control pests (flies, rodents), to have a manual of good practices in management, hygiene and biosecurity, to make frequent microbiological assessments of water, and to treat dead animals, bedding and guano in situ and by composting, in order to deactivate pathogenic organisms.

PIGS, FEEDLOTS AND DAIRY FARMS

Livestock excreta waste, although considered as a soil amendment, and which needs to be recycled within the production system itself, entails a number of difficulties that could, if not well managed environmentally, become a source of air, soil and water pollution.

In this sense, the legislation has begun to cover their treatment in order to preserve the environment, given that the excesses in the nutrient balances (nitrogen and phosphorus) and the emissions of greenhouse gases (GHG's), produce undesired specific pollution.

One of the major drawbacks of Argentine legislation in this area is the lack of a specific law for the management of animal production waste. From the national point of view, these would be contained by analogy within the law of hazardous waste, being the law which regulates them in a collateral way, Law 24,051, which applies in cases of national jurisdiction, as well as in the provinces which have ratified it.

Worldwide, some countries, including Argentina, present national policies corresponding to manure management. Depending on the policies developed in these countries, three situations were determined in the level of coherence of these policies: very good, moderate and bad or none. In this sense, Argentina is in a moderate level, with some contradictions and many policy gaps to be solved.

The possibility of carrying out and monitoring the implementation of policies in the country is considered weak, as the lack of coordination between the various regulatory bodies and

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the lack of clear criteria make the task difficult. Regulatory monitoring is weak in Argentina, as well as in almost all of South America except Chile and Ecuador.

In Argentina, the production of pigs, began and developed as a complement to agricultural activity, being a secondary activity within the farms, located essentially in the typical corn nucleus of the Pampas region (Buenos Aires, Cordoba, Entre Rios, Santa Fe). It began to take off between 2005 and, where it is registered in 2020 with a growth of more than 60%. Until the mid-90s, production was extensive, animals were fed on corn stubble or from pasture to field. Faeces degraded on the farm and nutrients were naturally incorporated into the soil. Today, more than 30% of pig production is semi-intensive or intensive according to the number of breeding sows in each establishment and follows a growing trend. This partly explains why there is no specific legislation at national level for this sector.

Family and semi-intensive production spread the *deep bedding* system, where animals are handled directly on the floor covered by a bed of wheat straw or wood shavings. It receives the animal's urine and faeces and at the end of a production cycle it is removed and can be composted. The sheds are tunnel-type, some of them modular and low-cost, with plastic roofs.

More recently, with the increase in production intensification (last 10 years), more important investments were made and housing in semi-closed and closed warehouses with environmental control was promoted. Cemented floors and other *slats were* implemented. In the former, the floors have a slope and when the grey water is washed it is conducted through furrows or channels. This management has a high-water consumption. In the latter, the sheds have a *slatted* floor*,* and food, faeces, and urine fall through the floor and accumulate in a *shallow pit of* less than 60 cm*,* which contains water. The slurry is frequently pumped out of the pit. The water that comes out of these sheds contains a high concentration of solids. In Argentina, usually, serial lagoons (anaerobic, facultative, and aerobic) are used as a form of treatment. The number of lagoons is related to the incoming flow and the solids load of the effluent.

Excreta treatment systems are a fundamental component of modern pig farming. Commonly, references to "Treatment Systems" may not be entirely clear. In some cases, treatment systems are mentioned that are actually storage systems, in others it refers to conditioning or pre-treatment systems.

The objectives of excreta treatment can be very varied, although sometimes they are not related to a legal or regulatory requirement, but to guidelines for managing the valuable nutrients contained in them.

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Among the processes used are the separation of solids, separation of solids by screw and press system, composting of excreta, treatment lagoons, and anaerobic digestion.

As for the treatment of excreta, dumps and feedlots, the effluents are treated in serial lagoons, similar to those described for pigs. Very few establishments use systems for separating solids from liquids, and the effluents are valorised agronomically in soils on different crops. The residues are rarely composted and are generally used in direct soil applications.

With the beginning of the growth of livestock intensification (1997 to 2000), especially of cattle for meat, SENASA sanctions Resolution 70/2001. This resolution establishes the National Register of Cattle Feedlot Establishments and makes it compulsory for the following categories of establishments to be entered in the register: 1) Cattle fattening establishments, which during the rearing and/or finishing process have their animals confined in spaces, and the National Register of Cattle Feedlot Establishments (RNEPEC) is created, which includes pigs, poultry, feedlot and dairy farms. With this legal framework, the provinces where the activity became relevant (Buenos Aires, Santa Fe, Córdoba, Entre Ríos) gradually regulated its application, placing special emphasis on environmental issues in terms of effluent control, land use and pollution in general.

However, the dizzying growth and lack of definitions in the previous resolutions required complementary legislation and in 2017, Resolution 70/2001 was abrogated by Resolution 329, which comes into force in 2017. This Resolution established new technical and infrastructure requirements (facilities, biosecurity, hygiene and sanitary management) for the registration of feedlots and updated the National Register of Livestock Establishments for Fattening to Corral created in 2001 and added the ovine and caprine species. It also requires producers to register with RENSPA. This norm respects the recommendation of the World Organization for Animal Health, in terms of taking into consideration the general principles of animal welfare and environmental preservation. One of the main causes is that these production systems, which come from livestock establishments in various areas, required specific regulation that considers their identification, registration, and oversight, as well as the management of their waste, effluents, and carcasses. Then the nation will delegate in each Argentine province, through its ministries, the regulation of environmental aspects (location, quantity of animals and waste management), to a great extent, as a consequence of the social and environmental impact that these undertakings cause in the local populations.

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4.4 Provincial legislation on excreta management

4.4.1 PROVINCE OF BUENOS AIRES

In the Constitution of the Province of Buenos Aires, section 28 (which enshrines environmental law) states that the Province in ecological matters must "guarantee the right to request and receive adequate information and to participate in the defence of the environment, natural and cultural resources". In turn, article 38 states that consumers and users have the right "to adequate and truthful information". Sections 26 to 28 of Law 11,723 on the Environment of the Province of Buenos Aires, regulate the Provincial System of Environmental Information, according to the following regulations: "Official bodies shall have the obligation to provide natural or legal persons, public or private, who so request, with the information they have on the environment, natural resources and environmental impact statements in accordance with the provisions of section 20, second part. Such information may only be withheld when the entity confers confidential status".

At the provincial level, excreta and slurry are not defined as special waste (Law 11,720), nor as pathogenic waste (Law 11,347), nor as industrial waste (Law 11,459), or as solid urban waste (Laws 13,592 and 14,273). In this sense, for the treatment of animal excreta in confined production, the requirements of other economic activities are applicable, since there is no legislation that contemplates them specifically.

The legislation that applies, such as Law 11,723 (1995) and its regulatory Decree 4,371/95, are generic norms of environmental protection, which gives space to the disparity of interpretations in their requirements by the control bodies or the judicial authorities themselves.

In the area of water pollution, regulations have been issued which set out the conditions for the dumping of effluents in these areas, but since they do not specifically refer to slurry or excreta within all the aforementioned cases, there is no specific regulatory framework at the national or provincial level which regulates them in a broader sense than the mere protection of bodies of water, soil and atmosphere.

Another issue that has been criticized at the technical level is the number of technical inconsistencies and shortcomings that undermine the regulatory framework in the area of application.

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If we go through Law 5,965 and its decrees, with Law 12,257 and its decrees and derived regulations (among them Res.336/03), we can verify the strong divergences and the lack of unification of scientific criteria between the values indicated to define tipping levels.

Although the present report does not have as its objective technical-scientific analysis, we can infer from the parameters indicated in the laws, resolutions, norms and their modifications and complements that there is no univocal criterion that allows us to take criteria in a strict sense; there are currently no databases and technical developments that meet current needs in the study of intensive livestock systems.

Provincial Organization for Sustainable Development (OPDS)

Decree Law 10.081

Enacted in 1983, called the Rural Code.

It regulates the facts, acts and goods of the rural activity of the Province of Buenos Aires. In title III it establishes the norms for the conservation of soils and the maintenance of fertility, being its authority of application the Provincial Organism for the Sustainable Development (OPDS).

Resolution 538/99

Instructions for the Environmental Impact Study (EIS) General guidelines to be considered by the Municipal Authority (Law 11723, annex II, point 2). Application Authority: OPDS and Municipalities of the province of Buenos Aires.

Law 10.510

Sanctioned in 1987.

This Act regulates the operation of establishments engaged in the rearing, collection or marketing of pigs. The following classification is established for pig farms: livestock; breeding; storage; greenhouse (Article 2). The Act prohibits, on all pig farms, the feeding of pigs with food waste, unless the processing to which such waste was subjected results in a final product considered suitable by the competent health authority. Decree No 4933/1989 lays down the provisions of this Act, which concern the rearing, fattening and/or marketing of pigs.

Law 11.723

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Article 29 of this Act states that "The provincial State and the municipalities, in fulfilment of their duty to ensure the education of their inhabitants, shall endeavour to A) the incorporation of ecological content in the different educational cycles, especially in the basic levels. B) the promotion of research in higher education institutions by developing plans and programs for the training of specialists to investigate the causes and effects of environmental phenomena. C) the promotion of environmental days with community participation, popular education campaigns, in urban and rural environments, respecting the characteristics of each region. D) the motivation of members of society to make suggestions and take initiatives for the protection of the environment in which they live. E) training for the development of appropriate technologies that make economic growth compatible with the preservation of natural resources and the conservation and improvement of the quality of life Article 30 states that the Provincial Government is responsible for coordinating with municipalities on education, dissemination and staff training programmes on environmental issues, by concluding agreements with research centres, higher education institutions and public and private institutions.

The present law includes the generation of a provincial environmental information system, composed of agreements with graphic media, radio, television and mass media.

Resolution 664/2000

Issued by the Secretariat of Environmental Policy, on 1/8/2000

This resolution deals with *landfarming,* as an accepted treatment for certain wastes, establishing the technical-operational conditions under which the treatment methodology for Special and Non-Special Wastes will be governed.

Resolution 81 on Poultry Production.

Ministry of Agriculture, Livestock and Food of Buenos Aires.
The same in its title of Management of corpses and residues indicates:
Art 13º: Guano coming from high posture farms must transit in closed trucks, avoiding spills. The professional responsible for the establishment must issue a health certificate, a model of which is included as Annex B of this document.
Art 14 : The bed used in the sheds must be eliminated within the premises of the establishment, using the most convenient mechanism. If there is any inconvenience, it can be proceeded as in the previous article. Bedding used in sheds that have suffered some type of acute illness must be moistened and piled up to provoke fermentative heating and decontamination. It should then be scattered and treated with appropriate powerful disinfectants.

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The guano that is moved comes from healthy birds, which in the last SIXTY (60) days have not been affected by infectious poultry diseases and have completed their production cycle without episodes of salmonellosis.

Law 14,343

Sanctioned in 2011.

It deals with environmental liabilities and contaminated sites. It regulates the identification of environmental liabilities and forces the recomposition of contaminated sites. Decree 148B/11. Enforcement authority: OPDS.

Law 14,867

Sanctioned in 2016.

It includes the rules for establishments destined to intensive fattening of cattle/buffalo in corral, installed or to be installed in the province of Buenos Aires, creates the registry of qualifications and the fund for the control of the establishments and establishes the regime of fees (feed lot-lot). Article 5, Paragraph H, expressly mentions the need for an Integral Waste Management Plan, for pests and vectors, excreta, hazardous waste and dead animals. Implementing authority: OPDS. Four years after it was sanctioned for lack of consensus, it is still not regulated

Resolution 664/2000

It establishes the methodologies for the treatment of special and pathological waste by *landfarming*. Implementing authority: OPDS.

Water Authority (ADA)

Law 5,965

Law on the protection of sources of supply and water courses and receiving bodies of water and the atmosphere

The present Law and the regulatory decrees 2.009/60 and 3.970/90, mark the conditions to which the overturning of effluents generated in the water courses must adjust; establishing the fundamental principles for the protection of the sources of water provision and the water courses receivers and the atmosphere. It prohibits the discharge of effluents into the atmosphere or into any body of surface water or groundwater that would result in the degradation of its quality.

Law 12.257

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Sanctioned in 1998

Also called the Water Code. Decrees 95/99 and 3.511/07 and their modification. This law establishes the regime for the protection, conservation, and management of water resources in the Province of Buenos Aires. Under the precept that water is a public good and must be used rationally to obtain maximum benefit from it, preserving this natural resource for the community. Article 43 provides for the imposition of a fee on concessionaires or permit holders of rights to use public water, the value of which must be defined on the basis of the different uses, taking into account criteria of priority, planning, availability and quality of the resource, and any other circumstance specific to or derived from each use.

Law 14,520

Sanctioned in 2013
Concomitant with Decree 416/13. This is the regime for the protection, conservation, and management of water resources in the Province of Buenos Aires. Creation of the Water Authority (ADA). Creation of a provincial hydrometric network integrated by in situ data collection stations, remote stations, and a central station; with the aim of keeping the hydrological data bank updated.

Resolution 389/98 (AGOSBA) and its amendment Resolution 336/03

It establishes quality standards for the discharge of residual and/or industrial liquid effluents to the different receiving bodies in the province of Buenos Aires. Its modification (Res. 336/03) incorporates branches of activities that are not allowed to dispose of liquid effluents in absorbent wells and modifies admissible discharge parameters. It adds the list of organo-chlorinated and organo-phosphorous pesticides included in Law 11,720. In addition, it sets the admissible limits of the parameters established, which are currently required for intensive animal production (feedlots, dairies, poultry and pigs). The dumping standard is shown in Table 9.

Resolution 289/08

Requirements for the submission of applications for operating permits, waste disposal works (excreta), etc.

Resolution 162/07 and its amendment Resolution 444/08

It generates the basis for establishing the amount of fines imposed for violations of Law No. 5,965 (dumping of effluents in bodies of water).

Resolution 660/11

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The creation of the Unique Bank of Water Resources Users (BUDURH) would not, I believe, be in force at present to confirm the compulsory registration of natural or legal persons of public or private law as users of water resources on the provincial territory. Water resources development involves both consecutive and non-consecutive uses.

Resolution 465/13

It regulates the obligations of water users to enter the Unique Data Bank of Water Resources Users (BUDURH). It covers, among others, livestock establishments as an indispensable requirement for processing permits and concessions for the use of water resources and/or bodies of water in Buenos Aires.

Resolution 518/12

It establishes that all those establishments located in the Province that carry out discontinuous dumping of their liquid effluents are obliged to inform the Water Authority of the day and time at which each dumping is planned, at least seventy-two working hours in advance.

Resolution 17/13 - Liquid effluents generated by feed-lot establishments

Delegates in the ADA the approval of the requirements necessary to carry out the works of treatment of liquid effluents generated by the establishments of Feedlot (Fattening to corral), Tambos, and of pig production established in the Annex I.

Resolution 336/2003 and Joint Resolution No. 737-ADA-18, specific for dairy farm effluents.

It establishes the quality parameters for the discharge of the admissible limits according to the destination of the tipping (sewer, rainwater pipe or surface body of water, absorption by soil or open sea), as described in point 5.1.2.4. Meanwhile, Resolution No. 737-ADA-18 establishes a regime for the Agronomic Use (AU) of slurry generated in establishments dedicated to the primary production of milk and/or mozzarella dough, in dairies located in the province of Buenos Aires . The conditions for the Agronomic Use (AU) of slurry generated in establishments dedicated to the dairy activity (dairies) will be established in the Good Practice Guide (GBP). The users who carry out the Agronomic Use of the slurry in the framework of this resolution will have to process the obtaining of pre-feasibilities, authorizations and permits, according to the specific procedure, without the application of the Resolutions ADA Nº 333/17, Nº 389/98 and its modifying Nº 336/03. The procedure for obtaining certificates, authorizations and permits is carried out in the form of a sworn statement in accordance with the Annexes to the resolution.

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The establishments that comply with the specifications of the agronomic use of the slurry, will require the analysis of pre-feasibility of exploitation of the water resource, which will not generate additional expenses or costs to those specified in the resolution. As a control for the baseline, existing extraction wells must monitor water through physical-chemical and bacteriological analysis of the drilling, descriptive memory, and plan of the drilling. Once the documentation is approved, the Water Authority will issue an Agronomic Use Permit valid for a period of four (4) years.

While the establishments that require works to be executed to enable the slurry AU, will also require the analysis of the pre-feasibility of exploitation of the water resource and the submission to the ADA of the technical information required by the Annexes. The schedule of tasks describing the works involved must **be** detailed, and this will not generate any expenses or costs additional to those specified in the resolution. Once the documentation has been approved, ADA will issue an authorization for Agronomic Use whose term will be determined by ADA according to the magnitude of the works involved and during which the schedule of tasks must be complied with. Once the schedule of tasks has been complied with, an Agronomic Use Permit will be granted without further proceedings, valid for a period of four (4) years. Non-compliance with the schedule will constitute a cause for revocation of the authorization for Agronomic Use.

This resolution establishes the fee for the use of the water resource, expressed in liters of diesel oil, depending on the number of cows to be milked (Resolution ADA No. 796/17). It incorporates as a novelty that the payment of the canon is for those wells exploited by motive power (electric energy or fuel), while the wells exploited by wind energy (wind mills), will not be reached. Depending on the size of the herd, a gradual application is set for the agronomic use of slurry from 1 year (400 cows in milking) to 1 year (less than 100 animals). Also, a bonus of between 50 and 25% is granted depending on whether the application is effective or partial. For users who join this scheme, the collection procedure and billing for the Effluent Quality Control and Operation Inspection Fee (TIFYCCE) are suspended.

Decree 4.933 /1989 on pigs

It regulates Law 10510 and indicates that the destination of drains and waste must be approved by the Ministry of Public Works and Services or the Provincial Directorate of Livestock, as appropriate.

Matanza Riachuelo Basin Authority (ACUMAR)

The **Matanza Riachuelo Basin Authority** (ACUMAR) is an autonomous, autarkic and interjurisdictional entity that combines its work with the three governments that have competence in the territory: the Nation, the Province of Buenos Aires and the Autonomous City of Buenos Aires. The agency was created in 2006 by Law No. 26168, within the scope of the Secretariat of Environment and Sustainable Development of the Chief of Ministers, in response to the worrying situation of environmental deterioration in the Basin due to

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activities of goods and services of industrial origin and some in the agricultural field (meat packing plants, slaughterhouses, markets for the concentration of livestock, auction fairs, among others). It should be noted that this basin takes in highly urbanized areas such as the capital of the country (CABA) and rural areas with intensive livestock activity in the province of Buenos Aires.

The ACUMAR Law grants the Authority created the competence to plan, order, execute and verify the compliance of regulations whose ultimate purpose is the environmental pollution and recomposition of the watershed referred to *ut supra*.

Throughout 10 years, ACUMAR issued several resolutions that legislate the control and use of water, taking into account the methodological advances and studies carried out on the Basin.

In 2007, the permissible limits for the discharge of liquid effluents in the basin were established (Resolution 1/2007), thus unifying the discharge parameters for liquid effluents for a shared jurisdiction of the Nation, the City and the Province of Buenos Aires. This resolution had and still has an effect on all the water bodies in the Matanza Riachuelo Basin (rivers, streams and courses in the Basin). This organization highlights the figure of the "Polluting Agent" (Resolution 366/10) to any establishment located in the basin that generates gaseous emissions or solid waste in contravention of the applicable legislation or that does not allow preserving or reaching the quality objectives set for them, or that does not comply with the limits established in the Consolidated Table of Admissible Limits for Liquid Effluent Discharges established by Resolution ACUMAR Nº 1/2007.

Resolution 278/2010, as amended by 37/2016

Approved ANNEX I of the Regulations for the Control and Supervision of Establishments in the Matanza Riachuelo Basin and ANNEX II of the Regulations for the Industrial Reconversion of Establishments in the Matanza Riachuelo Basin, which was modified by Resolutions from ACUMAR's Presidency No. 416/2010, No. 872/2011, No. 1173/2011, No. 1266/2011 and No. 37/2016.

Resolution 46/2017, repealing resolution 366/2010.

It redefines the figure and scope of the Polluting Agent and defines the Consolidated Table of Permissible Limits for Liquid Effluent Discharges (Table 8)

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Resolution 12/2019, repealing 278/2010 and others

ACUMAR updated its regulations related to industrial inspection, procedures and associated legal figures. This resolution entered into force on January 21, 2019. The new regulation strengthens and clarifies the functions of the inspectors, giving them the possibility to charge infractions and apply preventive closures that must be analyzed and ratified by analysts of the agency. It includes new legal figures such as the cessation of activities and environmental remediation (concepts which were not found in the previous legislation) allowing to keep the databases of offenders updated and avoiding the demarcation of the responsibility of environmental liabilities.

4.4.2 PROVINCE OF CORDOBA

Law 8167

Sanctioned on 03/06/1992.

It regulates pollution and the state of the air. In its Chapter III it indicates, ¨ Article 4.- Pollutants are understood to be solid particles, liquids, vapours and gases, contained in the atmosphere, which do not form part of the normal composition of the air, or which are present in normal quantities. It indicates the contamination parameters.

Law 10.208

Provincial Environmental Policy Act

Law No. 10,208, as described in its section 1, determines the provincial environmental policy and, in the exercise of the powers established in section 41 of the National Constitution, complements the minimum requirements established in National Law No. 25,675 -General of the Environment- for the sustainable and adequate management of the environment, the preservation and protection of biological diversity and the implementation of sustainable development that promotes an adequate coexistence of the inhabitants with their environment in the territory of the Province of Córdoba.

Within this framework, the obligation of intensive cattle farms whose breeding and/or fattening plants and stables for production where a number equal to or greater than 300 animal units are confined to feeding yards for more than one month, to present an environmental impact study and public hearing is analyzed, as established in paragraph 36 of Annex I of the aforementioned law. Within the framework of the provincial environmental

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policy law, there are two regulatory decrees that directly affect the management of livestock waste, mainly regarding the reuse of effluents or for dumping in different receiving bodies.

Provincial Decree 247/15

This decree establishes the regulation of Articles No. 42, 43 and 44 of Chapter VII: "Environmental Management Plans" and Articles No. 49 and 50 of Chapter IX: "Control and Inspection of Anthropic Activities", of the Provincial Environmental Policy Law No. 10,208.

It establishes the basis for the formulation of environmental management plans and the performance of environmental audits, necessary in the implementation of application plans for the reuse and agronomic use of effluents.

Provincial Decree 847/16

This Decree sets out the regulation of standards and norms on discharges for the preservation of the provincial water resource (Annex 8.1).

It indicates the parameters for the discharge of effluents over water bodies and sustainable reuse, indicating that for the management of feed-lot effluents, the body of application authority is the Ministry of Water, Environment and Public Services, and within it the Secretariat of Water Resources and Coordination, and establishes the bodies receiving liquid effluents (surface water courses, rainwater pipes, drainage channels, irrigation channels, groundwater, soil, etc.)

Article 6 prohibits the discharge of liquid effluents into groundwater systems or the infiltration of land which may in any way be linked or connected to free, semi-confined or confined aquifers. In cases where effluents are disposed of in the soil by means of infiltration, evaporation, agronomic use, reuse or irrigation, compliance with the necessary precautions to prevent contamination of groundwater or surface water is also required.

Article 7 prohibits the application or discharge of raw effluent to any type of receiving body (land, watercourse, etc.) until it complies with discharge standards. Nor does it allow the dilution of effluents with unpolluted water or the discharge of liquid effluents that do not meet the quality parameters established in this decree.

Article 15 states that discharges to receiving bodies must meet the quality conditions (physical, chemical, and microbiological) laid down in the regulations.

Within the framework of the Environmental Management Project, it is established that all productive establishments must contemplate in their operation, the presentation of the "discharge feasibility" with the purpose that the establishment can obtain the "discharge authorization" of the effluents that it generates to some receiving body.

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It also provides the framework that promotes the reuse of wastewater, and the encouragement of recycling, reuse of liquid effluents as a measure of efficient and sustainable management of water resources.

It indicates that the effluents for agronomic use (soil as a receiving body) should be reused under an Application Plan, determining that the establishment should have a qualified professional in charge of preparing a Good Practice Manual, Maintenance and Monitoring of the effluent treatment system and preparing an Environmental Contingency Plan.

Law 9,306

SICPA Act

This Act establishes the requirements, demands and limitations for the operation of intensive and concentrated animal production systems (SICPA) in the Province of Córdoba (Annex 8.2). SICPA is understood to be the procedures and/or activities destined to the production of animals, their products and by-products (meat, eggs, milk, hides, skins, feathers, hair, wool, etc.), including aquatic animals, developed in establishments where food is supplied directly to the animal in confinement, and animal waste and residues (manure, dead animals, food residues, etc.) are concentrated in sites that exceed the assimilation capacity of the soil. The Act distinguishes between critical and non-critical areas. Article 7 establishes as critical and/or sensitive zones those located at a distance of less than three (3) kilometres from towns, water springs, rivers, streams, lagoons and lakes, as well as those places where the depth of the free aquifer is less than ten (10) meters in the high period. The establishment of new SICPA establishments is prohibited, and for those establishments already installed, it is mandatory to present environmental audits (Resolution 476/16 - Registry of Technical Responsible).

In Chapter VII the Enforcement Authority sets out the obligations of the SICPAs about valid water and soil quality standards and their regular monitoring. Establishments are also subject to environmental, documentary, food, health, registration, and animal welfare monitoring. It is necessary to have a permanent treatment system for excreta and an environmental impact assessment, as well as a book of movements of income and expenditure of animals, with the appropriate certification of the authorized Technical Manager.

Resolution 476/15

This resolution is based on Law No. 9,306 and determines the implementation of the "Provincial Registry of Intensive and Concentrated Animal Production Systems (SICPA)" and the "Registry of Technical Responsible of Intensive and Concentrated Animal Production Systems". It makes a differentiation according to the number of animals and by virtue of their location in areas considered critical or not.

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Resolution 29/17

It is a regulation that regulates the management and agronomic application of livestock waste in the Province of Cordoba. It was generated by the Ministry of Water, Environment and Public Services of Cordoba through Decree 847/16.

Article 1 indicates that its objective is to provide Good Agricultural Practices (GAP) tools to facilitate the management of livestock waste from intensive production through an Application Plan (AP) that is obligatory for those establishments covered by the SICPA law that choose to make an agronomic use of livestock waste in livestock or mixed production establishments and must be presented by an Agricultural Engineer authorized as an environmental consultant in the RETECA (Annex 8.3).

The Application Plan is the Environmental Management Plan appropriate to the activity of Agronomic Management and Application of Livestock Waste in the Province of Córdoba, which is derived from Decree 247/16.

It can also be defined as the protocol that guarantees the correct functioning of the soil system (physicochemical variables) as a receiving body for animal effluents, and a supplier of nutrients to crops or pastures. However, at no time is it applied to cover water needs or an irrigation sheet, since the quantities only cover nutritional needs.

This issue generates a recovery of livestock waste, which becomes a soil amendment value as a nutrient supplier and an improver of the physical and biological conditions.

The regulations provide for two distinct dimensions to the Implementation Plan, namely

a-Characterization of used waste: The diversity of composition and origin of guanos, liquid or solid manures and used bedding requires their characterization as they have certain variation depending on the animal species under study.

b-Characteristics of the establishment, landscape and receiving soil-system: it analyses the variables of the characteristics of the waste and the particularity of the soil in question to ensure that no contamination of a chemical nature or permanent physical alterations to the soil are generated.

To achieve the sanitation of livestock waste, the regulations establish minimum stabilization periods of 120 days for effluents prior to implementation, so the dimensions of the establishment's lagoons must be in accordance with this requirement. With respect to solid waste, it is necessary to ensure at least thermal stabilization before distribution to the field through methodologies such as composting, solarization or treatment with external heat sources. The records generated, as well as the supervision of the activities is regulated by the National Service of Agri-food Health and Quality (SENASA).

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As for the provincial regulations, as from 2010 when Resolution 333 comes into force, the Secretariat of Environment of the Province of Córdoba is established as the entity that created the Registration, Verification and Control Unit of the SICPA, which will be in charge of the registration and recording of the systems and technical responsible, in issues such as instantaneous capacity, surface covered by corrals, water source, effluent treatment system or manure management.

According to information gathered through personal communications with the Provincial Water and Sanitation Department (DiPAS), the application of livestock waste for reuse is regulated by Decree 847/16 with the required discharge standards. On the other hand, how to carry out the agronomic use has not been detailed in said decree, so resolution No. 29, approved in mid-2017, arises. In said resolution, the presentation of the Application Plan (AP) is contemplated, which must be approved by the two entities that regulate it: the Secretariat of the Environment of the Province of Córdoba and the Provincial Directorate of Water and Sanitation. It should be made clear that the term "reuse" refers to the use of effluent to meet the water needs of crops (irrigation), which requires compliance with the stricter parameters established in Decree No. 847.

When planning the final disposal of the effluent, it is essential to take into account its origin and the destination where it will be discharged. Therefore, whenever the effluent from an intensive livestock system is used, it is mandatory to make a previous characterization by means of a complete chemical analysis. As mentioned in the section on materials and methods, the currently permitted destinations are: surface water courses, rainwater pipes (rural or urban), drainage or drainage channels, irrigation channels, groundwater systems, subsoil (boreholes) and soil for the reuse of liquid effluents or for the agronomic use of effluents. The final destination chosen will be the one best suited to each particular production system. The effluent discharge quality standards to be met will depend on that destination. In the case of discharges into surface waters, the standardized values for BOD are less than or equal to 30-40. The liquid effluent must have similar values for reuse. On the other hand, if the final disposal is through absorbent wells or sewage pipes, the required BOD is 150 and 200 respectively. It should also be noted that there are other parameters such as chemical and physical standards and the presence of pesticides that must be respected when discharging the effluent.

4.4.3 ENTRE RIOS PROVINCE

Constitution of the Province of Entre Ríos.

Last reform January 2008.

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Among several novel issues, it incorporated regulations to promote a healthy environment, such as to allow and encourage regionalization, the formation and defence of Associations or Cooperatives, as well as everything that makes sustainable development explicit.

In its section 83 it indicates: "The State sets the environmental policy and guarantees the application of the principles of sustainability; precaution; intergenerational equity; prevention; rational use; progressiveness; and responsibility. The police power in the matter will be of concurrent competence between the Province, municipalities and communes. It ensures the preservation and improvement of ecosystems and their biological corridors and the conservation of biological diversity. It promotes the creation of state banks of genetic reserves of species and prohibits the introduction of harmful exotics. It promotes responsible consumption the use of technologies and non-contaminating elements the most advanced and safe practices available an integral management of waste and its eventual reuse and recycling. It promotes the incorporation of renewable and clean energy sources. It establishes preventive and precautionary measures for environmental damage".

Law 6,260

It refers to the Prevention and Control of Pollution by Industries and aims to establish criteria and requirements on the location, construction, installation, equipment and operation to be met by industrial establishments to prevent pollution of the environment, ensuring the preservation of this and control by the State.

Article 9 of the law states that for the purposes of interpretation, any substance in a solid, liquid or gaseous state that produces or releases fumes, gases, mist, vapours or dusts which, without being harmful, inflammable or explosive, cause discomfort to personnel, the population in general and the surrounding area in particular, shall be considered industrial waste.

It is regulated by Decree 5837-91. Article 20 of the decree states that liquid effluents must comply with the complementary regulation on liquid effluents, which has been prepared using the following criteria:
a) For toxic components, setting maximum values at the discharge mouths to the final receiving medium.
(b) For non-toxic components, setting maximum limits at the outlets to the final receiving environment, according to the self-purification and dilution capacity of the latter.
In its Annex I, it refers to liquid effluents and their special discharge in compliance with the International Treaty of the Uruguay River with the Oriental Republic of Uruguay.

In its Annex II it refers to gaseous effluents, defining the values of air pollution.

In its Annex III, it refers to solid effluents, indicating the specific handling of them, and what type of substances that can be found in them must be specifically declared (Table 10)

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Resolution 133/2009

Integral Management of Urban Solid Waste

It creates a provincial registry of GIRSU, granting a file to each municipality and preparing the corresponding regulations. In order to organize the management of each municipality, it characterizes its urban solid waste taking as a parameter its amount of inhabitants; the population served with the collection service; the approximate floating population, time of the year in which the peaks of tourist affluence occur. A characterisation of the waste generated in that locality is also carried out, mentioning the quantity and characteristics of the waste, taking into consideration the modifications during the peaks of floating population, and the methodology used to carry out the characterisation. The standard also provides basic guidelines for the presentation of municipal GIRSU projects; and for the elaboration of environmental impact studies. Finally, the norm establishes that an environmental report must be made of the site where the domestic waste dump is located, with the objective of diagnosing the situation of the area of influence and based on this develop a mitigation plan to be implemented after the start of the remediation works.

Resolution 6491/2010

Law 10,233

Enacted on 29/8/2013

It regulates the productive activity of fattening animals in a corral.

In its article 1, it states: ¨Create the regulation of the productive activity of intensive fattening of animals to corral, in order to guarantee a sustainable environment, the right to production and well-being animal¨.

It indicates the records on activity, the minimum proportions that the undertakings must have, and the minimum distance that they must observe with other pig or poultry production establishments.

In its articles 23 and 24, they specifically express: ¨All establishment of intensive breeding and/or fattening of animals must have a system of treatment and/or elimination of excrements. The establishments shall have an operational manual in which they shall include in a detailed way the final destination of the solid waste. ¨

Law 10.311

Sanctioned on 3/6/2014

It is the law of integral management of urban solid waste.

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In its Article 1 it states: ¨La this law aims to establish the set of basic principles and obligations for the integral management of urban solid waste generated in the territorial area of the Province of Entre Ríos, in accordance with the provisions established in National Law No. 25,916, on Minimum Budgets for Environmental Protection for the Integral Management of Household Waste, with the ultimate aim of protecting the environment and the quality of life of the population.¨

The present law regulates as solid urban waste the elements, objects or solid or semi-solid substances generated by human activities developed in the territorial urbanization that, due to the consumption processes, are discarded or abandoned; including those of domestic, commercial, institutional, welfare or industrial origin that can be assimilated to domestic waste, due to their composition. Likewise, the following stages are incorporated: generation, initial disposal, collection, transport, transfer, treatment, recovery and final disposal.

Decree 4977/19 and Accreditation Guide

Implementing Authority Environment Secretariat

It is a decree that has 7 annexes.

- Annex 1 Glossary.
- Annex 2. Letter of introduction.
- Annex 3 Minimum general contents for environmental impact studies.
- Annex 4 Formula for the categorization of activities and projects. The formula takes into account variables such as waste and effluent generation, type and risks of the activity, dimensioning and location of the undertaking and location. Each item is scored. Up to 11: Corresponds to a category 1 activity or project. Between 11 and 25: Corresponds to a category 2 activity or project. Category 1 is of lesser environmental impact than a category 3. The poultry activity (layers and broilers), feed-lot, horses breedings, pigs, cattle and the industries derived from it (meat processing plants, slaughterhouses, skinning plants, dairy companies, cheese factories, sausage industry, poultry processing plants) has category 2
- Annex 5 Minimum general contents for the environmental report.
- Annex 6 Classification of activities. Category 2 activities, per year must perform the Environmental Report which lasts only 2 years.
- Annex 7 Documentation: register of consultants in environmental impact studies

4.4.4 CORRIENTES PROVINCE

Provincial Constitution

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The Provincial Constitution incorporates rules on environmental protection, and since the Municipalities are agents of the Provincial State to enforce the rules of the Provincial Constitution and the laws of the Province, they are extremely relevant in relation to the Municipal Management of Urban Solid Waste. In its Section 53°, the Provincial Constitution establishes that the Provincial State sets the environmental policy, protects and preserves the integrity of the environment, biodiversity, the use and rational administration of natural resources, the use of non-contaminating technologies and the reduction of the generation of harmful waste, dictates the legislation destined to prevent and control the factors of environmental deterioration, sanctions its noncompliance and demands the reparation of the damages, and although it does not mention the Municipalities, they must collaborate with the Provincial Government and contribute to the enforcement of the Constitution. Likewise, in section 55, it establishes that the Provincial State and the municipalities promote the integral management of waste and its productive use.

Law 5.388/99

It declares in its article 1 the adhesion to the law 24,051 of Hazardous Waste, and in article 3 it invites the municipalities to do the same.

Law 3.979

It regulates the management of waste effluents, whether they are solids, liquids, gases and/or heat or other energy sources. This law prohibits State agencies, whether national, provincial or municipal, public and private institutions, as well as private individuals, from degrading the environment, setting or surroundings, or harming the health and well-being of the population through actions, works or activities that produce waste effluents, or effluents that are not solid, liquid, gaseous and/or heat or other sources of energy.

As for the owners and/or those responsible for the contaminating sources or those that may contaminate the environment, they must adapt at their own expense, those facilities and/or treatment for the purification or disposal of waste effluents in order to make them harmless and inoffensive to health, avoiding that they affect or alter both the ecological balance and the air, soil and receiving water courses. The adaptation previously established will be effective in time, in form and under the penalties that the competent authorities prescribe according to the case.

Law 4.731

It is about the preservation, conservation, defence, and improvement of the environment. It dictates the obligatory nature of Environmental Impact Studies. It declares of Provincial

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Interest, the preservation, conservation, defence, and improvement of those urban, rural and natural environments and all their constitutive elements that by their functions and characteristics maintain or contribute to maintain the most convenient ecological organization for the development of favourable conditions for the health and welfare of the community, as well as for the permanence of the human species on earth in harmonic relationship with the environment.

In order to preserve, conserve, defend and improve the environment, the law includes the following actions: the ordering or settlement, the rational use of soil, water, flora, fauna, the preservation of health, the welfare of the population and the defence of natural resources; the prohibition and, if necessary, the repression of activities that degrade or are likely to degrade the environment; the control, reduction or elimination of factors, processes, activities or components of the environment that cause or are likely to cause damage to the environment, life and health of man and other living beings. In this sense, it is established that public or private, national or international persons responsible for works and/or actions that degrade or are susceptible to produce environmental degradation and affect the health of the population or the natural resources of the Province, are obliged to submit a study and evaluation report of the environmental impact in all stages of the development of such works.

In its section 7, it establishes that any inhabitant of the Province who considers himself affected in his interests, activities and/or properties, by works that contaminate the environment and/or that can harm the health of the population and/or affect the flora, fauna or natural resources, may appeal through the action of protection to any Provincial Judge for the purpose of requesting the suspension of the works, until the law is complied with.

Law 5,067

Or Environmental Impact Assessment. It establishes the obligation to submit to an Environmental Impact Assessment in the manner provided for in this law, to public or private projects, consisting of the execution of works, installations or any activity that may reasonably be expected to affect the environment. Said projects must carry out an Environmental Impact study, the content and scope of which it stipulates.

Law 5,533

Or Environmental Information. It establishes that every person has the right to request and receive information on the state and management of the environment and natural resources, without the need to invoke any special interest that motivates such a request

In its section 2 it is indicated that it is applicable to environmental information concerning or affecting the Province of Corrientes, which is in the possession of the Government of the Province, the Municipalities, national or binational entities and any public authority,

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organism and institution, including its contractors, concessionaires and private companies that provide public services in its territory.

Decree-Law 191/01

It is the Water Code of the Province of Corrientes. It establishes that water resources include: water, its channels, beds, and aquifers; and defines that water policy is understood to be an ordered set of courses of action tending to the achievement of general and particular objectives, adequate to ensure proper water resource management, tending to protect the resource from potential abuses derived from its use.

Article 63 provides that "It is prohibited to dump any type of solid, liquid or gaseous waste that may degrade or contaminate water resources or the environment, causing damage or endangering human health, flora or fauna, and compromising their use for various purposes. Such waste may be discharged only: a) When it is subject to prior treatment for purification or neutralization, which is appropriate to the criteria of the Authority of Application.

4.4.5 SANTA FE PROVINCE

Resolution 1089/82

It establishes the conditions to which the effluent must adjust, considering also the place where it is dumped and the dilution capacity of the receiving water body. It sets out the conditions that the effluent must meet and the facilities that must be provided for those buildings whose wastewater requires prior treatment to reach acceptable conditions for discharge to receiving bodies. Receiving bodies are understood to be: a collecting pipe or sewage pipe; a pipe or rainwater pipe; an open channel; a surface water course; a lake or pond; an absorbent well; or a dug or drilled well to any natural water body.

Law 11.717/2001.

Environment and Sustainable Development Act.

Sanctioned: 18 November 1999. Promulgated: by Decree n° 827, 28 March 2000.

It requires the evaluation of the environmental impact study by the enterprises. It is an important component of the environmental management system and it is characterized by being an instrument of preventive character tending to avoid environmental conflicts. This

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evaluation is an essential instrument of territorial ordering and, therefore, of strategic planning, in what refers to the location of activities and enterprises in the physical environment of the territory of the Province. Sections 18, 19 and 26 of the Law establish that individuals or legal entities responsible for projects must present Environmental Impact Studies to the Secretary of State for the Environment and Sustainable Development. The agricultural sector is included in this regulation.

In Santa Fe, at the provincial level, the legislation that covers the productive enterprises in which the fattening farms are included is the Environmental Law No. 11717 (1999) and its Regulatory Decree No. 101/03. Resolution No. 23/2009 of the Secretariat of the Environment creates within the framework of that agency a provincial registry of intensive cattle fattening establishments.

Resolution 0023/09

Issued by the Secretary of the Environment.

It has been created with the objective of regulating the installation and operation from the environmental point of view, of the intensive cattle fattening establishments to corral; to avoid and/or minimize the environmental degradation by contamination of soil, water and air, caused by this activity; and to elaborate a provincial registry in order to know quantity, characteristics and location of the mentioned establishments.

Law No. 13,723. Amends Law No. 11,717.

Sanctioned: 30 November 2017. Promulgated: by Constitution

The Ministry of the Environment convenes, ex officio or at the request of a party, Public Hearings for individuals or legal entities, public or private, responsible, potentially affected or interested in discussing the aspects that make the environmental impact of projects or activities and the actions necessary to prevent and mitigate environmental impact. The recommendations emanating from the Public Hearings shall be of a non-binding nature.

Law 13.740 or Santa Fe Water Law-Book 1.

This law is comprehensive and regulates the integrated management of all water resources in the province of Santa Fe, in order to promote the different uses of water in a sustainable manner in favour of present and future generations, guaranteeing the fundamental human right of access to drinking water. The integrated management of water resources involves territorial planning.

In particular, Section 2 mentions agricultural and forestry use and Section 3 mentions the use of livestock and farm animals in intensive containment systems. But, expressly, Section

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3 mentions that in cases of intensive and concentrated systems of animal production the provisions of "Section 4 - Industrial Use, insofar as they are compatible, and the special rules in force on the subject shall apply.

In Industrial Uses, in addition to the common requirements of Article 24, item 4 expressly requires that, together with the presentation of the project, the system for treating and purifying effluents and the impact they will have on the receiving body be specified. Article 37 stipulates the condition of effluent discharge. All users of water for industrial use who have to discharge effluents into watercourses and bodies of water must ensure that they are treated appropriately under the conditions laid down in the regulations in force with respect to their physical, chemical and biological characteristics and without causing damage to the environment, to rights of collective incidence, to other uses and to the rights of third parties.

4.4.6 LA PAMPA PROVINCE

Decree 2,793/06

It regulates the Provincial Environmental Law 1914, in order to make sections 27, 28 and 296 of Chapter VI of that law operative.

Article 27 of the Law prohibits the overturning, discharge or injection of polluting effluents into surface and underground water bodies, into the atmosphere and into the soil, when the effluents exceed the maximum emission values established for them and/or when they alter the quality standards determined for each environmental component.

Article 28 establishes that the environmental technical norms will determine the parameters and guide levels of environmental quality of the receiving bodies that allow guaranteeing the necessary conditions to ensure the quality of life of the population, the durability of natural resources and the protection of all manifestations of life.

Article 29 provides that the Under-Secretariat for Ecology, in coordination with the competent provincial and/or national agencies, in accordance with the receiving body, shall determine the maximum emission values, in accordance with the effluent and the receiving body, which shall be previously agreed upon by the Ecological Policy Body.

Decree 2793/06, establishes in its Annex (Table 11 and 12) the maximum emission values according to:
(A) Open rainwater duct, surface water, closed elemental, and non-permanent watercourse drains; and
B) Drainage to wells or drainage fields

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It is also established that the parameters not included must respect the values established for drinking water by the World Health Organization (WHO).

Law 1914

Sanctioned on 21/12/2000. Provincial environmental law.

In its section 1 it indicates: ¨La this Law, within the framework of section 18 of the Constitution of the Province of La Pampa, has as its object the protection, conservation, defence and improvement of natural resources and the environment in the provincial area, through the definition of policies and actions, the compatibility of the application of sectorial regulations of an environmental nature and the coordination of the areas of government intervening in environmental management, promoting citizen participation.¨

In the Annex, emission ceilings for air pollutants and air protection standards are regulated.

Law 1,466

The Province of La Pampa adhered to National Law 24,051, referring to the treatment of hazardous waste. Then, by means of Decree 2054/01, it proceeded to its regulation, and appointed the Undersecretary of Ecology as the Authority of Application of the same.

Likewise, this regulation determines that "the owners of the activities set forth in Article 1 of Law 24,051, whether they are natural or legal persons, public or private, must be registered in the Provincial Registry of Generators and Operators of Hazardous Waste, which will be kept chronologically by the Authority of Application, and the relevant registration, renewal and application for deregistration will be recorded there".

The substances defined in Law 24051 as hazardous waste are those that can cause damage, directly or indirectly, to living beings or contaminate the soil, water, atmosphere, or the environment in general.

Since the nature of hazardous waste can be very particular, it can become rather tedious to classify it into subgroups or classes, each of which is quite small.

It has been considered, however, that a waste can be optimally classified according to the waste stream (its origin and basic constitution) and its hazardousness. These two classifications are developed by the first two annexes of the law. The third annex is a classification of the waste according to its final disposal, whether the method leads to resource recovery or not.

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4.4.7 PROVINCE OF SAN LUIS

Act IX-0559-2007

In your art. 1 states: ¨ The purpose of this Law is to defend livestock in the territory of the Province against the invasion of exotic contagious diseases and the action of epizootic diseases already existing in the country, and to authorize, carry out health inspections and monitor livestock markets, markets, fairs, slaughterhouses, meat packing plants, salting plants, poultry slaughterhouses, stockpiles, egg marketing and industrialization, and the industrialization of hunting and fishing, and in general of all establishments where products of animal origin are produced or deposited, when the places where the sales or the slaughter of animals are carried out or where the establishments where products are produced, deposited or extracted are located, and the animals or the products that come from another Nation, another Province or another territory or are destined to international, interprovincial trade are located in the Province...¨

The provincial registry of Consultants and/or Professionals Specialized in Environmental Impact Assessment (EIA) was created by this law, which operates within the scope of the Under secretariat of Ecology, a mandatory requirement for the submission of Environmental Impact Assessments (EIA) of private activity.

It indicates the framework for environmental planning and management in the province.

In its article 27, it prohibits the overturning, discharge or injection of polluting effluents into surface and underground water bodies, into the atmosphere and into the soil, when the effluents exceed the maximum emission values established for them and/or when they alter the quality standards determined for each environmental component; however, it does not determine in a specific way which are the parameters and guide levels of environmental quality of the receiving bodies, although it includes in its Annex that it concerns the storage, treatment and/or final disposal plants of urban, industrial and rural solid waste.

Resolution (PCSYF) 4/08.

Enacted on 16/9/08

It creates a register of intensive animal production systems called feedlot at the provincial level, indicating the permitted zones, phytosanitary issues, and in its article 5 it states: ¨... E) it must also detail the direction of drainage of each corral, the distribution of the drainage, the location and size of the sedimentation and storage lagoon and the site of accumulation of solid waste. F) The Authority of Application requires that the slope of the location area of the open-air corrals is not less than 1% or more than 4%. The leveling of the facilities and location, G) must present the management plan for effluents and solid waste.

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SLASE Resolution 170/13

It regulates dumping permits, the agents of waste production among which it lists solid waste from agro-industrial activity, the agents involved, the creation of records, treatment guidelines and the management of these.

Although it does not specify tipping values, it refers to national standards and the full use of these and their degradation in the processes of treatment¨

4.4.8 PROVINCE OF TUCUMAN

At the provincial level, section 36 of the Constitution establishes the powers of the State with regard to the environment, and sets out among its obligations those of arbitrating the legal means to protect the purity of the environment by preserving the natural and cultural resources and aesthetic values that make for the best quality of life; to avoid environmental damage in its territory; to prevent and control the pollution and degradation of environments by erosion; to protect the natural reserves declared as such and to create new ones; and to organize its territorial space to preserve and increase balanced environments. Article 113 determines the protection of the environment, among other functions to be fulfilled by municipalities.

Law 6.253/91

Known as the General Environmental Law together with its Regulatory Decree 2,204/3/91, they have been a step forward in the issue of environmental protection and are recognized as a regulatory framework for all actions related to this issue. Among other elements, they incorporate the creation of the Provincial Council of the Environment as an organ of participation and the figures of environmental impact assessment, environmental education, environmental standards and criteria in the management of resources, as well as the obligation to promote and propose environmental policy in the territory of the province.

The implementation of these points has not yet taken place. In general, the terms in which the protection of the environment is considered follow the lines marked by the national Constitution, although the results have not been as expected, and it would be of great benefit to begin to adjust those points in which the Magna Carta has been imprecise.

In its article 10, it refers to: ¨ It is forbidden for any person, individual or owner responsible for plants, production or service facilities, to dump polluting effluents into surface and underground water bodies, to discharge, inject and infiltrate polluting effluents into the soil, or to make emissions or discharges of polluting effluents into the atmosphere, which produce or may produce in the short, medium and long term an irreversible, correctable or

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incipient degradation that directly or indirectly affects the quality and balance of human and natural ecosystems.¨

In its article 20: ¨ All authorized effluent dumping must be within the technically established criteria. The Authority of Application will be empowered to periodically inspect any activity or work that has an Environmental Aptitude Certificate, in order to follow up on the continuity of the accepted quality characteristics and the derivations that may occur in the future. ¨

Resolution 1.265/2003

Resolution 1265/2003 of the Provincial Health System establishes that waste liquids may be discharged into watercourses, canals (rainwater, irrigation), ditches, lakes, lagoons or land in the public or private domain, when they reach the quality levels set out in Annex I. Discharges to absorbent wells or unsealed land would be permitted by the authority of application, in accordance with the physical and chemical characteristics of the effluent and taking into account Annex V, which lists the industrial branches or activities whose effluents cannot be disposed of in absorbent wells or unsealed land.

Companies that manage and/or generate waste liquids, whether or not they are subject to treatment systems, should apply to the General Directorate of Environmental Sanitation for registration or re-registration in the Effluent Registry.

4.4.9 PROVINCE OF SALTA

Law 7,070

Environmental Protection Act
Sanctioned on 21/12/99.

It regulates water, soil, flora, fauna, atmosphere, landscape, natural parks and biodiversity, genetically modified organisms, waste, phytosanitary products, and energy. Regulatory Decree 3097/00.
In its Title III - Chapter VI it indicates the procedure of Environmental and Social Impact Assessment, Environmental Aptitude Affidavit and Environmental Aptitude Certificate. Regulatory Decree 3097/00. Annex I, activities that require an Impact Study, as well as emissions to the atmosphere (guide levels, effluents, vibrations, noise, odours).
In its Title IV - Chapter IV, it regulates the control and/or prohibition of air pollution, as well as generates air quality standards.

In its Title IV - Chapter II - Section I, it lists the principles of Sustainable Water Resources Management. Regulatory Decrees 3376/99; 1502/00; 1989/02; 2299/03.

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It deals with the protection of soils from pollution, wind or water erosion, flooding, salinization, of any form and irrational use.

In its Title V - Chapter II, it regulates waste in general.

In Title V - Chapter III it regulates on hazardous waste. Resolution SeMAyDeS 224/06. Registry of Generators, Transporters and Operators of Hazardous Waste.

Title V - Chapter IV. Regulates phytosanitary products (chemicals, agrochemicals, PCB's)

It creates the Provincial Council of the Environment as an entity for the dictation of norms referred to the topic.

Article 3 lists various concepts that are regulated by the norm and describes them. Among them we find concepts of a broad nature such as:

Pollution. process that generates any substance or form of energy that alters the environment negatively with respect to what occurs naturally, or when these by the mere presence of the substance or form cause a direct or indirect reversible or irreversible loss of the normal condition of ecosystems and their components in general; translated into negative and undesirable health, aesthetic, economic, recreational and ecological consequences.

Water pollution: Direct or indirect dumping, spills, waste, and deposits of all kinds of materials and, more generally, anything that can cause increased water degradation by modifying its physical, chemical, biological or bacteriological characteristics. The aquatic environment is polluted when the composition or state of the water is modified, directly or indirectly by man, so that it lends itself less easily to all or some of the activities for which it could serve in its natural state.

The Act is a large framework that indicates the general concepts, creates the control bodies, resolves jurisdictional issues, expresses adherence to national laws and indicates macro parameters.

Resolution SAyDS 528/09

Modified by Resolution 568/09. Register of Environmentally Hazardous Activities.

4.4.10 PROVINCE OF FORMOSA

Law 1060/93.

It regulates the Ecological and Environmental Policy of the Province.

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In its section 4 it regulates the Environmental Impact of projects and activities of social and economic development, indicating in its section 28 the projects in which an Environmental Feasibility Study is mandatory.

In Title III, Chapter I sets forth the general provisions for monitoring and controlling air quality according to emission levels. Noise, vibration, light and thermal energy emissions.

In Title III, Chapter III it dictates the general provisions for the protection of surface and underground water bodies.

In its Title IV, Chapter I, it lists

Art.111) For the purpose of minimizing environmental impact, the disposal in or on land, water, or air of any type of residue, waste or scrap without prior treatment duly authorized by the enforcement authority is prohibited.

Art.112) Recycling, recovery, combination or any other technology that could be developed in the future, complying with the following requirements, constitute the basis of the management of environmental waste accepted by this law: a) The minimization of the volumes of waste to be mobilized. b) The recovery of material and energy. c) The development of appropriate technologies and those that due to technological innovation could be developed for the purposes of environmental management that minimizes the impact. d) The obtaining of products from recycling that could substitute raw materials or the impact on renewable natural resources.

Art.113) The enforcement authority shall implement waste classification systems, at the sources of waste production, according to the characteristics that make the requirements indicated in article 112 possible).

Art.114) Waste disposal sites shall require the explicit approval of the enforcement authority.

Art.117) For the purposes of compliance with paragraphs b, c and d of article 112, the enforcement authority shall implement a public risk of waste generators suitable for recycling, with a view to enabling the market to apply economy in industrial treatment.

Art.118) In compliance with article 112 and for the purposes of environmental and economic feasibility, the enforcement authority shall set the rationalization criteria for waste management. Art.119) The following are special wastes: pathological wastes, explosives, toxins, flammable wastes, corrosive wastes, oxidizing wastes, **ecotoxic wastes,** wastes from public services, sewage wastes and radioactive wastes.

In its Title IV, Chapter I regulates the general provisions for the management of solid waste, indicating in Article 111 ¨It´s forbidden, for the purpose of minimizing environmental impact,

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the disposal in or on land, water or air of any type of waste, residue or refuse without prior treatment duly authorized by the enforcement authority. ¨

Also, in its art. 119 it indicates: ¨ Art.119) Special wastes are: pathological, explosive, toxic, flammable, corrosive, oxidizing, **eco-toxic,** public services, sewage, and radioactive wastes ¨

Law 1163/95

Sanctioned on 10/11/1995.
Regulates the use of Plant Protection Products

4.4.11 CHACO PROVINCE

Law 2160/77

Preservation and improvement of the urban, rural, and industrial landscape

Law 3.230/86, modified by Law 4.255.

Also known as the Water Code. Regulated by Decree 847/92, it regulates the physical-chemical conditions for the discharge of waste, industrial and/or sewage liquids. Of animal excreta.

Law 3.378/88

It regulates the sale, application, transport, and storage of chemical and biological products used in agricultural practices. Regulatory Decree 454/88.

Law 3.946/93

Hazardous Waste. Decree 578/05 regulates the registration of generators and operators.

Decree 787/94

It regulates the authorizations of effluent discharges from industrial, commercial, or mining activities.

Law 3.964/94

Environmental Defence Act. Decree 1730/94.

Law 4.302/96

Protection of soil, water and energy resources.

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Although Chaco Province has generated a significant amount of legal volume, most of this is in the form of accessions to and repetitions of national legislation.

Law 5735

A legal regime is created for the operation of feedlots and environmental impact studies are requested.

4.4.12 MISIONES PROVINCE

Law 2.267/85

It regulates the regime of localization and Industrial authorization, between which they are the agroindustry. Regulatory Decree 966/87.

4.4.13 PROVINCE OF MENDOZA

Law 5.961/92

It deals with the preservation of the environment, the protection of the ecological balance and sustainable development; as well as regulating the works or activities that must be submitted to Environmental Impact Assessment (EIA). Regulatory Decree 2109/94: EIA requirements, project categorizations and studies according to the estimated impact to be caused to the environment. Due to its scarce water resources and their use in the wine industry, Mendoza has abundant regulations in this area.

Among them we find:

- General Water Law. Sanctioned in 1884.
- Law 1920/50. Use of public water for agriculture.
- Law 4035/74. Groundwater regime. Complemented by Law 4036/74. Regulatory Decree 1839/75.
- Resolution HTA 563/75. It defines the various uses that Law 4035/74 contemplates on: supply of populations, agriculture and livestock, industry, mining, recreation and tourism and medicinal uses.
- Law 322/05. General Administration of Surface Water.

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- Resolution AySAM 19/90. Unique Registry of Establishments that Dump Effluents into Collectors. Conditions of Admissibility of Industrial Effluents. Pollution Control.
- Resolution DGI 778/96. General regulation for the control of water pollution. Protection of the quality of water in the public domain. Regulates discharges, controls, authorizations and permits (Table 13 and 14).

Regulatory Decree of Law 8.461 and its Regulatory Decree 1685/13-

It defines the form of authorization and operation of the productive establishments that are dedicated to the breeding/rearing and/or fattening of cattle, regulates the conditions of authorization and operation of productive establishments that are dedicated to the breeding/rearing and/or fattening of cattle to corral.

4.4.14 SAN JUAN PROVINCE

Law 2,553/61

Sanitary code, sanctioned on 1/2/61

Article 13 states: It is forbidden to send solid, liquid or gaseous effluents of any origin to the atmosphere or to channels, courses or water bodies, whether surface or underground, that may cause degradation or impairment of the air or water of the Province, without prior purification treatment or neutralization that makes them harmless or inoffensive to the health of the population or that prevents their harmful effect on the atmosphere and contamination, damage or obstruction of sources, courses or water bodies. A regulation shall determine the conditions for the disposal of the above-mentioned effluents, while Article 15 thereof states Water from sewers, drains or other presumably polluted sources may not be used for the raising of edible aquatic species or for the cultivation of vegetables and fruits which are usually consumed uncooked and grow on the surface of the ground.

Law 5.824/87

It regulates the preservation of Water, Soil and Air resources. Regulatory Decree 2107/06, effluents from industrial, commercial, agricultural, mining and service activities, in surface and underground waters. Quality standards for discharges.

Law 6634/95 (amended by Law 6740/96)

It regulates the preservation, conservation, defence and improvement of the provincial environment, implementing the regulation of the Environmental Impact Study. Regulatory Decree 2067/97.

Decree 2.107/06

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It sets the permissible limit parameters for the discharge of effluents into watercourses and infiltration into the soil (Table 15).

Law 8.238/11

It regulates the System of Integral Management of Urban Solid Waste (USW) and waste assimilated to USW. In its article 8, paragraph f, the law includes Non-hazardous industrial and agricultural waste within its framework, indicating that the construction and development of Treatment and Final Disposal Centres for Urban Solid and Assimilable Waste must be observed, in which the greatest possible recovery of materials present in the waste and their reuse is sought.

4.4.15 PROVINCE OF SANTIAGO DEL ESTERO

Law 6321/97

It regulates the defence, conservation and improvement of the environment and natural resources, generating dispositions on the projects, works and activities that must present a Study of Environmental Impact.

Likewise, in its Title IV - Chapter VIII, it enunciates provisions on Waste Management in a generic manner without stating values for tipping.

Law 6.312/96

Agrochemicals Act. Regulatory Decree 38/01

4.5 National regulatory framework for fertilizers in amendments

Resolution No. 264

Sanctioned in 2011. National Service of Agri-food Health and Quality (SENASA).

The Regulations for the Registration of Fertilizers, Amendments, Substrates, Conditioners, Protectors and Raw Materials in the Argentine Republic were approved. This resolution is issued on the procedures, criteria and scope, of all the mentioned products and the registration of the trademarks in all the national territory. It defines the subjects to be registered (it includes importers, exporters, distributors, processors and fractionators), the forms of registration, payment of duties and classifies all products (the classification of the product list and its definitions was reported in Task 1.2-)

Since the use of compost provides:

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- multiple benefits due to its ability to improve the physical, chemical, and biological properties of soils
- provides organic matter and a variety of macro and micronutrients
- there is an increased supply of agricultural, agro-industrial and household waste separated at source
- increased demand for the product compost

It was necessary to update and expand the requirements and controls for the marketing of compost and on these foundations is the *National Reference Framework for the Production, Registration and Application of Compost (*Tables No. 24, 25, 26, 27 and 28).

For the construction of the standard, it was decided to give intervention to different official organizations on the subject and[1], as a result of the inter-institutional concession, the Joint Resolution 1/2019 arose.

Joint Resolution 19/19

This **Resolution established the technical aspects** for the **elaboration and application of the by-products** generated in the **biodigesters. In turn, the resolution determines the** quality parameters that must be satisfied in the **digests,** as well as the **requirements and restrictions for the application of the** same (Tables No. 29 and 30)**.**

In an annex of twenty-three pages, Environment determines, among other things, the general criteria and minimum requirements that the digestate from anaerobic digestion plants must meet in order to ensure its agricultural application. Furthermore, the agency pointed out that these regulations aim to "promote the agronomic valorisation of the digestate due to its nutrient content and other intrinsic properties that make it potentially beneficial for soils and crops, protecting the health of people, animals and the environment

1 Institute of Microbiology and Agricultural Zoology (IMyZA) of the NATIONAL INSTITUTE OF AGRICULTURAL TECHNOLOGY (INTA), the Centre for Environmental Research and Development (INTI-Ambiente), the Soils Group of the NATIONAL UNIVERSITY OF COMAHUE and the Province of RIO NEGRO, the Waste Management Department of the SECRETARIAT OF THE GOVERNMENT OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT, the Ecological Coordination of the Metropolitan Area, State Society (CEAMSE) and the Ministry of Environment and Public Space of the Government of the Autonomous City of Buenos Aires, who, together with representatives of the Directorate of Agrochemicals and Biology of the aforementioned National Service and of the Secretariat of Environmental Control and Monitoring, generated a new

According to a report made by the Secretariat of Agriculture, Livestock and Fisheries, which depends on the Ministry of Agribusiness, of the Presidency of the Nation, it is introduced that the Good Management and Use Practices (BPMU), which represent a collection of techniques, technologies and procedures that lead to achieve the productive objective sought respecting the original characteristics of the environment and health of animals (birds and others) and people involved.

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This regulation arises as a necessity since anaerobic digestion of waste began to boom. The digested material has a content of nutrients such as nitrogen, phosphorus and potassium (NPK), whose concentration differs depending on the raw material that gives rise to it, so it is not covered by any regulations in force.

4.6 Conclusions Regarding Legislation in Argentina

Environmental problems in intensified animal production systems are almost entirely related to excreta management and, consequently, to nutrient management and animal nutrition.

The solution can be made effective with the combined efforts of different actors, including producers, authorities, researchers who provide technical solutions and companies (machinery, technology, etc.) that can help implement them.

The identification of "knowledge gaps" is essential for the implementation of effective measures.

The most relevant, in general, are referred to the reliable information on the number of establishments (and heads) that carry out fattening to permanent and temporary corral, and stables; to local studies on the environmental impact of continuous applications of manure on the soil; to the quantification of the economic impact of the effects caused by the already existing pollution and its corresponding economically valued mitigation measures; and to the knowledge and understanding of the environmental problem at the level of the population.

The corrective actions that are implemented should be contained in information, communication, and education programs, along with adequate legislation and development of technologies appropriate to the characteristics of each type of production.

The latter include the development of pollution models at farm, basin and geographic region scales; the generation of specific indicators for monitoring intensive systems and their neighbouring ecosystems; as well as the development of low-cost equipment so that producers can implement the reuse of manure and effluents in their establishments.

The agricultural producer, therefore, faces several challenges to meet the requirements demanded by the consumer and the globalized markets.

In this new context, it is especially important to consider the environmental impacts of intensified animal production systems. To this end, water quality must be monitored within

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an integrated management of soil, water, and effluents within the same rural establishment. Livestock waste should be considered as a source of nutrients to be recycled within the production system itself, and its balance should be optimized, thus reducing production costs and the environmental risk of pollution. Manure would then cease to be a waste product and become a nutrient resource, but this will require controls by the authorities. In summary, a challenge for animal production is the challenge of nutrient management, both from an environmental and economic perspective.

In Argentina there are no general regulations that typify the management of intensive animal production, whether in feedlot, dairy, pork or poultry, and the specific treatment of excreta.

The national legal framework is of a generic nature regarding environmental impact, generating serious difficulties at the time of implementation.

From the provincial point of view, the handling of excreta and slurry is not incorporated or regulated by a particular law.

In the normative field we find ideas that try to order activities in a broad sense, lacking specificity, data, and concrete technical developments to develop the operability that they indicate.

This situation occurs at a general level, including in municipal regulations, since they dictate rules for the authorization of livestock activities, but referring to national or provincial environmental standards without any technical criteria or real control over the waste generated by them.

Such contradictions often occur even within the same Agency, as is the case with the Water Authority (ADA), which has a multiplicity of different scientific criteria for effluent overturning in surface waters; since one resolution (336/03) is based on concentration values to indicate restrictive overturning limits, while another (734/14) allows for permit criteria on a case-by-case basis without defining technical guidelines indicating the threshold for access to such permits. In these permits, the tipping limits are not discriminated against based on the origin of the waste (organic or inorganic) and even without considering the discharge and course of the watercourse that receives it.

This shows that, even when there is specific legislation, the lack of uniqueness of technical criteria generates contradictions and even varied interpretations against the thing that is intended to be safeguarded.

The fact that the law on industrial and service waste makes it clear that animal excreta in industrial processes must be treated in a way that is not specific to it, once again makes it clear that a regulatory framework is needed for these processes.

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In general, and with some exceptions, the regulations do not create a legal framework for the generation, handling, and final disposal of animal excreta in intensive processes. It is therefore necessary to generate legislation that, under the cover of new technologies and biological processes, unifies criteria in this sense.

In the absence of specific regulations, and by virtue of the difference in technical criteria mentioned, the waste generated in the intensive farming activity is very complex to coordinate an operation that complies with all the discordant standards, which could generate a high environmental impact in the present and near future.

In Argentina, the legislation of the provinces is non-existent or incipient with respect to the installation of feedlots, so that the projects initiated, in their great majority, have not taken into account environmental or social aspects other than those directly associated with product quality or production efficiency. In some cases, social reactions have led to some changes or adjustments in the management of effluents and odours in production facilities. However, there is a lack of a history of adaptation and permanent adjustments to remedy or prevent subsequent effects. In the Argentine context and with international experience, the imposition of requirements and restrictions should be oriented from warning and preventing effects to avoid the cumbersome and costly task of environmental remediation and the relocation or redesign of productive establishments.

In addition to the above-mentioned issues, there is a lack of local data collection at environmental levels, such as hydrological data, and data on the generation of excreta or effluents generated, in order to be able to magnify the real levels of overturning and the assimilation capacity of the watercourse. The same applies to the discharge of excreta into soils and their reuse as organic amendments, since it is impossible to carry out an appropriate environmental impact study without knowing the characteristics of the waste and the soil, the levels of concentration in them, and the degree of vulnerability of the water networks. With these data, protocols could be generated that are adjusted to the level of treatment required in each region, according to the final destination given to the waste, and the necessary technologies could be applied according to each process.

Unfortunately, in Argentina, the Control Agencies also have very limited resources, which complicates even more the control of the processes used; it is imperative to articulate clear and precise legal rules appropriate to the regions, climate issues, watercourses, etc., as well as to provide the Agencies with greater tools to implement permits and overturning standards.

Without the real articulation of the legislators with the specialists (INTA, ADA, SENASA, Universities, etc.), it will be impossible to carry out accurate technical analyses that generate the scientific support of the norms.

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Waste is not going to disappear, so the intervention and coordinated commitment of all citizens, producers, and the State itself is required. There is no free environmental policy. An environmental policy implies investments, spending resources, concentrating efforts and strategically planning the integral management of waste. If natural resources have value because they generate genuine foreign exchange, then environmental quality has a price. There are no easy solutions, only intelligent options, technology can be one of the tools to achieve that end, but it is not the only one.

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5 Chile regulatory framework

Given the impact of climate change, it is now crucial to promote sustainable agriculture in the world, to efficiently reduce the carbon footprint and greenhouse gas impacts.

From November last year, the Committee on Agriculture of the Chamber of Deputies began discussion of the law No. 20.089 establishing rules on the composition, labelling and marketing of fertilizers in Chile. The so-called fertilizer labelling law is currently in the second legislative process, in the hands of the Senate.

This project aims to establish the provisions for the import of fertilizers, covering not only their components, but also other parameters related to their quality and due control.

In Chile, Decree Law No. 3,557 / 1981 of the Ministry of Agriculture, which establishes provisions on agricultural protection, indicates that the labelling of fertilizers must contain their composition and in the case of bulk, this information must be in the ballot, invoice or dispatch guide. In the case of the European Union, Regulation (EC) N ° 2003/2003 of the European Parliament and of the Council of October 13, 2003 regarding fertilizers was analysed, which establishes the information that the fertilizer label must contain, both compulsory and optional.

It is concluded that the European Union has specific requirements such as: Name of the product, Measurement (net weight, volume and density), Grade, Name and Address of the licensee, Purpose of the product, Instructions for use, Declaration of composition in percentage of each active ingredient and Analysis of composition guarantee (Guaranteed analysis of nitrogen, phosphorus and potassium, secondary minimum guarantees and micronutrients, etc.).

This document focuses on the comparative legislation on the labelling of fertilizers in the framework of the discussion of the “Project that establishes norms on composition, labelling and marketing of fertilizers” (Bulletin No. 12.233-01).

Chile's regulation was analysed, Law Decree No. 3,557 / 1981 that establishes provisions on agricultural protection of the Ministry of Agriculture such as Law 18,455 / 1985 of the Ministry of Agriculture (MINAGRI), Regulation (CE) No. 2003 / 2003 of the European Parliament and of the Council of October 13, 2003 regarding European Union fertilizers.

For the preparation of the document, the current legislation available in Chile Law was consulted, as well as legislative information of each country considered in this work.

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5.1 General and legal considerations

The Agricultural and Livestock Service of Chile (SAG) fulfils a role of control of the purity of the fertilizer indicated in the labelling of origin by means of analyses carried out in laboratories.

To import fertilizers, an Application for the Importation of Fertilizers must be filed with the SAG Office for the port of entry, along with the following documentation:

• Certificate of Customs Destination (CDA).

• Agricultural Product Inspection Report (IIPA).

• Invoice or similar document of probative value, in original or authorized copy, indicating the volume of the item to be entered and its amount, in value in destination port or port of origin.

• Cargo manifest, bill of lading (B/L) or air guide of the means of transport.

The import, manufacture, sale, and distribution of fertilizers is regulated by Decree Law No. 3.557 of 1980 (Title III, Paragraph 2). This Decree Law empowers the SAG to prohibit the processing, entry, distribution, or sale of fertilizers that include elements that could in any way harm agricultural soils. (Art. 37).

Each of the fertilizers that are imported must be subject to rigorous analysis by the Chilean Ministry of Agriculture, which will consist of a certain number of evidence proving that such fertilizers do not contain elements that could be harmful to agricultural soils.

The SAG conducts port-of-entry control, through a documentary and physical review, and subjects 100% of imported fertilizers to sampling. Imported with a volume of 5 Kg/lt. intended for laboratory use or household use, except for biofertilizers, are exempt from sampling.

The importer may request that sampling be carried out at the primary premises of the port of entry or under the storage regime.

In the official sampling a sample and two counter samples must be obtained, in accordance with Chilean Standard NCH 44 Inspection by Attributes, to check its composition. Resolution No. 1.035 of 2011 establishes tolerance margins in the fertilizer content, to qualify laboratory analyses.

A Fertilizer Inspection and Sampling Act is prepared for all products subject to sampling, which will be retained until the Authorized Laboratory issues the Analysis Results Report and is qualified by the relevant SAG Office. For this purpose, inspector SAG shall issue a Retention Act.

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If the data subject presents a Certificate of Official Composition of the country of origin, the product will be released at the port of entry without requiring laboratory analysis. (Art. 39).

If the result of the initial sample analysis, sent to an Authorized Laboratory matches the declared centesimal composition, the final entry authorization is granted. If the result of the analysis is different, i.e. it does not comply with the stated, the interested party must choose between relabelling the packaging or performing a new composition analysis, using the counter sample.

If the result of the first counter sample as opposed to the initial sample meets the declared composition, the SAG will send the second counter sample for analysis. If it does not comply, the packaging must be relabelled or the invoice must be modified in the case of bulk fertilizers, and the new centesimal composition should be indicated only for elements that were detected outside the permitted tolerance range.

Once imported fertilizers have been arranged for sale, it may be analysed at any stage of its marketing, to verify that its composition is accurate with that described on its label. (Art. 40).

Any user of the imported fertilizer may request the Ministry of Agriculture to carry out the corresponding analyses in order to verify that the composition of the product matches that recorded on its label, since, if not, the user may demand the corresponding payment. (Art. 41).

The Agricultural and Forest protection division, through circular No. 290 of 24 May 2010, reported that, as of 30 January 2011, the SAG will require packaged or bulk fertilizers to declare the accompanying elements contained in the product (heavy metals and others).

5.2 Law No. 20.089

5.2.1 Background

The aim of the law No.20.089 refers to the need for new fertilizer regulations to update the requirements for their importation, covering not only their components but also other elements that relate to their quality. In this regard, it should be noted, first of all, that the forestry sector needs to have an adequate regulatory framework for fertilizers, which emphasizes ensuring the quality of fertilizers, allowing economic operators to have sufficient information for their use and the Agricultural and Livestock Service (SAG) with a history for their proper control. The necessary increase in the competitiveness of the sector must be supported by increasing the capacities of the private sector, which must be strengthened by the State through the generation of public goods in matters that are of benefit to society as a whole, such as research, innovation, animal and plant health and the care of natural resources. It adds the message that the state-designed policy, around enhancing foreign

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trade in agricultural products, not only implies a change in existing policies in the sector, but also involves challenges in the most diverse areas of the national economy. This is justified in the fact that agriculture has a high productive diversity, both at the primary and industrial level. These products are marketed in different global markets and consumed by millions of people, presenting high safety standards that distinguish them worldwide. In this regard, it is important to stress that having quality inputs for the development of agricultural activity is essential to make this activity viable and competitive in international markets.

5.2.2 Objectives of the law no. 20.089

The draft law in this report aims to modernize existing legislation in this area in order, on the one hand, to specify what physicochemical composition of fertilizers means, and on the other hand to improve information systems for users of this input.

5.2.3 Legal or regulatory rules amends

The legal rules that the law no. 20.089 amends are as follows.

(a) Decree Law No. 3.557, establishing Provisions on Agricultural Protection.

b) Law No. 18.755, which lays down Rules on agricultural and livestock service.

c) Decree with Force of Law No. 25 RRA, 1963, on Bonuses and Trade in Fertilizers, Disinfectant and Pesticides.

5.2.4 Legal regulation of fertilizers

The message outlines that the legal regulation of the fertilizer market is given by Decree Law No. 3.557 of 1981, which was supplemented by SAG resolution No. 1.207 dated 21 September 1983. This legislation established the margin of tolerance in the content of fertilizer elements in the marketing of fertilizers. Subsequently, this resolution was repealed and replaced by SAG resolution No. 1035/10 of 18 February 2011, which establishes the tolerance margins for simple fertilizers, compound fertilizers and fertilizers with less than ten nutrient units and creates tolerance for heavy metals and biuret, as stated in the packaging label or invoice for bulk fertilizer. It adds the message that, in terms of consistency with the legal framework, the law no. 20.089 is adequately part of the SAG's legal status. This, founded on the fact that the SAG aims institutionally, to contribute to the agricultural development of the country, through the protection, maintenance and increase of animal and plant health; the protection and conservation of renewable natural resources affecting

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the country's agricultural production and the control of inputs and agricultural products subject to regulation in legal and regulatory standards, and that to meet this objective, it is up to it within its public functions and orders to implement and monitor compliance with legal and regulatory standards on fertilizer production and trade, as well as to carry out the relevant analyses. In relation to the foregoing, the SAG may prohibit the manufacture, entry, distribution or sale of fertilizers containing elements harmful to agriculture; as well as taking samples to imported fertilizers at any stage of their marketing, being able to apply sanctions only for non-compliances with the composition of the nutrient and accompanying elements declared on the packaging or label of the fertilizer, or on the corresponding ballots, invoices or dispatch guides, in the case of solid fertilizers sold in bulk. However, the SAG does not have the power to regulate such inputs broadly, nor to restrict them if for reasons of quality or other parameters other than physicochemical composition, they make it necessary. It also has no responsibility to establish requirements and controls on liquid bulk fertilizers, but only for packaged fertilizers and solid-state bulk fertilizers.

5.2.5 Fundamentals of the law no. 20.089

The message highlights as the basis of the legal initiative the following: - The SAG is the official authority responsible for inspecting and auditing the manufacture, import and trade of fertilizers, as well as the physicochemical composition, and must establish the required parameters according to the particular characteristics of each product. - The results of the audits carried out by this Service reveal the need to strengthen control over fertilizers to improve both the knowledge of the supervisory authority, as well as the information available to users about the physicochemical composition and quality parameters of fertilizers, as they affect their agronomic effectiveness.

5.2.6 Details of Law No. 20.089

5.2.6.1. TITLE I: General provisions

Article 1.- The purpose of this Law is to lay down the provisions on quality parameters, composition, classification, packaging, declaration, labelling and traceability applicable to the manufacture, formulation, production, marketing, holding, import and export of fertilizers, without prejudice to the other rules applicable to them. The provisions and technical definitions necessary for the implementation of this law shall be laid down by a regulation issued by the Ministry of Agriculture, which shall also provide for provisions relating to the classification and requirements to be met by manufacturers, formulators, 54 producers, marketers, packers, holders, importers and exporters of fertilizers. Without prejudice to the obligations and requirements set out in this law, fertilizers intended for use in organic

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agriculture shall also be subject to the criteria and requirements set out in Law No. 20.089, which establishes the National Certification System for Organic Agricultural Products and its complementary regulations.

Article 2.- For the purposes of this Law, the following definitions shall apply:

a) Biofertilizer: Preparations containing living or latent cells of microbial strains, nitrogen fixatives, mycorroid fungi, phosphorus solubilizer fungi, and in general, microorganisms enhancing the absorption of various nutrients or producers of active substances that are used to apply to seeds, soil or foliage, formulated alone or in mixture with fertilizers, which help provide plants with some or all of the nutrients they require, or increase the number of these microorganisms in the medium and accelerate microbial or physiological processes in such a way as to increase the availability of nutrients that can be assimilated by plants by influencing crop development and yield.

b) Life cycle of a fertilizer: A period that covers all stages or phases which a fertilizer passes through from its manufacture, production and/or formulation to its final application or arrangement, if any.

c) Marketer: Any natural or legal person, who sells or distributes fertilizers without changing the characteristics of the product. This concept includes the dealer concept.

d) Composition: Content of main nutrients, secondary nutrients or micronutrients, impurities and contaminants present in fertilizers.

e) Amendment: Any product or mixture of substances of an inorganic, organic or biological nature that, incorporated into the soil, modify or improve the physical, chemical or biological characteristics of the soil, without prejudice to its value as fertilizers.

f) Packaging: Closed container that facilitates the transport and storage of a fertilizer.

(g) Label: Text printed or fixed on the packaging in which the contained product is identified and its characteristics, in accordance with the provisions applicable in each case, in accordance with the certificates issued in the country of origin by the competent authority or the results of the analyses carried out locally in laboratories recognised by the Agricultural and Livestock Service.

h) Exporter: Natural or legal person who sends domestic or nationalized fertilizers for use or consumption abroad.

(i) Manufacturer: Natural or legal person responsible for the production of a fertilizer product. Any producer, importer or packer, as well as any distributor modifying the physical or chemical characteristics of a fertilizer product, shall be considered a manufacturer.

j) Fertilizer: Organic or inorganic material, of natural or synthetic origin that, because of its nutrient content, facilitates the growth of plants, increases their yield and improves the quality of crops or that, by their specific action, modifies soil fertility or its physical, chemical

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or biological characteristics, or the nutrition of plants when applied to foliage. This concept includes amendments, fertilizers and biofertilizers.

k) Bulk Fertilizer: The one who is transported and sold unpackaged, to which a label cannot adhere.

l) Fertilizer of heterogeneous composition: That fertilizer that has a conformation or combination of non-uniform elements.

(m) Fertilizer of homogeneous composition: That fertilizer that has a standardized and uniform formulation that can be reproduced with identical characteristics.

n) Formulator: Any natural or legal person engaged in the function, directly or through third parties, of proportionally mixing fertilizer elements or products or components of amendments, with or without the help of formulation aids.

o) Importer: A natural or legal person who legally introduces foreign fertilizers for use or consumption in the country.

p) Quality parameters: Chemical, physical, or biological properties that characterize a fertilizer, such as granulometry, solubility, hygroscopicity, pH and hardness.

q) Producer: Natural or legal person engaged in the function, directly or through third parties, of extracting or producing a fertilizer of natural origin.

r) Service: Agricultural and Livestock Service.

s) Holding: Possession or storage of fertilizers in a specific location for a certain time.

t) Traceability: Set of measures and procedures designed to check the composition and quality parameters of fertilizers throughout their life cycle.

u) User: Natural or legal person applying fertilizers for agricultural purposes, directly or through third parties.

Article 3.- The Service shall be responsible for monitoring and ensuring compliance with this law, its regulations, and other complementary provisions, and taking the necessary measures to implement it. The Service may, through a well-founded decision, prohibit the importation, manufacture, formulation, production, distribution, possession, and marketing of fertilizers which constitute a risk to human, animal, or plant health, without prejudice to the powers which assist the other bodies of the State Administration.

5.2.6.2 TITLE II of the obligation to declare

Article 4.- Producers, manufacturers, formulators, marketers, packers, importers and exporters of fertilizers and persons who use them for purposes other than agricultural use shall be registered in the Single National Register set out in Article 12. This registration must be made no later than 30 days, counted from the date of filing of the affidavit of initiation of

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activities with the Internal Revenue Service and will be carried out in accordance with the conditions and requirements established in the regulations. Natural or legal persons who by law are not required to make such a declaration may request directly from the Service their registration in the registers, for which they must indicate the destination they will give to the product. Persons referred to in this Article shall also be obliged to notify the Service of the change of their domiciles within 30 days of the occurrence of such acts.

Article 5.- The information provided to the Service under this law shall be safeguarded in accordance with the provisions of the legislation in force, without prejudice to the provisions of Law No. 19.628, on the Protection of Private Life and Law No. 20.285, on Access to Public Information.

3.6.3. TITLE III of quality, composition, and labelling parameters

Article 6.- Manufacturers, formulators, producers, marketers, packers, importers, and exporters of packaged fertilizers shall inform on their labels the centesimal composition of the nutrient and accompanying elements and, in addition, the quality parameters they contain, in accordance with the standards dictated by the Service. In particular, it should be noted the solubility of the compound and granulometry, the origin, the date of importation and the batch of the product. In the case of mixtures, made by the manufacturer, producer or importer, the label shall indicate the particular quality parameters of each of the fertilizers that make it up, in accordance with the nomenclature established by the Service through resolution. In the case of fertilizers marketed in bulk, whatever their composition or status, the information indicated in the above subparagraphs must be attached to the ballot, invoice, or dispatch guide of such products. The Service, through resolution, will determine the quality and composition parameters applicable to fertilizers marketed in the national territory and stipulate the shape, size, proportion, characteristics and content of the labels thereof, taking particular care that the information contained therein is permanent or indelible, clearly visible and easily understood for the population and in the Spanish language. In the case of fertilizers authorized by the Service for use in organic agriculture, the condition shall be indicated on its label. Labels may not include any mentions that do not correspond, or that are unequivocal or error-induced with respect to the origin, composition, quality parameters or other characteristics of the product. Without prejudice to the foregoing, the labels of fertilizers intended for export may be in line with the labelling requirements of the countries of destination.

Article 7.- Regarding fertilizers of homogeneous composition, they shall declare on the label the elements they contain and the conditions thereof, in accordance with the technical standards established by the Service by resolution. In the case of heterogeneous fertilizers in composition, such as those from extraction or deposit processes, they shall, in addition to the above subparagraph, ensure a minimum nutrient content and comply with quality parameter specifications, which must be indicated on the corresponding label or attached to the ballot, invoice or dispatch guide. The Service may determine the composition tolerance ranges and quality parameters applicable to each type of fertilizer.

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Article 8.- In order to ensure traceability of fertilizers, the Service shall, by resolution, determine the information of the national manufacturer or importer to contain the label or attach himself to the ballot, invoice or dispatch guide, without prejudice to the powers conferred on the other bodies of the State Administration in this matter.

5.2.6.4 TITLE IV of sampling and analysis

Article 9.- The Service shall, through resolution, regulate the sampling and analysis procedure for verification of the composition and quality parameters of fertilizers. In the case of imported fertilizers, the Service may dispense with the analysis where they have a certificate of composition and quality parameters, issued by the competent authority of the country of origin of the product. In cases where, in accordance with international conventions, the analysis is inappropriate, the Service may also dispense with it. Notwithstanding the foregoing, the Service may take samples intended to verify the composition and quality parameters of imported fertilizers in order to verify the veracity of the information contained in their respective certificates.

5.2.6.5 TITLE V of exports

Article 10.- For fertilizers for export purposes, the Service may, ex officio or at the request of a party, issue an over-the-counter certificate indicating composition and quality parameters. Such certificates shall be granted on the basis of analysis results issued by laboratories authorized by the Service or by the Laboratory of the National Customs Service. The analyses shall also comply with the rules laid down in this law, its rules of procedure and other supplementary provisions.

Article 11.- The Service may exempt products intended exclusively for export from compliance with certain requirements laid down in this law in order to comply with the requirements of foreign markets. Such adequacy shall be governed by the official rules of the country of destination.

5.2.6.6 TITLE VI of the registry

Article 12.- Create a Single National Register in which manufacturers, formulators, producers, marketers, packers, importers, and exporters of fertilizers shall register, which shall be administered by the Service. The Register shall govern for the entire national territory and shall be of public and permanent nature, without prejudice to laws No. 19.628 and 20.285. The regulation shall lay down the form, requirements and other conditions for the incorporation, suspension and disposal of natural and legal persons registered there.

5.2.6.7 TITLE VII of the audit and sanctions

Article 13.- The control of compliance with the provisions of this law and the decisions given for its implementation shall be the responsibility of the Service, without prejudice to the powers which assist the other bodies of the Administration of the State. The procedure for establishing sanctions imposed in connection with violations of this law and their amount shall comply with the provisions of paragraph IV of Title I of Law No. 18.755, which lays down rules on the Agricultural and Livestock Service.

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Article 14.- The Service may carry out inspections, audits and sampling in sufficient quantity for analysis at any time and place, and at any stage of the fertilizer life cycle, in order to verify that they comply with the standards laid down in this law, in the regulations and in the supplementary provisions. The sampling and analysis procedure shall be regulated in the regulation referred to in the second subparagraph of Article 1 of this Law.

Article 15.- The Service may, at the request of the interested parties, take samples of fertilizers acquired by users in order to verify their composition and quality parameters. If the fertilizer results in a composition other than that expressed on the label or in the information attached to the ballot, invoice or dispatch guide, the user shall have the right to sue, where appropriate, the payment of the corresponding compensation, in accordance with the general rules.

Article 16.- The following conduct constitutes offences likely to be punishable by fines for tax benefit:

(a) To omit any of the obligations set out in Article 4 of this law, which shall be punishable by a fine of 100 to 500 tax units per month.

b) Market or make available to users or intermediaries fertilizers that do not meet the requirements set out in Articles 6, 7 and 8, in the regulations and supplementary provisions of the Service, which shall be fined from 100 to 1,000 tax units per month.

c) Prevent or hinder any inspection, audit or sampling action by the Service, which shall be punishable by a fine of 3 to 100 tax units per month.

d) All other violations of the obligations contained in this law, in the regulations or supplementary provisions of the Service will be punished with a fine of 5 to 500 tax units per month. The range of the fine to be applied under the above literals will depend on the amount or value of the products committed to the infringement and, possibly, on the damage they cause to the user.

5.2.6.8 TITLE VIII modifications to other legal bodies

Article 17.- Introduce the following amendments to Decree Law No. 3.557, which lays down provisions on agricultural protection:

1. Replace Article 3(m) with the following text: "m) Biostimulants: Substance or mixture therein, microorganism or mixtures therein with substances, the main function of which, when applied to seeds, plants or the rhizosphere, stimulate natural processes to improve or promote nutrient absorption, nutrient efficiency, tolerance to biotic or abiotic stress or crop quality."

2. Replace the terms "Fertilizantes" in the statement in Title III and Paragraph 2 of that title with the term "Biostimulants".

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3. Replace Article 37 with the following: "Article 37.- The Service may, through a well-founded resolution, regulate, restrict or prohibit the importation, manufacture, formulation, production, distribution, export, tenure, marketing and application of biostimulants, without prejudice to the powers which assist the other bodies of the State Administration. In addition, by reasoned decision, the Service may order the retention or commissioning of prohibited biostimulants, as well as the destruction of these. The Service shall keep a public file up-to-date, detailing prohibited and restricted biostimulants.".

4. Break down Articles 38 to 41 of Paragraph 2 of Title III. Article 18.- Repeal Article 11 of decree with force of law No. 25 RRA, 1963, on Bonus and Trade in Fertilizers, Disinfectants and Pesticides.

Article 19.- Introduce the following amendments to Law No. 18.755, which Lays down Rules on the Agricultural and Livestock Service: 1. Modify Article 2 to replace the term "agricultural", the first time mentioned in its text, with "silvoagropecuario". 60 2. Modify Article 3o in the sense of incorporating in point (m), following the word "fertilizers", the expression ", biostimulants,". 3. Modify Article 13 as follows: (a) Incorporate the following second subparagraph, passing the current second and third subparagraphs, to be third and fourth subparagraphs, respectively: "Also, in the performance of their auditing duties, they may require and examine all documentation that relates to the activities subject to the control of the Service, such as books, invoices and dispatch guides, and may request from the audit the clarifications that are necessary to fulfill their task.".

b) Replace in the third subparagraph, which would pass fourth, the words "crime" with "guarantee".

4. Replace in the third subparagraph of Article 14a the sentence "and upon the informed authorization of the Regional Director of the Service, which may be granted by any means enabling its grant to be established." by the following: ", those to be ratified by the Regional Director by resolution.". 5. Modify Article 19, as follows: (a) Replace the sentence "shall be notified by means of documents containing the full copy of the resolution and the data necessary for its correct intelligence. These cards shall be left by an official of the Service at the address of the data subject or his representative, if he has it, leaving written testimony of his action.", by the following: "they shall be notified in accordance with the provisions of Paragraph 1 of Chapter III of Law No. 19.880, which establishes the basis of the Administrative Procedures governing the acts of the Bodies of the Administration of the State, or the one that replaces it.".

(b) Add the following second subparagraph: "Without prejudice to the foregoing, notifications may be made by e-mail, where the data subject has expressly stated in the procedure his willingness to be notified by this means.".

5.2.6.9 TRANSITORY PROVISIONS

Article one.

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- This law shall take effect one year after its publication in the Official Journal. The time limits, referred to in Article 4, to make the registration set out in its first subparagraph and the communication established in its second subparagraph, shall begin to run once this law enters into force.

Second article.

- The rules of procedure of this law shall be issued within one year of the publication of this law in the Official Journal and shall be signed by the Minister of Agriculture.

Third article.

- The largest tax expenditure represented by the application of this law in its first budget year of validity, will be financed from the budget of the Agricultural and Livestock Service, and whatever is missing, may be supplemented from the budget item of the Public Treasury. For the following years, it will be in line with the respective Budget Laws."

5.3 Conclusions regarding legislation in Chile

Among the main proposals raised by Decree Law 3557 on fertilizers, is to give the SAG greater powers to inspect and control the quality of fertilizers throughout the entire marketing chain (manufacturing, import, export, distribution, sale and possession) .

This will allow the farmer to make a better purchasing decision, by having relevant product information on the packaging and thus obtaining the best productive result.

This law is in its first constitutional process of the Chamber of Deputies, which was entered on November 13, 2018.

On the other hand, the new labeling regulations will allow farmers to have better quality fertilizers and labels where the necessary technical information is declared to allow them an adequate purchase decision.

The foregoing, given that currently the regulation is insufficient to address matters related to the quality parameters of fertilizers.

The new law that will govern fertilizers is part of the international trend to move towards cleaner and safer agriculture.

In this sense, through this regulation, efforts are being made to strengthen official controls, have relevant technical information on the products that are marketed in the country, and thus favor a better purchase decision by farmers along with promoting in practice a trade in better quality fertilizers.

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Regarding what the actors of the industry in general must do to comply with the new labelling regulations, the companies that produce, import and pack fertilizers must comply with the labelling regulations, regulated by the Service and label their products declaring in the containers all the information required by the regulations established by law.

For their part, farmers will obtain benefits, since in trade they will have better quality fertilizers and labels where all the technical information necessary to make the best purchase decision is declared.

6. Comparison study considering EU legislation and CELAC countries

6.1 Comparison between EU and Argentina:

In order to recognize the current state of the legal situation in Argentina and to be able to make a technical comparison with EU law, it is necessary to understand the above facts.

Law has a hard science component, as far as the technical legal issue is concerned; and a soft component, which is the philosophy and value that such law protects.

Drawing a parallel between two legal frameworks, in countries or regions with very different realities, histories or historical moments, and incomparable social values, is at least complex or partial if we do not analyse where we started from and what path we took to reach the current situation.

The progress made in environmental law and its application in Latin American countries since the Rio Conference shows a significant number of advances both in the development of environmental legislation and in its application, which must be described as positive for various reasons.

Many of the most important legal changes were made in the constitutional field. This implies that the necessary basis for the development of environmental legislation has been established and a set of duties have been imposed on legislators to act in this sense. At the same time, some constitutional provisions, which have the characteristic of being self-enforcing, have placed officials and judges in the situation of immediately enforcing their mandates.

The topic of conservation and sustainable use of natural resources has made new advances in the last decade of the 20th century in fields such as the conservation of biodiversity and other related matters: heritage and genetic resources, wildlife, protected natural areas, biotechnology and biosafety, natural disasters and others. Additionally, the Basic Laws of

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the last decade establish the constitutional basis for legislation on an increasingly important number of environmental issues: environmental impact assessment, environmental damage, transboundary movements of hazardous waste, protection of cultural heritage and many others. Environmental management issues have also come to occupy a space in the Constitutions of recent years, particularly the issue of social participation and the involvement of indigenous peoples and their communities.

The legal changes have usually been made in the direction and with the appropriate contents. In fact, the efforts made on a legal level have generally been aimed at providing our countries with the proper environmental legislation they require. This has been carried out, as it has been said, by means of the issuance of general laws or "framework" which incorporate principles of national environmental policy and establish the main instruments for its enforcement, as well as by means of the dictation of other regulations which are congruent with the need to establish the necessary integral legal framework for a modern environmental management.

Consequently, the first conclusion that can be drawn from the above is that we are in the presence of a few particularly fruitful years in terms of the development of environmental legislation and its application in Latin America and especially in Argentina. The second conclusion is that the Rio Conference has directly or indirectly had a major influence on the development of environmental legislation and its application in the countries of the region.

With regard to the progress made in the development of environmental law and its application in Latin America, it has become clear that these advances have been unequal among the countries of the region, with marked differences between them, which do not always coincide with their different levels of relative development.

Another important consideration that qualifies the general conclusion on the importance of the development of environmental legislation and its enforcement in the region is the numerous provisions that have been incorporated in recent years and that require further provisions in order to be enforced. In fact, there are legal rules that are self-enforcing, that is, they can be enforced without the need for others to complement them for that purpose. However, there are also legal rules that are not self-executing, since their implementation requires other rules to make them possible. This happens with several constitutional rules and, when it comes to environmental law, with most of the provisions contained in the laws that make up that sector of the national legal systems, to the extent that they require regulations and technical standards for their application. That is why one of the endemic reasons for the inefficiency of environmental law is precisely the lack of autonomous development of its provisions, which determines their inefficiency.

The expectations for sustainable development that these constitutional changes have created and, in general, the changes they have promoted in the field of environmental legislation and its application continue to be in a significant proportion, just expectations. No one is unaware that the transition towards an environmentally sustainable society is long

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and difficult, especially when it comes to developing countries. These legal changes, which in a state governed by the rule of law are necessary but not sufficient to initiate this transit, must be welcomed. But they cannot remain on a purely programmatic level at the risk of being discredited and considered by society, with some reason, as mere stratagems to postpone effective decision-making to combat a situation of environmental degradation that has become unsustainable. It is the responsibility of the legislators in each country to comply with the mandates established in their respective Constitutions by passing the corresponding laws. This also applies to the general or "framework" laws issued in recent years, as well as to those enacted in previous decades, with respect to provisions that are not self-executing and have not been regulated, and the technical standards that are necessary to put them into practice. In this case, it is up to the Executive to issue the regulations and technical standards required for this purpose.

Another consideration that should be borne in mind to complete the general conclusion on the importance of the development of environmental legislation and its enforcement in the region points to the fact that, beyond their developmental problems, in many countries there remain others that conspire against their efficiency and effectiveness; that is, against what the Conference called "effectiveness" of environmental legislation. In fact, the progress made in Latin America and Argentina in terms of environmental law enforcement is relative, as it generally refers only to certain countries or to certain issues. On the other hand, in almost all cases there are still problems of inefficiency, such as the scarce or incipient presence of the idea of sustainable development in economic legislation, even in countries where this idea has been constitutionally enshrined. This is even reflected in government practices, which, when facing the recurrent crises that Latin American countries, and especially Argentina, continue to confuse the urgent with the important and postpone sustainable development for better times.

Another problem of inefficiency that is still very much present in Argentina is the voluntarism with which some environmental problems are combated due to the insufficient or mistaken consideration of the social causes that are present in their generation. Among other consequences, this means that even some of the addressees of a given legal norm are unable or limited to comply with it for reasons beyond their control, which poses problems that cannot be ignored. Some of them affect people whose precarious economic and social situation leads them to violate rules established for the conservation of natural resources, while others reach out to companies that are in a very complex situation that does not allow them to observe imported criteria that have not been adapted to local reality.

This problem of inefficiency is often compounded by the lack of mechanisms necessary for the enforcement of environmental legislation or the inadequacy of available mechanisms. In fact, it is common that there is a close relationship between the social inadequacy of the legal-environmental rule and the mechanisms foreseen for its enforcement, because the lack of consideration of the social survey that is indispensable to take into account to properly regulate a certain environmental situation, leads to the emphasis on corrective

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mechanisms rather than preventive ones, without establishing provisions to remove the causes that generate undesirable environmental situations. These inadequacies or disconnections determine that the respective norms are not complied with and that sanctions are not applied either, since in the end, the merely repressive treatment of certain conducts is only effective to correct individual deviations and not massive deviations from the established legal order, such as those that most frequently endanger the environment.

Administrative enforcement of environmental legislation is still a very important component of environmental management. In recent years, the mandates given to the administration to ensure the enforcement of environmental legislation have continued to grow. This increase in the functions of the environmental administration has not been accompanied, in most cases, by the allocation of the human, technical and financial resources necessary to inspect and monitor the enforcement of environmental legislation, within an unavoidable reorganization of environmental management that allows it to act in a more efficient and effective way. The fact is that where these resources have been granted, some satisfactory results have been achieved which go beyond the imposition of the respective sanctions and extend to the achievement of better levels of compliance with the corresponding provisions. However, it has been normal that human, technical and financial resources have not been allocated to carry out the tasks that the law entrusts to the agencies in charge of the administrative enforcement of environmental legislation, tasks that are based on the inspection and surveillance functions.

These administrative shortcomings, which are common to many countries in the region, lead to the conclusion, as stated in Mexico, that the conservation of natural ecosystems "cannot be achieved through the exclusive use of the administrative inspection and surveillance mechanism", even if this mechanism is strengthened by other measures. To that end, it will be necessary to use "a very broad set of management instruments" that promote sustainable management of natural resources and help prevent the occurrence of illegal activities. This is the extraordinary importance of methods to ensure spontaneous compliance with environmental legislation, including campaigns to publicize the existence of this legislative framework and to internalize the social values protected by this legislation among the population, thus generating social support. These types of measures can significantly reduce the occurrence of environmental crimes and facilitate their punishment.

The modest economic growth of recent decades has not meant progress for the less favoured sectors of the population either: the population surviving on less than a dollar a day has increased considerably, which has meant many inhabitants living or experiencing extreme poverty. In countries with economic growth such as Argentina, Brazil and Chile, income inequality increased in absolute terms. In short, the region was among the most unequal in the world in terms of income: in many countries the poorest 10 percent have less than 5 percent of the income of the richest 10 percent. The international economic system that favours sustainable development is an increasingly distant goal for the countries of Latin America, and in particular for Argentina. On the contrary, recent years have been

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characterised in that region by recurrent crises that highlight the extreme vulnerability of the regional economy, especially in the financial field. These crises, among other effects, have generated enormous difficulties in halting and reversing environmental deterioration.

The development of a more advanced stage of environmental legislation and its enforcement in Latin America is far from over. Perhaps it would be more accurate to say that we are witnessing the beginning of a process which is aimed at this objective and which, in the years following the Rio Conference, has shown an interesting dynamic which needs to be continued. It is therefore necessary to draw up a legislative agenda for the coming years which will reconfirm the directions to be followed and make explicit the legal tasks to be carried out. These tasks consist, in short, of a generalization of the changes that have been made to all the countries in the region and to all sectors of their environmental legislation, paying special attention to the mechanisms for the application of these changes and a correct adaptation of the norm to the synergy and local reality.

However, it should not be lost sight of the fact that while all Latin American countries - without exception - have legal tasks to perform, the magnitude of those tasks may, however, differ greatly from country to country. The effort made to establish an adequate legal framework for environmental management in Argentina must be guided by certain considerations which guarantee its "effectiveness". These can be summarized by saying, firstly, that it is necessary for legal changes to take into account the historical specificities of the societies in which they are inserted, including the specificities of their legal systems and the local legal culture from which they derive, and secondly, that legal changes must respond to environmental policy principles which take into consideration appropriate social and economic criteria in accordance with their own reality. The effectiveness of environmental legislation is closely linked to the technical support that Argentina needs to have a truly effective environmental law. International cooperation in these fields must be a basic component of the legislative agenda in the coming years. The effectiveness of environmental legislation is also closely linked to the development of the country's own legal culture, which is ultimately what guarantees a true incorporation of new ideas into the legal systems and their effective enforcement within each society.

In the development of environmental legislation, there are particularly notorious delays in terms of land use planning and economic instruments, particularly in the regulation of civil liability for environmental damage. http://www.saij.gob.ar/doctrina/dasa050092-quaglia-dano_ambiental.htm

The same applies to the legal implementation of the Convention on Biological Diversity, whose numerous and complex mandates involve the review and adaptation of almost all the nature law in force in each country. Indeed, the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the use of genetic resources - which are the objectives of that Convention - are still awaiting regulations on the subject, particularly with regard to access to genetic resources.

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Even the few biodiversity laws that have been enacted in recent years do not regulate these issues in a complete, clear and consistent manner

A separate call for attention must be made to the need to finish regulating biosafety, not only to implement the recent Biosafety Protocol, but also to give it the regulation it needs on all biosafety issues. On the way to protecting biological diversity as a value in itself, i.e. all species and all ecosystems, the provisions on all components of nature - water, soil, wildlife, forests and jungles - must be verified, as well as moving towards the establishment of special systems to protect fragile ecosystems and marine ecosystems.

The protection of the atmosphere is another legislative task to be undertaken. https://www.argentina.gob.ar/sites/default/files/completo-compressed.pdf

There is an urgent need to improve the legal rules on air pollution control and prevention and their implementation, especially in the megalopolises whose growing number is creating serious environmental problems. But it is also urgent to build up national legislation on climate change in line with the ultimate objective of the United Nations Framework Convention on Climate Change and the Kyoto Protocol, which refers to stabilising greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system.

Monitoring of all these issues is urgent and cannot be delayed. It is already many years of misguided policies in the name of a development that has not been such, which have led to the threshold of a point of no return, such as a widespread environmental crisis. Argentina has a truly extraordinary endowment of natural resources, on which its development depends; it is a country with great biodiversity, fresh water reserves, and productive land, the disappearance or contamination of which would jeopardise the future of locals and neighbours. Some changes that are favourable to the environment are being counteracted by new problems, which have to do with the processes of globalisation of the economy and environmental issues themselves. In addition, there are still many old problems that are linked to unsustainable modes of production and consumption. All this makes for a rather discouraging picture. The important thing is to always bear in mind that none of these phenomena are the result of the natural evolution of societies, but rather the consequence of human decisions and, therefore, social facts that can be counteracted with political measures, on a scale that corresponds to the seriousness of the situation.

In this process of improvement, as in any social change, the law has a very important function to fulfil; for which it will be necessary for us jurists to provide the collaboration that can reasonably be expected from its professionals, which will be achieved by keeping our minds open not only to understanding the complex facts that make up the environmental fabric of our societies, but also to renewing the legal ideas that are necessary to face new situations. It is quite possible that one of the great transformations of modern law in the 21st

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century is represented by what towards the end of the last century began to emerge as the law for sustainable development.

In this field the law not only regulates the quality of life or access to information of the population; it also overlaps, and coordinates issues related to international trade in an increasingly globalised market.

In this direction, the concept of the "environmental label" has been incorporated, being a brand increasingly appreciated by producers and exporters: a concept that arises in the European nations at the end of the 70s. With the passing of time, the interest in obtaining this label has increased, and not only for ecological purposes. The increasingly strict sustainability requirements for importing products and goods, both in terms of production processes and the polluting emissions they generate up to their destination, end up erecting "green barriers" that will make it increasingly difficult for those who do not comply with them to access markets.

For example, during the year 2020, several British chains threatened Brazil with a boycott of their products if a law is passed that would cause further deforestation in the Amazon rainforest.

Sustainable production is the result between the political decision and the investment groups, since it does not only refer to ordering changes, but to generating consensus, under the risk of not generating adhesion and that the norm is inapplicable or not observed.

In this respect Argentina lags far behind, even compared with other countries in the region such as Brazil, Chile, and Colombia, although it is true that some of these countries' governments have experienced a certain decline. A process of harmonisation between an environmentally friendly economy and the urgent needs of the developing country must be achieved. In Argentina's case, the many issues that still need to be addressed create endless opportunities.

If Argentina does not make the necessary changes by adapting its agricultural and agro-industrial production, it could have problems in its exports; since in a not too long term the environmental label will be one of the main barriers for international trade. In fact, when the Mercosur-European Union agreement was announced, France and the Netherlands raised doubts because the environmental parameters between South American and European production were not the same.

This could become an issue in our region as well. http://revistadivulgatio.web.unq.edu.ar/entradas-ejemplares/barreras-comerciales-basadas-en-requisitos-y-normas-ambientales-analisis-de-la-medicion-de-la-huella-de-carbono-y-su-posible-impacto-sobre-la-exportacion-de-alimentos-hacia-la-union-europea/

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Failure to comply with such premises could mean the application of barriers to tariffs for not demonstrating sustainable water management, energy consumption, waste recycling, or even sustaining a tax based on carbon footprint. As an example we can see the economic recovery plan announced in the midst of the EU pandemic of one trillion euros based on environmentally friendly mechanisms that do not generate greenhouse gases; it seems logical then, that it would demand that what is imported is also produced with the environment in mind. Argentinean companies that realise this, and work towards this, will have a competitive advantage in the future. Such a situation will occur in all product areas, since the focal point is the production process per se with all the areas involved. For example, transport, and Argentina has a problem with its matrix of routes caused by the dismantling of the railway network that are considered more energy efficient and less aggressive to the environment. The same goes for transoceanic transport and airlines.

Of all the group of businessmen in various fields, those who observe these issues most are the agricultural producers, although in this area there is a quantity of legislation that has been developed according to each theme, which has generated what we could call regulatory inflation with laws that contradict or overlap, are useless or counterproductive. There is a need to develop a consistent and integrated strategy within an overall vision. https://www.grupogpps.org/wp-content/uploads/2017/09/Las_dos_caras_de_Jano.pdf.

In the EU, unlike institutional provisions and trade, agricultural and transport policies, which were the only ones that can be described as "common" and original, environmental policies were not included in the 1957 Treaty of Rome. The Treaty made no direct or indirect mention of the environment and only appeared as a Community concern in the first half of the 1970s (many years before Argentina), with the formulation of Environmental Policy (EP) programmes and the development of environmental legislation. Thus, at the Paris Summit in July 1972 it was recognized that special attention should be paid to the environment and the first Environmental Programme for the period 1973-1976 was adopted.

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The AP cemented its initial legal authority from Articles 100 and 235 of the Merger Treaty or Treaty of Brussels, which gives rise to the name European Economic Community (EEC/EC). Article 100 allowed all kinds of technical characteristics to be laid down for all kinds of products by means of directives, and Article 235 stated that "If action by the Community should prove necessary to attain the objectives of the common market, one of the objectives of the Community, and this Treaty has not provided the necessary powers, the Council shall (...) take the appropriate measures". This made it possible to harmonize and approve the first programmes which led to a European environment policy later on. The Single European Act filled this constitutional gap with three articles in Title VII on the environment. However, the Act did not agree for the AP to incorporate the system of co-decision between Parliament and the Council. This was left to the governments with regard to negotiation and environmental action as "Community policy". It highlights actions in which the Community will participate by basing them on the principles of the polluter pays, prevention and remediation, and that such action should preferably take place at the source of environmental damage. It also states that it will be a component of other policies. It also affirms the principle of subsidiarity, stressing that it will act only to the extent that the objectives can be better achieved at Community level. It also incorporates the operational legal basis which provides for Council decisions to be taken unanimously after consulting Parliament and the Economic and Social Committee.

In summary, the programmes initially took the form of Council resolutions which were not legally binding and were considered to be indicative or suggestions; and since the Single European Act, environmental decisions are prepared and adopted in the Council, although the procedure for taking them and acting on them remains highly intergovernmental. As regards the development of the programmes, the EC adopted the First Environmental Action Programme in 1973 and continued to adopt them every five years until 1992, when the deadlines were extended.

Several programmes have been approved and as the programmes progress and achieve objectives, priority areas of focus are refined and adjusted. Amongst these, the fifth programme was devoted to the reduction of pollution levels, the implementation of common environmental legislation for the benefit of all EU citizens and the integration of the environmental dimension into all Commission policies. The subsequent programme would change the five strategic areas of 1993 (industry, energy, transport, agriculture, and tourism) into four priority areas of attention, namely: climate change, nature and biodiversity, environment and health, and natural resource and waste management.

The measures taken are along the same lines, and new measures have been refined, improved, and enriched. They began with the negotiation of water purity to be used for specific purposes; they continued with air pollution, sonic pollution, wildlife, pollution prevention and now have standards and policies for: air quality, water, chemical waste, environmental accidents and civil protection, transboundary pollution and neighbouring

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countries, health, industry and technology, land use, noise pollution, hazardous chemicals, biotechnology, climate change, environmental economics, international issues, biodiversity, sustainable development, soil pollution, and waste pollution.

The diversity of issues and the detail with which decisions and resolutions are negotiated, which is evident in the text of these, shows the differences in the conceptions and environmental policies of the Member States, which generates difficulties in reaching consensus. It must reconcile the resources available for making major changes to the productive systems of the member countries with the compatibility of the AP with other policies and the central objective of the Union's economic growth. For example, in the case of water purity, which was one of the first Community programmes, different points of view were put forward; the majority of members considered that the way to control water purity was by controlling the waste sent into the water and setting emission standards, while the United Kingdom sought a qualitative objective and started by defining what water really was. The end result was a compromise that elaborated equivalencies between the two and methods of measurement.

The Lisbon commitment of 2000 succeeded in bringing social, environmental, and economic issues together in the EU. The European Council in Lisbon drew up a 10-year plan to make the Union more competitive, including AP in the regulations and policies for agriculture, employment, development, energy, enterprise, fisheries, research, transport, economy and financial affairs. Thus, for example, in agriculture, agro-ecological payments have been agreed on reference level and "good agricultural practice" applied at sufficient levels of scale and intensity and targeted at an appropriate level of management, while eliminating subsidies to environmentally unsustainable activities or crops. Without prejudice to this, the 6th Environmental Programme has been the most strategic programme known, because it involves the participation and responsibility of all social sectors to adopt innovative, viable and sustainable solutions to environmental problems. With regard to foreign policy on the environment, the EU has been negotiating and evaluating the possible environmental, social and economic impacts of a trade agreement, and in this sense the trade agreements with Chile and Mexico incorporate the issue of environmental sustainability. In this sense, there is articulation with the guidelines of the WTO, multilateral organisations, and world forums on the environment.

In the analysis of the comparative law between Argentina and the EU, it is impossible to avoid what is established through the Mercosur bloc; an economic bloc of which Argentina is a member.

Mercosur has included AP since its inception in the recitals of the Treaty of Asunción (1991) which created the common market. This sets out the understanding that an AP "must be achieved by making the most efficient use of available resources, preserving the environment, improving physical interconnections...", and Article 1 of the Treaty, while not explicitly mentioning the environment, states "the commitment of the parties to harmonize legislation in the relevant areas", so it can be assumed that the environment is incorporated

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in the founding treaties. It is reasonable that the issue of the environment be included in the Treaty establishing Mercosur, since this organization was created in the nineties of the 20th century when this issue was already gaining global relevance. However, strangely enough, the text of the Treaty or the additional protocols makes no other mention of the environment.

The evolution of environmental policy seemed to have a firm basis because, recently instituted by Mercosur, the Specialized Meeting on the Environment (REMA) was created in 1992 by Resolution Mercosur/GMC/Res N° 22/92, with the aim of "analysing the legislation in force in the State Parties and proposing actions to be taken in the different areas in order to protect the Environment". In 1994 a resolution was approved with the fundamental directives of environmental policy with the aim of harmonizing environmental legislation in the Mercosur countries. Despite this progress, doubts or hesitations were beginning to emerge regarding the depth of the environmental commitment, since the same text emphasizes that harmonization "does not imply the establishment of a single legislation" (Annex to Resolution Mercosur/GMC/Res N° 10/94).

Environmental policy did not make great legislative progress until 2001, when it was agreed to create the Mercosur Framework Agreement on the Environment, which reaffirms the commitment of the Member States to the 1992 Rio de Janeiro Declaration on Environment and Development and establishes as its objective "sustainable development and environmental protection, through the articulation of economic, social and environmental dimensions". However, the Agreement proved to be considerably less expansive than the original 1996 version of the protocol. The final Agreement provides for cooperation on ten points, among which are the enforcement of international agreements, which may include the adoption of common policies, the exchange of information on national positions in international fora, the exchange of information on national laws, the harmonization of national legislation, the encouragement of national policies and instruments, the encouragement of scientific research and the development of clean technologies, the promotion of the use of economic instruments to support the implementation of sustainable development policies, the provision of timely information on environmental disasters and emergencies, and the promotion of environmental education. The thematic areas of the Agreement are: sustainable management of natural resources, quality of life and environmental planning, environmental policy instruments and environmentally sustainable productive activities. And, in turn, each thematic area is subdivided into more specific aspects, such as water, air, soil, among others. This shows the diversity of topics and environmental resolutions or agreements that can be reached. More recently, in 2007, the Summit of Environment Ministers highlighted the adoption of common measures on air quality, clean production, combating desertification, climate change and protection of the ozone layer for the entire region. Despite being a highly intergovernmental agreement and the weakness of the collective commitment, individual Mercosur countries, especially Brazil and Argentina, are aware of the importance of the environment as a necessity for life and development.

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Several legal analysts highlight Brazil, Argentina, and Chile as the countries with the largest number of environmental studies, although the number of studies does not necessarily lead to a common environmental policy in or between Mercosur countries. Other legal analysts highlight the conflictive nature of the administration of shared natural resources between Mercosur countries and emphasise that this is one of the aspects that has delayed the construction of a common environmental policy. Among them, hydroelectric projects are cited as one of the issues that have caused the greatest difficulty in relations between the countries, as they were marked by the military and geopolitical rivalry between Brazil and Argentina that was characteristically visible in the years prior to Mercosur. A recent example of the difficulty of reaching agreements or settling environmental disputes is the installation of the paper mills on the Uruguayan side of the river Uruguay. The installation of the paper mills on the banks of a shared river has led to a political and legal dispute between Argentina and Uruguay, which indirectly affects the Mercosur AP.

Around 2005, Argentina decided to file a complaint about the pollution of the river before the International Court of Justice in The Hague, alleging environmental damage that also affects the communities on its riverbank. Argentina based its claim on the 1975 Statute of the Uruguay River, bypassing all Mercosur dispute settlement mechanisms. Uruguay, on the other hand, raised its claim in the Mercosur dispute settlement system, a situation that, although derived from the environment, was not presented as an environmental problem, since Uruguay based its claim on the fact that the protests made by Argentines at the international border limited the free circulation agreed in the Treaty of Asunción, moving the axis of the dispute away from environmental issues. On this point, several authors find that since the establishment of Mercosur, countries have incorporated national legislation and increased environmental protection in each of their countries, but that such progress is not directly linked to the fact of being a member of Mercosur, but is linked to their participation in other environmental commitments of a multilateral nature.

In all the experiences reviewed, we can observe the scarce formal or informal participation of civil society in each experience of integration in the environmental field, in contrast to the importance that environmentalist organizations such as the Commission on Sustainable Development (CSD), the United Nations Environment Programme (UNDP) and the Global Environment Facility have acquired, as well as non-governmental organizations such as Acción Ecologista, Greenpeace, Friends of the Earth and Ecologistas en Acción, among others that have achieved international renown.

In the case of the EU, Greenpeace has organised itself as a political party and is represented in the European Parliament. Greenpeace chose to use this formal mechanism, giving a political approach to the issue from a global European perspective, both within the EU institutions and in the member countries, and does not behave as a purely intra-EU representation of civil society. In the Andean Community of Nations or Mercosur, there is no participation by civil society organised at a high level around the environmental issue,

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which proposes an agenda in the common policy by dictating guidelines that respect the environment and sustainable development within the framework of these organisations.

The strong NGO involvement, typical of the 1990s, has been declining over time. In the case of Mercosur, the ECO Foundation has been the most continuous participant, but on several occasions, it cannot even participate as an observer, as the group's discussions are increasingly private or directly inaccessible. The Eco Foundation is the only non-governmental environmental foundation created on its own initiative to accompany the Mercosur process.

The differences are evident in the views of the AP in each case. The EU has advanced and developed an AP of environmental competitiveness, animal protection and forestry to limit or prevent the increase of pollution rates in the Union, while it expresses environmental standards linked to trade with the rest of the world as mentioned above.

This circumstance highlights the antinomies in the visions of each member country, as well as its role in its role as a shaper of trade-related environmental policies. The Andean Community of Nations focuses on biodiversity or the protection of genetic resources and the food issue, while Mercosur focuses on sustainable development and environmental protection. These two visions show a duality of positions and realities: important resources of the biosphere are conserved which are considered valuable in the interrelationship with other actors, including the Community partners, and in parallel there is a need to exploit these resources to increase the standards and quality of life of its inhabitants. Clearly the situation creates an environmental economy dilemma.

In the trade and environment relationship, the CAN and Mercosur are located as receiving agents of policies and subject to the environmental rules of the EU and global and multilateral organizations, so they have not focused on establishing a common environmental base tailored to their needs and realities. The exception is the commitment to request resources for environmental studies, financed by international organizations, which serve to gather information and eventually allow a realistic picture on which to draw the few formal control activities.

From a foundational point of view, the EU and Mercosur were born at different times and with different scenarios, reaching different degrees of maturity according to the political will and the management of the asymmetries of the member countries.

In this way the EU formed a true customs union, while Mercosur for the moment, is a union of countries that maintain their customs among themselves and work towards a common objective according to the area. The above-mentioned beginning and the political will, together with the contribution of resources from each of the member states to be administered supranationally in pursuit of the common objective of preserving the environment by generating policies and practices that allow for the development of

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sustainable production, have placed the EU in a space that is superior to any other country or economic block in the world.

In Argentina, the adaptation plan in the constitutional reform of 1994 incorporated in the Magna Carta the idea of preserving the environment in a direct way, as well as the need to protect natural resources and generate a sustainable productive system; creating the fundamental rights of preservation, access to an environmentally dignified life, of quality, and eco-sustainability.

This change was reflected in the number of laws that, based on constitutional precepts, regulated different issues from a sustainability perspective.

The focus was no longer just on production, but on producing with a vision that would allow the production process to be repeated in the most environmentally friendly way to achieve sustainability of the process.

From the legal point of view, Argentina has a number of laws that regulate the care of the environment, as well as sustainable production processes, including agricultural and livestock farming.

The problem is that these laws have emerged specifically for the regulation of an isolated issue, with little interrelationship between them generating an overlap between them, and in other cases leaving legal gaps, as it is not a comprehensive approach; but even so there is sufficient legislation to apply in this area.

In the EU, the determination of a supranational body has encouraged those Member States which had been lagging behind in the implementation of certain precautionary or care measures in the production processes to generate sustainable actions, providing them with the regulatory framework and, in many cases, the necessary funds to generate the necessary adaptation plans and controls.

The agricultural plan in the EU has been, due to a territorial issue, of an intensive nature; the treatment of waste, pollution, effluent treatment, and other issues must be verified to a lesser or greater extent due to its proximity to large cities and the public awareness that these farms generate.

In Argentina the traditional agricultural and livestock model has always been extensive, due to the overabundance of territory and natural resources. In that map, the productive processes have been developed far from the big cities, protected by large extensions of land, which has not generated urgencies in terms of environmental regulations.

If we add to that the large distances, historically centralized political power, and smaller economic resources, we can understand the discrepancies between the European and Argentine legal framework.

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Although Argentina is a country rich in natural resources, its control structure and the resources allocated for management and control are limited, since its issues do not have a daily impact on large cities.

Nevertheless, globalisation has generated a change in the awareness of the populations, and from the EU agro-trade policy the will for sustainability has been spilled over to many other countries. Argentina has not been the exception, and is currently working on adaptations, pushed by international pressures that demand not only an organic product, but a dignified process that respects the environment in order to achieve sustainable development.

There is also endogenous pressure from the population itself to address and control issues such as water pollution due to the lack of effluent treatment, land pollution due to the lack of control and subsequent waste treatment, or direct pollution caused by agrochemicals such as glyphosate. Although in Argentina it is a common treatment, social pressure due to the amount of studies on its carcinogenic effects is driving a change of vision and eventually a legislative change; as it has been happening in the EU where its authorization of use has been renewed until 2022 where it will be checked again, or in certain countries with the Czech Republic, Italy and the Netherlands who have restricted its use.

The law, as we said at the beginning of this activity, generally comes to regulate something that is already installed as a social value. The legal framework, although perfectible, is given. What remains is to audit that these norms are being complied with and that those who do not observe them have the exemplary sanction that educates the rest of the participating agents.

6.2 Comparison between EU and Chile

In Chile, there is the Decree Law No. 3,557 / 1981 that establishes provisions on agricultural protection of the Ministry of Agriculture in Title III paragraph II on fertilizers states: Article 38.- The fertilizers that are sold packaged must indicate on the container or on a special label, in indelibly, the centesimal composition of the product they contain. In the case of solid products that are sold in bulk, the centesimal composition of the same must be indicated in the corresponding tickets, invoices, or dispatch guides.

Regarding EU: Regulation (EC) No. 2003/2003 of the European Parliament and of the Council of October 13, 2003 regarding fertilizers indicates the information that fertilizer labels must contain. The following is the content of the label:

a) Mandatory identification

- The expression "CE FERTILIZER" in capital letters.

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- Type of fertilizer (example: calcium nitrate, triple superphosphate, etc.).

- The mention "of mixture" after the designation of the type.

- Additional indications (identification of the type of fertilizer, identification when it has micronutrients and its name, declared content in percentage of mass).

- The indication of the nutrients will be made both in their literal name and with their chemical symbol, for example: nitrogen (N), phosphorus (P), phosphorous pentoxide (P2O5), potassium (K), potassium oxide (K2O) , calcium (Ca), calcium oxide (CaO), magnesium (Mg), magnesium oxide (MgO), sodium (Na), sodium oxide (Na2O), sulphur (S), sulphur trioxide (SO3), boron (B), copper (Cu), cobalt (Co), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn).

- When the fertilizer contains micronutrients, totally or partially chemically bound to an organic molecule, the name of the micronutrient must be followed by one of the following qualifiers:

i) "chelated by"

ii) "complexed by"

- The micronutrients contained in the fertilizer, which will be listed in alphabetical order of their chemical symbols: B, Co, Cu, Fe, Mn, Mo, Zn.

- The specific instructions for use for the products - The indication of the quantity in liquid fertilizers, expressed by mass. The indication of the quantity in liquid fertilizers expressed in volume or in the equivalent of the mass in relation to the volume (kilograms per hectoliter or grams per liter) will be optional.

- Net or gross mass and, optionally, volume in the case of liquid fertilizers. If the gross mass is indicated, the tare mass must be indicated next to it.

- The name or company name and the address of the manufacturer.

b) Optional identification - Identification in accordance with the regulations

- The storage and handling instructions - Indications of the doses and conditions of use indicated for the conditions of the soil and the crop in which the fertilizer will be used.

- The manufacturer's brand and the commercial name of the product. In the case of packaged fertilizers, these indications must be printed on the container or label. In the case of bulk fertilizers, the indications will be in the accompanying document (Art. 7).

Finally, article 10 states:

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1. The labels or indications printed on the container, with the aforementioned information, in a clearly visible place. The labels should be attached to the container or its closure system. If the closing system consists of a seal, it must bear the name or brand of the packer.

2. The labelling (...) must be and remain indelible and clearly legible.

3. In the case of bulk fertilizers (...), the merchandise must be accompanied by a copy of the documents containing the identifications. This copy of the documents must be accessible to the control bodies.

7. General conclusions

In the EU the 2003/2003 regulation will be repealed by the 2019/1009 regulation to allow harmonisation between Member States by having a compliance criterion that sets out the safety and quality specifications required for a product to be on the free market. The new regulation will additionally cover products such as organic and organo-mineral fertilisers, soil improvers, inhibitors, plant biostimulants, growing media or blends which are not covered under the 2003/2003 regulation and allow them to be on the open market. The 2019/1009 regulation introduces limits for toxic contaminants such as cadmium. It is the first of its type and will allow for a high level of soil protection and reduce environmental and health related risks. National legislations within the Member States cover fertiliser products which were not covered under the 2003/2003 regulation. Most Member States participating in the FERTIMANURE project have specific rules on the maximum limit of certain substances such as nitrogen and phosphorous. The 2019/1009 regulation is intended to bridge the gaps between EU and national legislation. Whilst many Member States will continue to enforce their existing national legislation, the 2019/1009 regulation could reduce the need for additional national legislation and an increased harmonisation across the EU.

In Argentina, the national legal framework is of a generic nature regarding environmental impact. No general regulations at national or provincial level exist when it comes to the management of intensive animal production and there is no law concerning the handling of excreta and slurry. Municipal regulations dictate the rules for the authorisation of livestock activities.

In Chile, the proposals made by Decree Law 3557 on fertilisers which is in its first constitutional process of the Chamber of Deputies, give the SAG greater powers to inspect and control the quality of fertilisers throughout the entire marketing process. By having relevant product information on the packaging will allow farmers to make an informed decision when purchasing fertilisers to yield the best results and therefore have better quality fertilisers and labels with the necessary technical information available.

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The need for sustainable agriculture is becoming more apparent due to climate change and therefore a shift to sustainable and better-quality fertilisers is needed. These new laws and regulations in the EU, Argentina and Chile where certain toxic contaminants are banned and proper labelling of products is mandatory will enable farmers to make better informed decisions on which fertilisers to use on their land.

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ANNEX 1: Resolution 410/2018 amending Resolution 97/2001

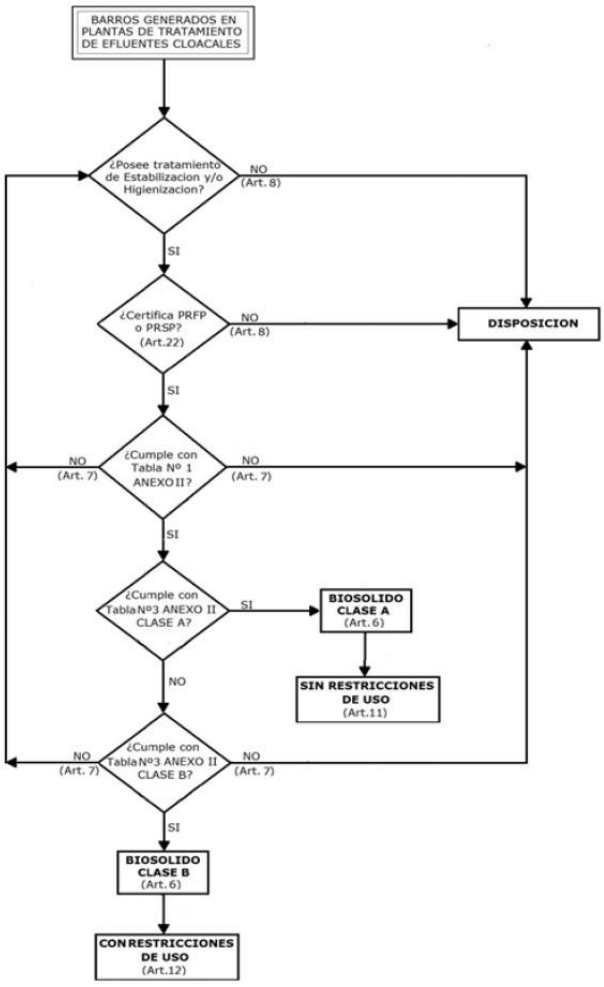

Figure 1: Flow chart

STABILIZATION. VECTOR ATTRACTION REDUCTION

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INDICADOR *	MÉTODO ANALÍTICO	VALOR DE REFERENCIA
Reducción de Sólidos volátiles (SV)**	Método SM 2540 G	SV > 38%
ó		
Deflexión de Oxígeno (DO) ***	Método SM 2710 B	DO < 1.5 mg O2/hr/g ST

Table 1. Reference Values

(*) For other indicators to determine vector attraction reduction, see EPA 503 CFR 40 Control of Pathogens and Vector Attraction in Sewage Sludge. Chapter 8 and Appendices C and D.
(**) To calculate the difference in Volatile Solids Reduction, the time before and after the chosen treatment should be considered as measurement points (ANNEX III).
(***) The Oxygen Deflection must be measured after the chosen treatment (ANNEX III)

PARÁMETRO	MÉTODOS ANALÍTICOS	MÉTODOS DE DIGESTIÓN	VALOR DE REFERENCIA (mg/kg materia seca)
Arsénico			75
Cadmio			40
zinc			4000
Cobre			1750
Cromo Total			1500
Mercurio			25
Níquel			400
Plomo	Método SM 3112 B, 3113 B; 3114 B; 3120 B; 3125 B Método EPA 200.7; 200.8; 200.9	Método EPA 3050 A; 3050 B; 3051 A	1200

Table 2. Concentration of Potentially Toxic Elements in Biosolids

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PARÁMETRO	MÉTODO DE DETERMINACIÓN	BIOSÓLIDOS CLASE A	BIOSÓLIDOS CLASE B
Coliformes fecales	Método SM 9221 E; 9222 D	< 1000 NMP/g MS	< 2.000.000 NMP/g MS
Salmonella	Método SM 9260 D	< 3 NMP/4 g MS	

Table 3. Level of Pathogens in Biosolids. Classification

Cantidad de barros generados (Tn/Año base seca)	Periodicidad	Parámetros a determinar
Menor que 300	Anual	Tablas N° 1, 2 y 3 ANEXO II
Igual o mayor que 300 y menor que 1.500	Trimestral	
Igual o mayor que 1.500 y menor que 15.000	Bimestral	
Igual o mayor que 15.000	Mensual	

Table 4. Biosolids Sampling Frequency

Note: for stabilisation treatments carried out by means of composting, the parameters defined in Annex II must be measured after the process has been completed and before they are used or made available.

PARÁMETRO	VALOR DE REFERENCIA (mg/kg materia seca)
Arsénico	20
Cadmio	3
Cinc	600
Cobre	150
Cromo Total	750
Mercurio	0,8
Níquel	150
Plomo	375

Table 5. Concentration of Potentially Toxic Elements in Soils

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PARÁMETRO	VALOR DE REFERENCIA (kg/ha.año)
Arsénico	0,5
Cadmio	0,15
Zinc	30
Cobre	12
Cromo Total	3
Mercurio	0,1
Níquel	3
Plomo	15

Table 6. Annual Application Load

PARÁMETRO	VALOR DE REFERENCIA (kg/ha)
Arsénico	1,8
Cadmio	0,5
Zinc	100
Cobre	40
Cromo Total	10
Mercurio	0,3
Níquel	10
Plomo	50

Table 7. Maximum Application Load

9.1- Resolution (ACUMAR) 1/07. From 31/8/2007. B.O.: 13/9/2007.

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ANNEX 2:

GROUP	PARAMETER	UNIT	TYPE OF WASTE		
			SEWERAGE PIPE	PLUVIAL/ SURFACE BODY	FLOOR ABSORPTION(e)
	Cyanides destructible by chlorination	mg CN-/l	≤ 0,1	≤ 0,1	Absent
	Total Cyanides	mg CN-/l	≤ 1,0	≤ 1,0	Absent
	BOD5 (on gross sample)	mg O2/l	≤ 200	≤ 30	≤ 200
	Detergents (SAAM)	mg SAAM/l	≤ 10	≤ 2,0	≤ 2,0
	COD	mg O2/l	≤ 700	≤ 125	≤ 500
	Total phosphorus	mg P/l	≤ 10	≤ 5,0	≤ 10
	Total Suspended Solids (TSS)	mg/l	NE	≤ 35	NE
	Ammonia Nitrogen	+ mg NH4 /l	≤ 75	≤ 25	≤ 75
	Total Kjeldahl nitrogen	mg NTK/l	≤ 105	≤ 35	≤ 105
	pH	UpH	5,5-10,0	6,5-9,0	6,5-9,0
	Sedimentable solids in 10min (f)	ml/l	≤ 0,1	≤ 0,1	≤ 0,1
	Sedimentable solids in 2hs (f)	ml/l	≤ 5,0	≤ 1,0	≤ 5,0
	SSEE	mg/l	≤ 100	≤ 50	≤ 50
	Temperature	°C	≤ 45	≤ 45	≤ 45

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Inorganics	Aluminium	mg Al/l	≤ 5,0	≤ 2,0	≤ 1,0
	Arsenic	mg As/l	≤ 0,5	≤ 0,5	≤ 0,1
	Bario	mg Ba/l	≤ 2,0	≤ 2,0	≤ 1,0
	Boron	mg B/l	≤ 2,0	≤ 2,0	≤ 1,0
	Cadmium	mg Cd/l	≤ 0,1	≤ 0,1	Absent
	Zinc	mg Zn/l	≤ 5,0	≤ 2,0	≤ 1,0
	Free chlorine	mg Cl/l	NE	≤ 1,0	Absent
	Cobalt	mg Co/l	≤ 2,0	≤ 2,0	≤ 1,0
	Copper	mg Cu/l	≤ 2,0	≤ 1,0	Absent
	Total Chrome	mg Cr/l	≤ 2,0	≤ 2,0	Absent
	Hexavalent chrome	mg Cr6+/l	≤ 0,2	≤ 0,2	Absent
	Iron (soluble)	mg Fe/l	≤ 10	≤ 2,0	≤ 0,1
	Manganese (soluble)	mg Mn/l	≤ 1,0	≤ 0,5	≤ 0,1
	Mercury	mg Hg/l	≤ 0,005	≤ 0,005	Absent
	Nickel	mg Ni/l	≤ 2,0	≤ 2,0	≤ 1,0
	Lead	mg Pb/l	≤ 0,1	≤ 0,1	≤ 0,1
	Selenium	mg Se/l	≤ 0,1	≤ 0,1	Absent
	Sulphates	2- mg SO4 /l	≤ 1000	NE	≤ 1000
	Sulphides	mg S2-/l	≤ 1,0 IF-2017-043217	≤ 1,0 83-APN-ACUM	≤ 5,0 AR#MAD
	Phenolic substances (g)	mg/l	≤ 0,5	≤ 0,5	≤ 0,1

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Fecal Coliforms (h)	CFU/100ml	NE	≤ 500	≤ 500
Total Hydrocarbons	mg/l	≤ 30	≤ 30	Absent
Volatile hydrocarbons	mg/l	≤ 1	≤ 1	≤ 1
Aldrin (i)	µg/l	<0,01	<0,01	Absent
Chlordane (i)	µg/l	<0,1	<0,1	Absent
DDT (Total Isomers) (i)	µg/l	<1	<1	Absent
Dieldrin (i)	µg/l	<0,01	<0,01	Absent
Endosulfan (i)	µg/l	<0,02	<0,02	Absent
Endrin (i)	µg/l	<0,04	<0,04	Absent
Heptachlor (i)	µg/l	<0,04	<0,04	Absent
Heptachlor epoxy (i)	µg/l	<0,04	<0,04	Absent
Hexachlor benzene (i)	µg/l	<0,01	<0,01	Absent
Lindane (i)	µg/l	<3	<3	Absent
Methoxychlor (i)	µg/l	<30	<30	Absent
Paration (i)	µg/l	<0,65	<0,65	Absent
Malation (i)	µg/l	<0,65	<0,65	Absent
2.4 D (i)	µg/l	<4	<4	Absent

Table 8. Consolidated Permissible Limits for Liquid Effluent Discharges. modified and/or supplemented by: resolution 366/10 ACUMAR

9.2- Resolution 389/98 and its amendment Resolution 336/03

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GROUP	PARAMETER	UNITED D	ANALYTICAL TECHNICAL CODE	LIMITS FOR DOWNLOADING TO:			
				Cloacal Collector	Cond. Pluv. or body of surface water	Soil absorption (h)	Open Sea
I	Temperature	ºC	2550 B	≤45	≤45	≤45	≤45
	pH	upH	4500 H+ B	7,0-10	6,5-10	6,5-10	6,5-10
	Sedim Solids 10 Min (2)	ml/l	Cone Imhoff	Absent	Absent	Absent	Absent
	Sediment solids.2 Hours (2)	ml/l	Imhoff Cone	≤5,0	≤1,0	≤5,0	≤5,0
	Sulphides	mg/l	4500 S=D	≤2,0	≤1,0	≤5,0	NE (c)
	S.S.E.E. (1)	mg/l	5520 B (1)	≤100	≤50	≤50	≤50
	Cyanides	mg/l	4500 CN C and E	≤0,1	≤0,1	Absent	≤0,1
	Total Hydrocarbons	mg/l	EPA 418.1 or ASTM3921- 85	**≤30**	**≤30**	Absent	≤30
	Free Chlorine	mg/l	4500 Cl G (DPD)	NE	≤0,5	Absent	≤0,5
	Fecal Coliforms (f)	NMP/10 0ml	9223 A	≤20000	≤2000	≤2000	≤20000
	D.B.O.	mg/l	5210 B	≤200	≤50	≤200	**≤200**

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	D.Q.O.	mg/l	5220 D	≤700	≤250	≤500	≤500
	S.A.A.M.	mg/l	5540 C	≤10	≤2,0	≤2,0	≤5,0
	Phenolic substances	mg/l	5530 C	≤2,0	≤0,5	≤0,1	≤2,0
	Sulphates	mg/l	4500 SO4 E	≤1000	NE	≤1000	NE
	Total organic carbon	mg/l	5310 B	NE	NE	NE	NE
	Iron (soluble)	mg/l	3500 Fe D	≤10	≤2,0	≤0,1	≤10
	Manganese (soluble)	mg/l	3500 Mn D	≤1,0	≤0,5	≤0,1	≤10
	D.B.O.	mg/l	5210 B	≤200	≤50	≤200	≤200
	D.Q.O.	mg/l	5220 D	≤700	≤250	≤500	5≤00
	S.A.A.M.	mg/l	5540 C	≤10	≤2,0	≤2,0	≤5,0
	Phenolic substances	mg/l	5530 C	≤2,0	≤0,5	≤0,1	≤2,0
	Sulphates	mg/l	4500 SO4 E	≤1000	NE	≤1000	NE
	Total organic carbon	mg/l	5310 B	NE	NE	NE	NE
	Iron (soluble)	mg/l	3500 Fe D	≤10	≤2,0	≤0,1	≤10
	Manganese (soluble)	mg/l	3500 Mn D	≤1,0	≤0,5	≤0,1	≤10
	Zinc	mg/l	3111 B and C	≤5,0	≤2,0	≤1,0	≤5,0
	Nickel	mg/l	3111 B and C	≤3,0	≤2,0	≤1,0	≤2,0

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	Total Chrome	mg/l	3111 B and C	**≤2,0**	**≤2,0**	Absent	NE
	Hexavalent Chrome	mg/l	3500 Cr D	**≤0,2**	**≤0,2**	Absent	NE
	Cadmium	mg/l	3111 B and C	≤0,5	≤0,1	Absent	≤0,1
	Mercury	mg/l	3500 Hg B	≤0,02	≤0,005	Absent	≤0,005
	Copper	mg/l	3500 Cu D or 3111 B and C	≤2,0	≤1,0	Absent	≤2,0
	Aluminium	mg/l	3500 Al D or 3111 B and C	≤5,0	≤2,0	≤1,0	≤5,0
	Arsenic	mg/l	3500 As C	≤0,5	≤0,5	≤0,1	≤0,5
	Bario	mg/l	3111 B	≤2,0	≤2,0	≤1,0	≤2,0
	Boron	mg/l	4500 B	≤2,0	≤2,0	≤1,0	≤2,0
	Cobalt	mg/l	3111 B and C	≤2,0	≤2,0	≤1,0	≤2,0
	Selenium	mg/l	3114 C	≤0,1	≤0,1	Absent	≤0,1
	Lead	mg/l	3111 B and C	≤1,0	≤0,1	Absent	≤0,1
	Pesticides Organochlorines (g)	mg/l	6630 B	≤0,5	≤0,05	Absent	≤0,05

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	Organophosphate pesticides (g)	mg/l	6630 B	≤1,0	≤0,1	Absent	≤0,1
	Total Nitrogen (d)	mg/l	4500 N org B (NTK)	≤105	≤35	≤105	≤105
	Ammonia Nitrogen (d)	mg/l	4500 NH3+F	≤75	≤25	≤75	≤75
	Organic Nitrogen (d)	mg/l	4500 N org B	≤30	≤10	≤30	≤30
	Total Phosphorus (d)	mg/l	4500 PC	≤10	≤1,0	≤10	≤10

Table 9 Rollover Parameters

9.3- Law 6,260

ANNEX 1

Parameters	**Permitted Limits**	
	A sewerage system	**To watercourse**
1. pH	5,5 a 10	5,5 a 10
2. Substance soluble in ethyl ether	<100 mg/lt	<100 mg/lt
3. Mineral Oils	<10 mg/lt	<10 mg/lt
4. Sulfur	<1 mg/lt	<1 mg/lt
5. Sedimentable solid in 10 minutes	<5.0 ml/lt	<5.0 ml/lt
6. Sedimentable solid in 2 hours.	(1)	(2)

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7. Floating solid	(3)	It must not contain
8. Temperature	<45°c	<45°c
9. Biochemical oxygen demand	(4)	(5)
10. Consumed oxygen	(6)	(7)
11. Chlorine Demand	(8)	(8)
12. Cyanide	<0.1 mg/lt	<0.1 mg/lt
13. Hexavalant chromium	<0.2 mg/lt	<0.2 mg/lt
14. Trivalent chromium	<2 mg/lt	<2 mg/lt
15. Substance reactive to blue		
methylene	<2 mg/lt	<2 mg/lt
16.Cadmium	<0.1 mg/lt	<0.1 mg/lt
17.Lead	<0.5 mg/lt	<0.5mg/lt
18.Mercury	<0.005 mg/lt	<0.005 mg/lt
19.Arsenic	<0.5 mg/lt	<0.5 mg/lt
20.Phenolic substances	<0.5 mg/lt	<0.5 mg/lt

Table 10. Regulatory Decree of Law 6260 Complementary Standard on Liquid Effluents

21. Other conditions.

21.1.- Discharges into the Uruguay River must not alter the maintenance of the river quality standards established in the "Digest on Uses of the Uruguay River", a document signed by the Governments of the Argentine Republic and the Oriental Republic of Uruguay. The mixing zones defined for each particular industry shall not overlap with zones that have been determined for uses defined as 1, 2, and 3; as from the end of the mixing zone, the quality set for use 4 shall be maintained.
21.2.- Industrial discharges located less than 5 km. upstream, or 1 km. downstream, from a water intake for population consumption, must have a maximum biochemical oxygen demand of 50 mg. O2/lt. and the content of the contaminants indicated in parameters 11 to 20 must be within the permitted limits for drinking water, and the demand for chlorine must also be satisfied.

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21.3.- Discharge into rainwater pipes, closed or open, or into the water table is not permitted, except for the water table, in which case the maximum permitted biochemical oxygen demand is 200 mg. O2/lt. and the content of the contaminants indicated in parameters 11 to 20 must be within the permissible limits for drinking water.
21.4 .- Discharges to non-permanent water courses, or with a flow rate less than 10 times the flow of the industrial discharge, will be subject to a particular study for each case.
21.5.- The substances, whatever their state, separated in the treatments of purification of residual liquids cannot be discharged into water courses, sewage collectors or water tables.

REFERENCES

SEDIMENTABLE SOLIDS IN 2 hours References (1) and (2)

(1) The requirements of the Sewerage Service Provider, if any, must be met.
(2) If you are a local customer, you must be less than 10 ml/litre.

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(3) For watercourses: SUSPENSION MATERIALS, TOTAL DISCHARGES into the Paraná River: < 200 mg./lt. –
Downloads to the Uruguay River: < 100 mg./lt. –
Discharges to rivers, inland streams with permanent flows and greater than 10 times the discharge rate of industry: < 30 mg./lt.
Under no circumstances should environmental damage occur as a result of sedimentation, accumulation or decomposition of sedimentable material.

FLOATING SOLIDS, reference (3)

(4) The requirements of the sewerage service provider must be met.

BIOCHEMICAL OXYGEN DEMAND, references (4) and (5)

(5) The requirements of the sewerage service provider must be met. If no local standards exist, it must be less than 250 mg O2/lt.

(6) Discharges to the Parana River: < 400 mg O2/lt. Discharge to the Uruguay River: <250 mg O2/lt.

Discharges to rivers and inland streams with permanent flows and greater than 10 times the discharge rate of industry: <50 mg O2/lt.
Under no circumstances should environmentally damage, such as unpleasant odors, unpleasant appearance, etc., occur.
Under no circumstances may these admitted values be reached by diluting the effluents.

CONSUMED OXYGEN, references (6) and (7)

This test shall only be carried out when it is not possible to make the BOD.

(7) The requirements of the sewerage service provider must be met, if no local standards exist, it must be less than 100 mg/lt.

(8) Downloads to the Parana River: < 160 mg/lt. Discharges to the Uruguay River: < 100 mg/lt.

Discharges to rivers and inland streams with permanent flows and greater than 10 times the flow of industry:< 20 mg/lt.
Under no circumstances may these admitted values be reached by diluting the effluents.

CHLORINE DEMAND, reference (8)

(9) When it is deemed necessary due to the nature of the origin of the residual liquid, chlorination may be required until the demand for chlorine is satisfied. At the request of the interested party and justifying the availability of another treatment to reduce the microbiological content other than chlorination, this requirement may be waived; in that case the discharge must have less than 5000 total coliform bacteria per (100) milliliters.

9.4- Decree 2793/06

Parameter	**Unit**	**Maximum Value**
Temperature	ºC	45
pH	UpH	6.5-10.0
Sedim solids. In 10 min.	mL/L	Absent

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Sedim solids in 2 hours	mL/L	1.0
S.S.E.E.	mg/L	50
Sulphides	mg/L	1.0
Total Nitrogen	mg/L	15
Cyanides	mg/L	0.1
Total Hydrocarbons	mg/L	50
Residual chlorine	mg/L	0.5
D.B.O.5	mg/L	50
D.Q.O.	mg/L	250
Detergents (SAAM)	mg/L	2.0
Phenolic Substances	mg/L	0.5
Phosphates	mg/L	10
Arsenic	mg/L	0.5
Total Chrome	mg/L	0.5
Lead	mg/L	0.5
Mercury	Ug/L	5.0
Total Coliforms/100mL	N.M.P	2.0X104
Fecal Coliforms/100mL	N.M.P	5.0X103

Table 11.Drainage to open rainwater duct, closed elementary surface water course and non-permanent water courses
The parameters not included must respect the values for drinking water established by the World Health Organization (WHO)

Parameter	**Unit**	**Maximum Value**
Mineral oils	mg/L	It must not contain
PH	UpH	5.5-10.0
Sedim solids. In 10 min.	mL/L	0.5
Sedim solids in 2 hours	mL/L	1.0
S.S.E.E.	mg/L	100

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Sulphides	mg/L	1.0
Iron	mg/L	2.5
Cyanides	mg/L	0.1
Total Hydrocarbons	mg/L	50
Detergents (SAAM)	mg/L	2.0
Total Chrome	mg/L	0.5
Arsenic	mg/L	0.2
Lead	mg/L	0.5
Mercury	Ug/L	5.0
D.B.O. 5	mg/L	200
D.Q.O.	mg/L	350
Total Coliforms/100mL	N.M.P	2.0X104
Fecal Coliforms/100mL	N.M.P	1.0X103

Table 12. Drains to wells or drainage fields

9.5- Resolution 778/96

Item	Parameter	Units	Maximum allowed	Maximum tolerable	Unique specifications and observations
1	True Color	UCV	12	18	UCV or "true colour unit". Measured on filtered effluent.
2	Specific Conductivity	Micro siemens at 25°C	900	1800	In some receiving bodies, higher value will be allowed for a limited time, provided that they do not cause damage to third

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					parties. Continuous monitoring may be required.
3	Sedimentable Solids	ml/l	Less than 1	10	Values obtained in with de Imhoff in two (2) hours. The requirement may be greater to avoid possible shipments. No sediment will be admitted when its BOD exceeds 100 mg/l.
4	Compacted Sedimentary Solids	ml/l	0,5	1	Same as above. Values obtained after 10 minutes. No sediment will be admitted when its BOD exceeds 100 mg/l.
5	Ethyl Ether Soluble Solids	mg/l	50	100	Near drinking water intakes may not exceed 0.05 mg/l.
6	Temperature	°C	30	45	For special cases, the maximum will be set uniquely.

Table 13. Physical Parameters

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NO.	Parameter	Unite.	Maximum Allowed	Maximum Tolerable	Unique specifications and observations
7	Arsenic	mg/l	0,05	0,1	If groundwater is affected, less than 0.05 mg/l. Near drinking water intakes, the maximum allowed is 0.01 mg/l.
8	Boron	mg/l	0,5	1	Near drinking water intakes, the maximum allowed will be less than 0.03 mg/l. This parameter may be stricter, depending on the irrigated crops.
9	Cadmium	mg/l	0,003	0,01	Near drinking water intakes, the maximum will be allowed less than 0.003 mg/l.
10	Cyanides	mg/l	Less than 0.05	0,05	Near water intakes for beverages, the maximum allowed is 0.05 mg/l. This parameter may be stricter, depending on the effect on aquatic life.
11	Chlorides	mg/l	200	400	This parameter may be tightened if there is a possibility of corrosive effects.
12	Hexavalent Chrome	mg/l	0,05	0,1	In the vicinity of drinking water intakes, the maximum per- mitted will be less than 0.05 mg/l. This parameter may be

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					stricter, depending on the effect on aquatic life.
13	Total Chrome	mg/l	Less than 0.5	0,5	Higher demands are possible near water intakes for drinking or aquatic life.
14	Detergents	mg/l	1	1	The maximum tolerated may be varied in individual cases, depending on the type of receiving body, but shall always be less than 2.0 mg/l. In the vicinity of drinking water, the maximum may not exceed 1.0 mg/l.
15	Phenols	mg/l	0,05	0,1	Near drinking water intakes, the maximum allowed will be less than 05 mg/l.
16	Phosphates	mg/l	0,4	0,7	For lakes and reservoirs or ponds, a point value less than 0.5 mg/l.
17	Hydrocarbon-buros	mg/l	0,5	x	The maximum tolerated will be set according to the type of the receiving body and problems it may cause. It will always be less than 5 mg/l. In the vicinity of drinking water, the maximum permitted shall be less than 0.1 mg/l. In all cases, the maximum allowed for polynuclear

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					hydrocarbons shall be less than 0.02 mg/l.
18	Manganese	mg/l	0,1	0,5	Near drinking water intakes, the maximum allowed will be less than 0.1 mg
19	Mercury	mg/l	Less than 0.001	0,005	Near drinking water intakes, the maximum allowed is 0.001 mg/l or stricter depending on the affectation
20	Nitrates	mg/l	Less than 45	45	This parameter may be more stringent in the case of direct or indirect overturning to lakes, reservoirs and lagoons.
21	Nitrites	mg/l	Less than 0.1	0,1	
22	Ammonia Nitrogen	mg/l NH4	1,5	5	This parameter may be more stringent when related to faecal coliforms. In the case of receiving bodies with aquatic life, the maximum permitted is 0.02 mg
23	pH	No.	6.5 a 8.2	5.5 a 9.0	In some industries, continuous monitoring will be required and the type of treatment must be indicated.

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24	RAS	No.	6	x	The maximum to be tolerated will be set according to the receiving body, subsequent uses of the water and problems that may be caused. In no case shall it exceed 12
25	Sodium	mg/l	150	275	This parameter may be stricter in cases where water intakes or other special cases are involved.
26	Sulphates	mg/l	250	400	This parameter may be more stringent in cases where corrosion is possible.
27	Sulphides	mg/l	Less than 1.0	1	
28	Colifecal	nmp/ 100 ml	200	1000	The mixing of waste liquids with sewage shall not be authorized, except in special cases. This parameter may be stricter in cases where it may affect drinking water.
29	BOD	mg/l	30	120	In some drains and sewers a higher value will be expressly allowed, for a limited time, provided that no problems are caused to third parties or receiving bodies. This parameter may be stricter if there

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					could be an influence on drinking water intakes.
30	COD	mg/l	75	250	Same as above.
31	Helmintos	eggs/litre	Less than 1	1	Ditto. 28.

Table 14. Chemical Parameters

9.6- Decree 2.107/06

QUALITY STANDARDS FOR INDUSTRIAL EFFLUENT DISCHARGE

As a general rule, industrial effluents containing sewage are not admitted to the sewage system:

a) Thick bodies capable of producing blockages (wool, hair, tow, etc.)

b) Wastes from the treatment of waste effluents whose parameters exceed the maximum permitted limits set out below

PARAMETERS	UNITS	MAXIMUM ALLOWABLE VALUES
pH	or pH	6 a 9
Temperature	ºC	40
Conductivity	microsiemens/cm	2000
Total suspended solids	mg/l	250
Sedimentable solids in 10 minutes of total compact nature	ml/l	0,5
Cold soluble substances in ethyl ether	mg/l	100

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Hydrocarbons / Mineral oils	mg/l	50
BOD	mg/l	250
COD	mg/l	600
Arsenic	mg/l	0,1
Cadmium	mg/l	0,1
Trivalent Chrome	mg/l	2
Hexavalent Chrome	mg/l	0,2
Lead	mg/l	0,1
Mercury	mg/l	0,005
Zinc	mg/l	1
Copper	mg/l	1
Nickel	mg/l	1
Total Cyanides	mg/l	1
Cyanides easily oxidized	mg/l	0,1
Detergents (Totals)	mg/l	5
Phenols	mg/l	2
Sulphides	mg/l	1

Table 15. Discharge to sewer

As a general rule, the following will not be admitted: rivers, streams, slopes, lakes and watercourses, industrial effluents containing them:

a) Floating debris; substances with an oily appearance; foams or other unpleasant or harmful residues

b) Substances that form putrescible or harmful sludge deposits for any reason when settling

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c) Thick bodies (wool, hair, rags etc.).
d) Toxic substances; smelly; flammable; explosive, corrosive or that can produce flammable gases.
e) Waste from the treatment of waste effluents whose parameters exceed the maximum permitted limits set out below.

PARAMETERS	UNITS	MAXIMUM PERMISSIBLE VALUES		
		Water course natural and artificial lakes, lagoons, streams, etc.	Drains and Drainages	Soil absorption
Color	Color Units	12	18	18
Temperature	ºc	30	45	45
Conductivity	microsiemens/cm	1400	2500	2500
Sedimentable solids in 10 minutes of total compact nature	ml / l	0,5	0,5	0,5
Sedimentable solids in 2 hours of total compact nature	ml / l	1	1	5
Total Suspended Solids (103 - 105 'C)	mg./l	40	40	50
Cold Soluble Solids in ...Ethyl ter	mg/l	30	50	50
Antimony	mg/l	0,02	0,02	0,02

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Arsenic	mg/l	0,05	0,1	0,1
Bario	mg/l	2	2	2
Berilio	mg/l	0,1	0,1	0,1
Boron	mg/l	1	1	1
Cadmium	mg/l	0,01	0,01	0,01
Total Cyanide	mg/l	0,2	0,2	0,2
Free chlorine	mg/l	1	1	1
Chlorides	mg/l	300	400	400
Cobalt	mg/l	0,05	0,05	0,05
Copper	mg/l	1	1	2
Total Chrome	mg/l	0,1	0,5	0,5
Detergents (SRAM)	mg/l	1	1	1
Phenolic Compounds	mg/l	0,05	0,05	0,1
Phosphates	mg/l	0,7	0,7	5

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Fluoride	mg/l	2	5	5
Total hydrocarbons **	mg/l	absent	0,5	absent
Total Iron	mg/l	2	2	2
Manganese	mg/l	0,2	2	2
Magnesium	mg/l	100	100	100
Mercury	mg/l	0,001	0,004	0,004
Molybdenum	mg/l	0,1	0,1	0,1
Nickel	mg/l	0,2	0,5	0,5
Nitrates (N- NO3) (UV)	mg/l	10	20	20
Ammonia Nitrogen (N-NH4)	mg/l	5	10	10

Table 16. Discharge to rivers, streams, springs, lakes and watercourses

* The Authority of Application will set the value according to the characteristics of the effluent produced and from the receiving body.
** The Enforcement Authority reserves the right to require greater specificity of these compounds.
III. In no case shall the effluent discharged by the Industrial Establishment degrade the natural quality conditions of the receiving body.
IV- Under no circumstances may effluents containing prohibited substances be dumped, as established by current legislation.
V- The Authority of Application reserves the faculty to request the Industrial Establishment the studies and information regarding the state and quality of the water tables, surface and

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underground waters of the area where the effluent overturns, when circumstances duly justified by the Authority of Application require it. The costs and expenses demanded by such studies shall be borne by the Industrial Establishment.

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9.7- Resolution 97/2001 (effluents). Not in force - repealed by Resolution 410/2018

Clase de las Naciones Unidas	Nº de Código	CARACTERISTICAS
1	H1	Explosivos: por sustancia explosiva o desecho se extiende toda sustancia o desecho sólido o liquido (o mezcla de sustancias o desechos) que por si misma es capaz, mediante reacción química de emitir un gas a una temperatura, presión y velocidad tales que puedan ocasionar daño a la zona circundante
3	H3	Líquidos inflamables: por líquidos inflamables se entiende aquellos líquidos o mezcla de líquidos, o líquidos sólidos en solución o suspensión (por ejemplo pinturas, barnices lacas, etcétera, pero sin incluir sustancias o desechos clasificados de otra manera debido a sus características peligrosas) que emiten vapores inflamables a temperaturas no mayores de 60,5 grados C, en ensayos con cubeta cerrada, o no más de 65,6 grados C, en cubeta abierta (como los resultados de los ensayos con cubeta abierta y con cubeta cerrada no son estrictamente comparables, e incluso los resultados obtenidos mediante un mismo ensayo a menudo difieren entre sí, la reglamentación que se apartara de las cifras antes mencionadas para tener en cuenta tales diferencias sería compatible con el espíritu de esta definición).
4.1	H4.1	Sólidos inflamables: se trata de sólidos o desechos sólidos, distintos a los clasificados como explosivos, que en las condiciones prevalecientes durante el transporte son fácilmente combustibles o pueden causar un incendio o contribuir al mismo, debido a la fricción.
4.2	H4.2	Sustancias o desechos susceptibles de combustión espontánea: se trata de sustancias desechos susceptibles de calentamiento espontáneo en las condiciones normales del transporte, o de calentamiento en contacto con el aire, y que pueden entonces encenderse.
4.3	H4.3	Sustancias o desechos que, en contacto con el agua, emiten gases inflamables: sustancias o desechos que, por reacción con el agua, son susceptibles de inflamación espontánea o de emisión de gases inflamables en cantidades peligrosas.
5.1	H5.1	Oxidantes: sustancias o desechos que, sin ser necesariamente combustibles, pueden, en general, al ceder oxigeno, causar o favorecer la combustión de otros materiales.
5.2	H5.2	Peróxidos orgánicos: las sustancias o los desechos orgánicos que contienen la estructura bivalente -O-O- son sustancias inestables térmicamente que pueden sufrir una descomposición autoacelerada extermica.
6.1	H6.1	Tóxicos (venenos) agudos: sustancias o desechos que pueden causar la muerte o lesiones graves o daños a la salud humana, si se ingieren o inhalan o entran en contacto con la piel.
6.2	H6.2	Sustancias infecciosas: sustancias o desechos que contienen microorganismos viables sus toxinas, agentes conocidos o supuestos de enfermedades en los animales o en el hombre.
8		Corrosivos: sustancias o desechos que, por acción química, causan daños graves en los tejidos vivos que tocan o que, en caso de fuga pueden dañar gravemente o hasta destruir otras mercaderías o los medios de transporte; o pueden también provocar otros peligros.
9	H10	Liberación de gases tóxicos en contacto con el aire o el agua: sustancias o desechos que, por reacción con el aire o el agua, pueden emitir gases tóxicos en cantidades peligrosas.
9	H11	Sustancias tóxicas (con efectos retardados o crónicos): sustancias o desechos que, de ser aspirados o ingeridos, o de penetrar en la piel pueden entrañar efectos retardados crónicos, incluso la carcinogenia.
9	H12	Ecotóxicos: sustancias o desechos que, si se liberan, tienen o pueden tener efectos adversos inmediatos o retardados en el medio ambiente debido a la bioacumulación o los efectos tóxicos en los sistemas bióticos.
9	H13	Sustancias que pueden, por algún medio, después de su eliminación, dar origen a otra sustancia, por ejemplo, un producto de lixiviación, que posee alguna de las características arriba expuestas.

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Table 17. List of hazardous characteristics

INDICADOR (*)	METODO ANALITICO	VALOR LIMITE
Sólidos volátiles (SV)	Método 2250 solids e) Standard Methods for the examinations of water and wastewater. EPA ed. 20 (1998)	Reducción de SV > al 40%
Nivel de Estabilización (para 5, 10, 20 y 40 g. de muestra a 5, 10, 20 y 30 minutos)	Método 423 (Standards Methods for the Examination of Water and Wastewater, 1985)	Deflexión de oxígeno disuelto no mayor en promedio del 10% del oxígeno disuelto del agua destilada de dilución.

Table 18 Muds. Vector Attraction

PARAMETRO	METODO ANALITICO	VALOR LIMITE EN BARROS (mg/kg base materia seca)
Arsénico	Método 3500 b,	75
Cadmio	Método 3111 b	20-40
Cinc	Método 3111 b	2500 a 4000
Cobre	Método 3111 b	1000 a 1750
Cromo Total	Método 3111 b	1000 a 1500
Mercurio	Método 3112 b	16 a 25
Níquel	Método 3111 b	300 a 400
Plomo	Método 3111 b	750 a 1200
Bifenilos policlorados (*)	Método 1668-Rev.A: Polychlorinated biphenyls congeners in water, soil, sediment and tissues by HRGC/HRMS	0,8

Table 19. Muds. Metals and PCBs
(*) Refers to seven (7) main congeners:28, 52, 101, 118, 138, 153 and 180

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PARAMETRO	METODO DE DETERMINACION (*)	VALOR LIMITE NIVEL A	VALOR LIMITE NIVEL B
Escherichia coli o Salmonella	Part 9221 E. o Part 9222 D. "Standard Methods for the Examination of Water and Wastewater" 20th Ed.. 1999. APHA. Part 9260 D. "Standard Methods for the Examination of Water and Wastewater". 20th Ed., 1999. APHA.	< 1000 NMP/g MS < 3 NMP/4g MS	< 2.000.000 NMP/g MS
Huevos viables de Helmintos	Yanko, W.A. EPA 600/1-87-014, 1987	< 1/4g MS	
Indicadores virales (*)		Reducción del 99,9% de la densidad de bacteriófago somáticos de Escherichia coli	

Table 20. Microbiological Characterization
(*) This parameter is to be considered as a transitional application until the limit value of the most suitable indicator is defined.

PARAMETRO	METODO ANALITICO	VALOR LIMITE
Sulfuros	Método 9030 Test Methods for Evaluating Solid Waste – Physical/Chemical Methods (1987)	500 mg/ks MS (Como H_2S)
Cianuros	Método 9010 Test Methods for Evaluating Solid Waste – Physical/Chemical Methods (1987)	250 mg/kg MS (Como HCN)
Líquidos Libres	Ensayo Líq. Libres. Federal Register/Vol 47 Nº 38, Feb. 25, 1982/Proposed Rules	Ausencia
Sólidos Totales	Método 2540 solids b). Standard Methods for the examination of water and wastewater EPA. Ed 20 (1990)	≥ 20%
pH (para 10 g. de muestra en 25, 50 y 75 cm^3)	Método 4500 b). Standard Methods for the examination of water and wastewater EPA Ed 20 (1990)	6 a 8

Table 21. Muds. Basic conditions for landfills

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PARAMETROS	METODO ANALITICO (*)	VALORES LIMITE
Arsénico	Método 7061 a	1 mg/l
Bario	Método 7080 a	100 mg/l
Cadmio	Método 7130	0,5 mg/l
Cinc	Método 7950	500 mg/l
Cobre	Método 7210	100 mg/l
Cromo Total	Método 7190	5 mg/l
Mercurio	Método 7440 a	0,1 mg/l
Níquel	Método 7520	1,34 mg/l
Plata	Método 7760 a	5 mg/l
Plomo	Método 7420.	1 mg/l
Selenio	Método 7741 a	1 mg/l
Aldrin + Dieldrin	Método 8081 a	3 x 10^{-3}mg/l
Atrazina	Determinación de Atrazina: Reserved-phased high performance Liquid chromatography of some common herbicides – T.H. Byast, Journal of Chromatography Science, 134 (1977) 216-218	ND (no detectable)
Clordano	Método 8081 a	0,03 mg/l
2,4,D	Método 8151 a	10 mg/l
Endosulfan	Método 8081 a	7,4 mg/l
Heptacloro – Heptacloroepoxi	Método 8081 a	0,01 mg/l
Lindano	Método 8081 a	0,3 mg/l
MCPA	Método 8151 a	ND (no detectable)
Metoxicloro	Método 8081 a	3 mg/l
Paraquat	Determination of Paraquat, P.F. Lott, J.W. Lott, Journal of Chromatographic Science, Vol. 16, 390 Set. 1970	ND (no detectable)

Table 22. Leachate Determinations

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PARAMETRO (*)	NIVEL GUIA USO AGRICOLA µg/g peso seco
Cadmio (total)	3
Cobalto	40
Cromo (total)	750
Cromo (+ 6)	8
Mercurio (total)	0,8
Níquel (total)	150
Plata (total)	20
Plomo (total)	375
Vanadio	200

Table 23. Conditions for biological treatment in soils. According to guide levels of soil quality for agricultural use.

9.8- Joint resolution 1/19 (compost)

Parameter	**Process**	**Limit Value**
I. Fecal coliforms	Open systems ≥55°C,15 days with at least 5 volts	<1000 NMP per gram of compost, on a dry basis
II. Salmonella sp.	≥ 55°C, 3 consecutive days with coverage that ensures temperature on the surface of the battery	<1 NMP/ 4 grams of compost on dry basis;
III. Ascaris lumbricoides	Closed systems ≥ 60°, 7 days	< 1 viable egg of Ascaris in 4g of compost on dry base

Table 24. Level of pathogens
For the compost where the process can be certified, it is required to comply with I) or I) and not II). In the case of compost where the process cannot be certified, it is required to comply with I), I I) and I I I).

Stability indicators (At least one indicator of each group should be measured)		
INDICATOR		**VALUE**
	Water soluble C (CSA)	< 10 g/kg

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Group I	CSA/N total	≤ 0,7
Group II	CO2 production	< 120 mg of CO2 /kg.h
	Solvita Test	≥ 5 for CO2
	Static Respirometric Index (SRI)	≤ 0.5 mg O2/g MO.h
	Dynamic Respirometric Index (IRD)	≤ 1 mg O2/g MO.h
Maturity indicators (At least two indicators should be measured, one of which should be the germination index)		
Ammonium (N-NH4+)		< 400 mg N-NH4/kg
Ammonium ratio: nitrate (N-NH $^{+/N-NO}$) 43		< 0,3
Germination rate using two species		> 60% (perennial or annual ryegrass, tomato, radish, barley, wheat, lettuce, or watercress (*Lepidium sativum)*
Solvita Test		≥ 4 for NH3

Table 25. Stability and maturity indicators

Parameters	**Compost Class A**	**Compost Class B**
Ph	5,0 – 8,5	
Odours	No unpleasant odours	
Humidity (H%)	< 60	
Electrical Conductivity (EC dS/m)	<4	<6
C/N ratio (%)	≤20	< 30
Organic matter (MO %)	≥20	
Potentially toxic elements (mg/kg DM)		
Cadmium	1,5	3
Copper	150	450
Total Chrome	100	270

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Mercury	0,7	5
Nickel	30	120
Lead	100	150
Zinc	300	1100
Arsenic	15	30

Table 26. Quality parameters

Material	**Dimension (mm)**	**Quantity (% DM)**
Flexible plastics and/or films	>4	≤5
Stones and/or soil clods	>4	≤5
Glass and/or metals and/or rubber and/or hard plastics	≥2	≤0,5

Table 27. Quantity of inert materials ≤ 16mm allowed in compost

a) Inert materials of a size greater than 1 6 mm, determined in s or greater dimension, are not allowed in any kind of compost.

b) For all classes of compost, the tolerance of impurities of size less than or equal to 1 6 mm must not exceed the values indicated in Table No. 4.

Potentially toxic elements	**Limit value** **(kg/ha. Year)**	**Maximum load allowed** **kg/ha**
Cadmium	0,15	0,5
Copper	12	40
Chrome	3	10
Mercury	0,1	0,3
Nickel	3	10
Lead	15	50
Zinc	30	100
Arsenic	0,5	1,8

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Table 28. Recommended limit values for the amounts of EPT that can be introduced into soils annually (kg/ha. Year) and maximum load allowed in 10 years (kg/ha)
The ANNUAL DOSE OF EPT LOAD to be added to a soil is calculated according to the concentration of EPT in compost and the limit value of EPT (Table No. 6), according to the following procedure:

a) The content of EPT in the compost to be applied is analysed;
b) The ANNUAL EFA LOAD DOSE to be added for each of the elements is calculated using the following formula: **DACE = (NL x 1,000) / C**

Where:
DACE: Annual Load Dose of EPT on a dry weight basis expressed in Tn/ha.year
LV (limit value): Amount of PTEs for compound "n" expressed in kg/ha.year (Table 6) C: Concentration of element "n" in compost expressed in mg/kg (dry matter basis) 1,000: Conversion factor

c) The ANNUAL EFA LOAD DOSE to be applied is the lowest of those calculated in the previous stage;
d) To calculate the REAL DOSE OF COMPOST (at its natural humidity) to be applied, the ANNUAL DOSE OF EPT LOAD must be converted to dry base considering the humidity content of the compost to be used according to the following formula:

DRC = (DACE x 100) / MS

Where:
DRC: Royal Dose of Compost in Tn/ha.year
DACE: Annual Load Dose of EPT dry weight base
MS: Percentage of dry matter in the compost to be used

9.9- Joint resolution 19/19 (anaerobic digests)

PARAMETER	INDICATOR	LIMIT VALUE	METHODOLOGY
Pathogens	**Fecal coliforms**	< 1000 NMP/g MF	TMECC 07.01-B
	Escherichia coli	Absence (*)	TMECC 07.01-C; APHA-AWWA-WPCF. Met. 9260
	Helmintos	1 viable egg/liter of digested	TMECC 07.04-A
	Salmonella	< 3 NMP/4g MF	TMECC 07.02-A; APHA-AWWA-WPCF. Met. 9260
Organic matter and nutrients	**pH (upH)**	6,5-8,5	APHA-AWWA-WPCF. Met. 4500 B
	EC (dS/m)	declare	APHA-AWWA-WPCF. Met 2510 B.
	Organic matter (MO)	> 40%	APHA-AWWA-WPCF. Met 2540 E.
	N-Total	declare	APHA-AWWA-WPCF. Met 4500 Norg B
	N-NH4+	declare	APHA-AWWA-WPCF. Met 4500-NH3 B and E; F
	P - total	declare	TMECC 04.12; EPA-M3015; TMECC 04.03; APHA-AWWAWPCF. Met 3111; 3120
	K+ - total	declare	TMECC 04.12; EPA-M3015; TMECC 04.04; APHA-AWWAWPCF. Met 3111; 3120
	Soluble Na+	declare	TMECC 04.05; TMECC 04.15; APHA-AWWA-WPCF. Met 3111; 3120

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	Cl- soluble	declare	APHA-AWWA-WPCF. Met. 4500-Cl- B
Stability (At least two must be submitted)	**Total Organic Acids (TAOs)**	≤ at 1500 mg/L	EPA, M204A; APHA-AWWAWPCF. Met. 6210
	Volatile Fatty Acids (VFA)	<0.43 g COD/g MO	Jenkins et al., 1991; Walker et al., 2010. OFW004-005 - WRAP; APHA-AWWA-WPCF. Met. 6210
	AT4 (accumulated oxygen consumption in 4 days)	< 10 mg O2/g MS	ASTM, 1996
	Residual Biogas	<0.25 L/g MO	Walker et al., 2010. OFW004-005 - WRAP
	Respirometric Index Dynamic (IRD)	< 1 mg O2/g MO/h	Adani, F. et al, 2004.
	Respirometric Index Static (IRE)	≤ 0.5 mg O2/g MO. h	TMECC 05.08
Impurities (>2mm)	**Glass, metal, plastic**	≤ 0.5% MS	TMECC 02.02-C
Potentially toxic elements (mg/kg DM)	**Arsenic**	15	TMECC 04.06
	Cadmium	1,5	
	zinc	300	
	Copper	150	
	Total Chrome	100	
	Mercury	0,7	
	Nickel	30	
	Lead	100	

Table 29. Limit value of physicochemical, biological, microbiological and respirometric parameters

(*) For digests derived from raw materials of animal origin, which may contain strain O157:H7

MS: Dry Matter

PARAMETER	**REFERENCE VALUE (mg/kg DM)**	
	pH<7	**pH >7**
Arsenic	15	20
Cadmium	1	3
Zinc	150	450

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Copper	50	210
Total Chrome	100	150
Mercury	1	1,5
Nickel	30	112
Lead	50	300

Table 30. Concentration of Potentially Toxic Elements in Soils

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PARAMETER	LIMIT VALUE (kg/ha.year)	MAXIMUM LOAD ADMITTED (kg/ha)
Arsenic	0,5	1,8
Cadmium	0,15	0,5
Zinc	30	100
Copper	12	40
Total Chrome	3	10
Mercury	0,1	0,3
Nickel	3	10
Lead	15	50

Table 31. Recommended Limits for the Amounts of Ept That Can Be Introduced into Soils Annually (Kg/Ha.year) and Maximum Load

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