# REINWASTE

# WP3

DELIVERABLE 3.3.1

INTERVENTION PLANS AND SECTOR SCENARIOS IN

EMILIA ROMAGNA

**Introduction**

The purpose of this document is to fix the «goal and scope», modality and internal timing to run the effective pilot activities. Firstly, each partner in collaboration with the recruited experts will decide what is the global approach to implement the pilot tests, according to the specific requirements of the supply chain (dairy, meat, horticultural) and the type of companies selected. Secondly, both partner at regional level («agri» + «industry») and their experts are invited to gather to define a global approach to run the pilot.

The document provides specific settings to deal with the companies along the entire Dairy supply chain, by FEDSERV for agrifood and CONFAGRI for agricultural sector in Emilia-Romagna region.

## Table of contents

# 1. State of the art on waste and challenge in the dairy pilot sector − agricultural sector

Starting from data and statistics on amount/volume and type of waste produced emerges that impact in 2016of the agricultural sector, that includes agriculture, forestry, hunting and fishing, is 0.2% of the total waste produced.

In 2016 the production of special waste in the Emilia Romagna region is over 13.6 million tons, 10.1% of the national total. The production of agricultural waste accounts for 1%.

The data related to special waste from Emilia Romagna show the type of waste and the quantities produced prevalently by the agricultural sector. Data illustrates that the main:

□ hazardous wastes produced from the agriculture sector are chemical wastes and exhausted oils and
□ non-hazardous wastes are common sludge, paper waste, plastics and wood and plant residues.

Furthermore, with reference to the types of inorganic waste produced, based on the knowledge of the dairy sector, the main products of the sector can be summarized below:

□ plastic seed packaging;
□ plastic plant protection products packaging;
□ silage film and plastic ballast bags;
□ plastic irrigation pipes;
□ plastic baling nets and wires;
□ medicated foods and all feeds packaging;
□ biocides packaging (detergents, disinfectants and disinfectants);
□ veterinary medicines packaging;
□ expired veterinary drugs;
□ iron: all ferrous materials (parts of agricultural machinery, car catches, etc.);
□ exhausted oils and accumulators;
□ sheaths and rubber parts of the milking machine and parts of other equipment.

Concerning the reduction of inorganic waste, the strategies available are less organized and much more dependent on technological innovation and eco-design strategies related to the industrial sector. Positive known examples relating to the dairy sector are:

□ replace, where possible, the current procurement procedures ( for examples products used for cleaning and disinfection) with return-refill schemes in order to reduce the quantity of packaging waste;
□ change, where possible, the current business model to reducing the use of plastics (for examples in dairysector the use of a feed different from silage);

☐ implement industrial symbiosis initiatives to create biodegradable products from agricultural waste.

## 2. State of the art on waste and challenge in the dairy pilot sector − industrial sector

Emilia-Romagna agri-food system starts from an already particularly advanced level, but there are significant margins for improvement in three main directions, which are all relevant for Reinwaste testing activities.

At this purpose the main challenge for the supply chain considered is linked to a sustainable reconversion of the supply chain as a whole. In primary production, it is necessary to proceed towards an increasingly sustainable agriculture characterized by responsible use of natural resources, and towards productions characterized by respect and enhancement of the environment.

Moreover, efficiency in the use of resources can be improved as well as reduced the environmental impact of production, in particular through the diffusion of precision agriculture, of new techniques for the fight against pests and for the increase quality and productivity.

Two main technological lines of development identified by the Regional S3 are in full synergy with Reinwaste testing phase.

1) *Valorisation of by-products and waste from the agri-food chain: industrial symbiosis and circular economy, application of enzymatic processes and bioconversion of by-products, application of green chemistry food additives and stabilization and conservation techniques*

2) *Innovative and sustainable packaging: environmentally friendly and intelligent materials for the packaging, modelling and simulation for packaging, coating plants*

Requests from the food industry are increasingly more specific and methodology for quality control increasingly demanding. Well-advanced food packaging in Emilia Romagna Region must be supported by accuracy for development of technological solutions, which cannot neglect nutritional and commercial needs. In such field of application, priorities are:

1) Eco-friendly innovative materials.

2) Control methods and assessment tools on packaging.

3) Wide use of LCA as a useful tool to audit the impact that can provide insights

towards the best combination of materials making a comparison with the sector average.

Concerning the dairy industry production the most common types of packaging for milk are glass, plastic and cardboard. In particular:

• Glass bottles are important because they are reusable, although they have the inconvenience of their heavy weight and fragility. They also present problems for the conservation of long-life milk because sunlight can lead to degradation of the fat and milk proteins.

• Plastic bags, usually from polythene, have the inconvenience that they are difficult to handle because of their instability and once opened for consumption they require a recipient for handling.

• Plastic bottles use materials such as polystyrene and polythene of high and low density. This packaging is used most of all in the packaging of sterilized milk.

• Cardboard boxes, such as TetraBrik with a laminated cardboard or paper base and often covered with plastic, paraffin or aluminium, are used above all for UHT milk.

# 3. OPERATIVE STRATEGY: Goal and scope of the testing phase foreseen in the entire dairy sector within Emilia Romagna

Regarding the general objectives of the Reinwaste project, related to support the dairy sector for identifying and testing innovative solutions aimed at reducing inorganic waste, the pilot action that has being implemented consists of a first phase in which on the 15 companies will be carried out a simplified environmental analysis only considering the waste environmental aspect.

The analysis will be conducted in the dairy sector (land cultivation and cattle breeding activities), without considering the processing and transport phases of the products downstream of the company.

Through a questionnaire (ANNEX 1) common for all farms, information is being gathered on the production process (crop layout, type of housing, types of farm fodder, etc.) and with the collection of more significant production data (land areas cultivated, herd in 2018, milk / purchase production, annual waste production and waste management costs).

The types of inorganic waste produced are identified, their quantification, the form of management applied and the costs. The problems and positive experiences of reduction of inorganic waste already matured will be emphasized.

At the end of the first phase, a report will be returned on the management improvement opportunities with the aim of reducing the inorganic waste produced, giving priority to recovery and reduction, and will be informed of the existence of mature technologies that involve process innovations.

At the end of this phase, 5 companies will be selected on which the analysis will be more in-depth to arrive at providing companies with feasibility studies and targeted business plans for each of the 5 companies.

The economic analysis will focus on changes in production parameters and on the cost benefits of the innovative strategies adopted. The impact of the innovations (ex-post analysis) will be simulated in the economic balance of the companies taken into consideration.

For the analysis of economic data, the Milk Money (MM) software will be used, produced by CRPA Spa, the research organization selected by Confagricoltura - Sepe, which allows the calculation of the cost of milk production divided into direct costs and factors of production. MM will be used to measure the effect of introducing innovations in dairy farms from an

economic point of view.

With regard to the food industry dairy sector most of the waste generated by a dairy firm is inorganic: primarily packaging waste from both raw and secondary materials as well as the finalproduct. Other wastes related to the maintenance activities, cleaning or laboratory and repair work are also produced. The recycling and treatment of waste generated in a dairy firm begins with separation, which avoids their being discarded with liquid waste and mixing together that would prevent adequate treatment of each type of waste. Minimization of waste in dairy industries The dairy industries are characterized by the production of very perishable products that must be protected with packaging in order to market them. Optimisation of the ratio of weight of packaging to weight of product permits reducing unnecessary consumption ofresources and/or energy for their production and reduces the amount of packaging waste that will remain on the market once the product is consumed. In order to implement a minimizationplan for packaging in a dairy firm, the following steps are usually taken:
• Carrying out of an inventory of all packaging used by the firm regarding formats, type of materials, volumes, specifications, etc.
• Study of possibilities for minimization of packaging (changes in material, characteristics of the material, packaging design, volume of packaging, transportation, storage)taking into account among other things the product's needs and the conditioning factors of the transportation system and storage used.
• Application of the measures;
• Quantification of the results.


Positive known examples relating to the dairy sector are:
a) replace the current procurement procedures (for examples products used for cleaning and disinfection) with return-refill schemes in order to reduce the quantity of packaging waste;
b) change the current business model to reducing the use of plastics (for examples in dairy sector the use of a feed different from silage);
c) implement industrial symbiosis initiatives to create biodegradable products from agricultural waste.

After the launch of Phase 1 of Testing activity SEPE and FEDSERV have already identified a series of possible technological solution to carry out, if applicable, in Phase 2.

The main inventory of waste in the dairy industry could be summarised as follows:

Table 19: Waste in the dairy industry

| PRODUCTIVE PROCESS | LEVEL OF GENERATION | MOST SIGNIFICANT OPERATIONS | OBSERVATIONS | PPO |
|---|---|---|---|---|
| Milk | High | Filtering/Clarification Skimming/Homogenization Packaging | Used filters and sludge from filtering organic material Waste from packages and packaging | 25 |
| Cream and butter | High | Packaging | Waste from packages and packaging | 25 |
| Yogurt | High | Packaging | Waste from packages and packaging | 25 |
| Cheese | Low | — | Mainly from secondary operations | 25 |
| Secondary operations | Medium | Cleaning and disinfection Maintenance of installations Laboratories | Waste from packaging from cleaning and disinfection. Waste from maintenance operations. Laboratory wastes | 24-26-32 |

| GROUP | | WASTE | PLACE OF GENERATION | CUSTOMARY USES |
|---|---|---|---|---|
| Organic wastes | | Rejected product (raw material, semi-finished product, final product) | Process | Recycling (animal feed) |
| Similar to domestic waste | | Bits of food, paper | Offices | Composting or storage at a dumping site |
| Packaging and packing | Empty | Removable film, wooden pallets heavy paper bags, Plastic, glass, cardboard, paper packaging | Reception | Reuse or recycling |
| | Full | Plastic, glass, cardboard, paper packaging | Packaging Storage Returns | Dumping or separation of the packaging from the product and separate management |
| Waste from maintenance operations | | Electric cables, scrap iron | Workshops Maintenance areas | Recycling or storage at dumps |
| Hazardous waste | | Used oils, batteries, packaging from hazardous waste | Laboratory Storage Workshop Cleaning areas | Transport, treatment and elimination or storage at hazardous dump sites |

# 3.1. SWOT analysis entire chain

| Strengths | Weaknesses |
|---|---|
| • Consolidated experience in the dairy sector of the selected research center <br><br> • The possibility of testing innovations on a sample of companies with different dimensional and production characteristics. <br><br> • Close relationship between Confagricoltura and the companies involved in the testing phase | • Difficulties for companies to find information on available innovations and resistance to applying them for costs <br><br> • Completeness of data due to the limited availability of companies <br><br> • Withdraw of the project by the companies involved…. |
| Opportunities | Threats |
| • Public administrations' sensitivity to supporting agricultural enterprises in waste management <br><br> • In the Region selected, the dairy sector represents a widespread, organized, consolidated and innovation-oriented supply chain <br><br> • Activation of synergies between the companies involved in the project and the stakeholders | • Rapid technological evolution to make obsolete the innovation tested <br><br> • Introduction of prohibitions and regulatory restrictions related to the context in which innovation is placed <br><br> • Small number of innovations already available for the reduction of waste produced by the dairy sector |

## 3.2. Expected results and impacts

On the basis of the statistical data and the experience of the operators in the Agricultural and waste sector it emerged that the type of inorganic waste most present in Emilia Romagna is made up of plastic waste including packaging and plastic baling nets and wires. This last one in particular makes up over 90 % of the total waste for a dairy farm. For this reason it is believed that the test phase will investigate innovative solutions on these types of waste.

In particular, as regards the management of waste from the baling nets, initiatives are underway to identify ways and synergies between all the actors involved in the management of this waste to facilitate recycling.

Therefore this project fits perfectly at the local level and not only in the search for a market analysis service in order to identify mature technologies or innovative processes with the aim of reducing or eliminating this waste and / or other inorganic waste produced.

# 3.3. INTERVENTION PLAN EMILIA-ROMAGNA

## AGRICULTURAL DAIRY SUPPLY CHAIN POSSIBLE ACTIVITIES

| Name of the company | Content of the testing phase to reduce inorganic waste. Description of the services that are implemented per each company |
|---|---|
| 1 Medium to large company | Cheese Grana Padano - Biogas plant –annual revenue 2.000.000 euro. <br>• silage film and plastic ballast bags<br>• plastic baling nets and wires |
| 2 small company | Cheese Grana Padano – annual revenue 500.000 euro.<br>• silage film and plastic ballast bags<br>• plastic baling nets and wires |
| 3 Medium company | Cheese Parmigiano Reggiano – annual revenue 1.000.000 euro.<br>plastic baling nets and wires |
| 4 large company | Cheese Parmigiano Reggiano and fresh cheese – annual revenue 3.500.000 euro.<br>• plastic baling nets and wires |
| 5 small company | Squacquerone Cheese (fresh cheese) – annual revenue 500.000 euro.<br>• silage film and plastic ballast bags<br>• plastic baling nets and wires |

## INDUSTRIAL DAIRY SUPPLY CHAIN POSSIBLE ACTIVITIES

| Name of the company | Content of the testing phase to reduce inorganic waste. Description of the services that are implemented per each company |
|---|---|
| 1 Medium to large company | REDUCTION OF TICKNESS OF PACKAGING USED |
| 2 small company | REPLACEMENT OF PLASTICS WITH BIODEGRABLE MATERIALS OR OBTAINED BY RENEWABLE SOURCES |
| 3 Medium company | FOCUS ON END-USE DESTINATION REPLACEMENT OF COMPOSITE MATERIALS WITH OTHER NANOMATERIALS TO IMPROVE THE RECOVERY OF PACKAGING AT ITS END-LIFE |
| 4 large company | ADOPTION OF NEW TECHNOLOGIES OF CONTROLS TO PREVENT DISTRUCTION OF PACKAGED FOOD |
| 5 small company | USE OF GLASS POT |