

More sustainable plastics for use in the meat industry (MATSOS)

Summary

The European plastics strategy published in January 2018 proposes a number of actions to achieve the changes needed to move towards a circular economy that will reduce waste generation and increase the recycling rate and reuse.

Ensuring 100% of plastic packaging marketed in 2030 is recyclable, compostable or reusable requires investment in sustainable solutions that involve efficient use of resources, without compromising the shelf life of packaged foods or consumer safety.

The MATSOS project aims to meet this challenge by developing new structures of more sustainable plastic materials for the packaging of fresh, cooked and cured meat products, following EU Regulation 10/2011 on 'plastic materials and objects intended to come into contact with food'.

In order to improve the sustainability of plastic packaging used for packaging the meat products of interest, work was conducted in different areas, such as: reducing the amount of virgin material needed for its manufacture by reducing the weight of the packaging and/or using post-consumption recycled plastic; use of monomaterials, removal of sealing layers and/or barriers and replacing them with adhesives; coatings or alternative barriers in multilayer materials in order to facilitate subsequent recycling; and even the use of raw materials from renewable sources for the manufacture of compostable packaging.

The new plastic materials were obtained through transformation techniques such as extrusion, co-extrusion, extrusion-coating and lamination.

The meat products in the study used modified atmosphere packaging (MAP) or vacuum packaging by means of different packaging systems (flow-pack, thermoformed and thermosealed) with the materials developed with variable mechanical properties and gas/humidity barriers, depending on the preservation requirements for each type of product, to observe their behaviour during packaging (machinability) and shelf life (sensory and microbiological) compared to those currently used.

Objectives

- To develop new structures of more sustainable plastics for the meat industry with the aim of reducing the quantity of raw materials (resins) required and post-consumption waste and/or improving recyclability.
- Validating these materials by studying the shelf life of various meat products has enabled the potential of these new materials for replacing those currently used to be determined and may even allow changes bringing us closer to a resource-efficient circular economy.
- Obtaining more sustainable materials for the packaging of the study meat products without compromising the shelf life of food, while maintaining quality and safety for the consumer.

Description of the actions carried out in the project

- Studying and analysing the materials, packaging systems and characteristics of the study products on the market in order to define possible lines to follow to obtain more sustainable plastics.
- Designing and manufacturing new material structures: application of ecodesign.
- Characterising the new structures in technical and functional terms (machinability).
- Determining the useful life of the new structures of sustainable plastic materials in commercial conditions compared to currently used materials.
- Transferring the results to the industry through magazines, newsletters, conferences and information sessions, among others.

Final results and practical recommendations

The final results of the project were highly satisfactory, leading to reductions in the amount of raw materials needed to manufacture the new materials (reducing the weight of packaging) in most packaging solutions. Structures were designed with fewer differences in the nature of the polymers present, thereby facilitating subsequent recycling. Finally, the structures of plastic materials were optimised to match the functional needs of the packaged product.

Some of the results obtained are given below, by family of meat product:

For MAP fresh meat products, where gas barrier requirements are not critical and where the product has a short shelf life (<10 days), the use of monomaterials is a viable sustainable solution. Aspects of appearance (transparency, presence of wrinkles in the container) and machinability (cut of the guillotines) will need to be improved.

For vacuum-packed sliced cooked meat products, there are sustainable solutions based on structures with polymer from the same family that ensure the preservation of this type of product. In the case of MAP sliced cooked meat products, the reduction in the thickness of the base does not compromise the product shelf life. Coating-based barriers applied to flexible materials (lids) guarantee product preservation, but new oxygen barriers in semi-rigid materials will have to be explored, as the tested alternatives lose their effectiveness over time.

In cured meat products with the presence of fungus and a long shelf life, it is important to adapt the permeability of the sustainable material to the water activity of the product and its susceptibility to oxidation. Monomaterial solutions provided preservation results equivalent to those currently used, while this was not the case for the tested compostable alternatives.

The companies adapted the plastic materials commonly used for packaging their products in more sustainable structures during the course of the MATSOS project and already use some of the developed and validated packaging solutions.

Conclusions

- There are viable sustainable solutions for the packaging of fresh, cooked and cured meat products.
- Exploration of new sustainable oxygen barriers for MAP sliced cooked meat products should continue.
- If any factor in the value chain of a product is changed, the shelf life must always be validated under reasonably foreseeable temperature conditions.

- Making the European plastics strategy a reality requires innovation in more sustainable materials, such as those developed by the MATSOS project, which contribute to reducing waste and facilitating its recycling. At the same time, new processes for the management and recovery of this plastic waste must be developed in order to achieve a true circular economy.

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Subject area(s) of application

- Agricultural production system
- Agricultural practice
- Agricultural equipment and machinery
- Livestock farming and animal welfare
- Vegetable production and horticulture
- Landscape / Territorial management
- Pest and disease control
- Fertilisation and nutrient management
- Soil management
- Genetic resources
- Forestry
- Water management
- Climate and Climate Change
- Energy management
- Waste and by-product management
- Biodiversity and environmental management
- Food quality/processing and nutrition
- Supply chain, marketing and consumption
- Competitiveness and agricultural and forestry diversification
- General

Geographical area(s) of application

PROVINCE(S)	REGION(S)
BARCELONA	BAGES OSONA VALLÈS ORIENTAL

Dissemination of the project (publications, seminars, multimedia, etc.)

- f) Presentation of the project at the webinar 'SUSTAINABLE PACKAGING FOR THE MEAT SECTOR' organised by INNOVACC Cluster, Packaging Cluster and FECIC, held on May 27, 2020.
- Watch the webinar video at the following link:
<https://www.youtube.com/watch?v=uylrO1N8IKY&t>
- g) Presentation at the conference organised by the Ministry of Agriculture, Fisheries and Food on June 16 'Virtual exchange between Operational Groups and Innovative Projects on the topic of Improvements in the Agri-Food Industry'. See the following link:
<http://www.redruralnacional.es/-/intercambio-virtual-entre-grupos-operativos-y-proyectos-innovadores-con-tematica-de-mejoras-en-la-industria-agroalimentaria>

Project website

<https://www.innovacc.cat/2018/07/23/el-projecte-materials-plastics-mes-sostenibles-a-la-industria-carnia-matsos-a-obtingut-un-ajut-de-grups-operatius-del-darp-2017/>

More information on the project

PROJECT DATES	TOTAL BUDGET
Start date (month-year): June 2018	Total budget: €181,338.79
Completion date (month-year): September 2020	DARP funding: €74,109.40
Current status: Executed	EU funding: €55,907.09
	Own funding: €51,322.30

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Order ARP/133/2017 of 21 June, approving the regulatory bases for grants for cooperation for innovation by promoting the creation of European Association for Innovation operational groups in the areas of agricultural productivity and sustainability and the execution of innovative pilot projects by those groups, and Resolution ARP/1868/2017, of 20 June, announcing the call for the grant.

