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Flow diagram for ABPs between pilot plants in order to obtain maximum added-value products

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D1.3 Flow diagram for ABPs between the different pilot plants in order to obtain maximum added-value products

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Description
ABP	Animal by products
PAP	Processed Animal Protein



1. Summary

One of the main objectives of PILOT-ABP project is to give the highest value to products obtained from ABPs by combining different technologies. Three innovative technologies will be developed applied to several feedstocks coming from ABPs, all of them linked to each other. Jointly, the three pilot plants will address the whole process of ABP treatment in a complementary way: the HTL plant will deal with the raw material, the high value oil plant will deal with the oil fraction and the biopolymer plant will deal with the protein fraction.

This deliverable includes the definition of the feedstock input for each one of the pilot plants and also sets up the logistics and handling procedures for the transfer of feedstock ABPs and the obtained products between the three pilot plants. The plan for delivery of products to the plants has been conceived to be as environmentally-friendly as possible, with a low carbon footprint during the process.

The result achieved in this task was the establishment of the best flow process among the pilot plants to maximize the added value of the products obtained.

2. Introduction

PILOT-ABP project aims to deal with ABP of Category 3, according to Regulation (EC) 1069/2009. These materials are considered as safe and include parts of animals that have been passed fit for human consumption, but which are not intended for consumption, either because they are not parts of animals that we normally eat (hides, hair, feathers or bones) or for commercial reasons. But they also include former foodstuffs and catering waste.

Another raw material considered in the PILOT-ABP project is the animal slaughter by-products exclusively from approved animals for human consumption in accordance with Directive 2002/99/EC (meat leftovers). These materials include products obtained from animals and products obtained therefrom, for human consumption, including live animals where they are prepared for such use. Figure 1 shows a schematic diagram of the possible animal by-products in the meat industry.

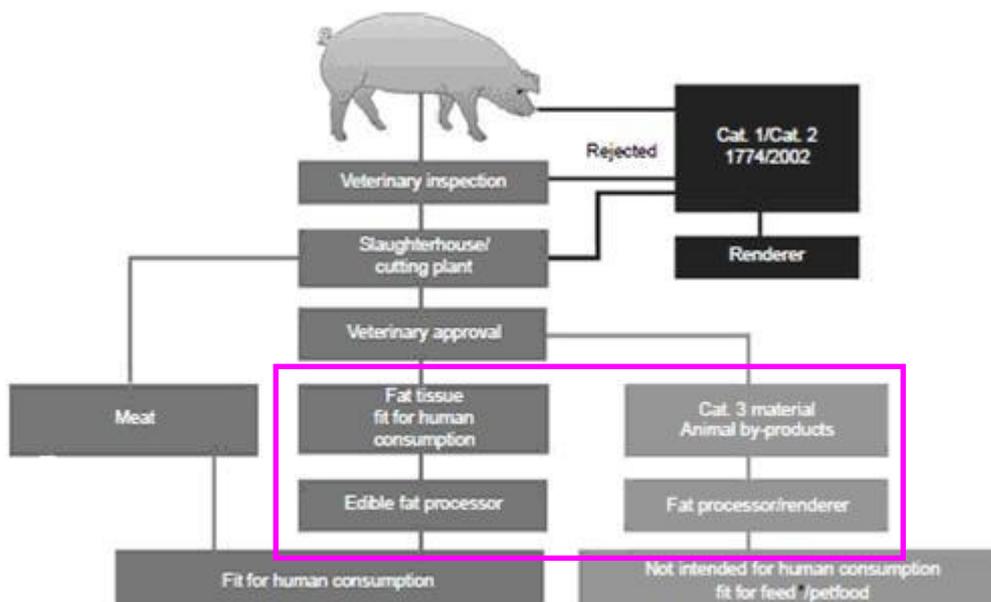


Figure 1: Schematic diagram of animal by-products¹

As a result of the thermal treatment of ABP from Category 3 and leftovers, two main products are obtained: the protein fraction (PAP) and the fat fraction.

These fractions will also be used in PILOT-ABP pilot plants since the project was conceived to give all the products involved in treatment of the ABP wastes the highest added value. The set of the three pilot plants will address the whole process in a complementary way, the HTL plant will deal with the raw material, the high value oil plant will deal with the oil fraction and the biopolymer plant will deal with the protein fraction.

3. Feedstock input for the different pilot plants

3.1 HTL pyrolysis pilot plant

This pilot plant will be designed to treat raw material and a mixture of the processed fractions in the same proportion as the raw material. The feedstock of this pilot plant will be:

- Unmilled raw material from Category 3 ABP and final products (PAP and fats) from a Spanish rendering company (through INESCOP as Coordinator).
- Final products from meat leftovers suitable for human consumption (chicken extract and chicken fat) from CARNAD.

¹ S. Woodgate, J. van der Veen, "The role off at processing and rendering in the European Union Animal production Industry". *Biotechnol Agron Soc Environ*, 2004, **8**(4), 283-294.



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- University of Alicante is making contacts with different slaughterhouses in the region, trying to get ground raw material with a suitable particle size to be used in the reactor.

As a result of the process an oil fraction will be obtained, which may be used as feedstock of the pilot plant for high value oils.

3.2 High value oil pilot plant.

This pilot plant will be designed to treat the fat fraction of the ABPs. For the high-value oil pilot plant, both leftovers (food grade) and by-products (not for consumption) are chosen.

Carnad A/S will deliver leftovers, including oil/fat from:

- Pig
- Cattle
- Chicken
- Duck

By-products will be delivered from the biopolymer and HTL pilot platforms to be evaluated in this process.

3.3 Biopolymer pilot plant

This pilot plant will be designed to treat the processed proteins from raw material. The feedstock of this pilot plant will be:

- Feedstock input 1: Processed Animal Proteins (PAPs), to be supplied by a Spanish rendering company (same provider as for HTL pilot plant)
- Feedstock input 2: Proteins obtained as by-products at HTL and high-value-oil pilot plants.

Moreover, there will be an output of by-products of the process: residual fat and oils obtained as by-products at the biopolymer pilot plant, which will be supplied as feedstock to HTL and high-value-oils pilot plant.



4. Flow diagram between the different pilot plants

Figure 2 below shows the schematic overview of the three pilot plants within the whole process of management of ABP wastes. Extraction of high value oil from leftovers from the food industry has been considered in the diagram, together with the processing of Category 3 materials.

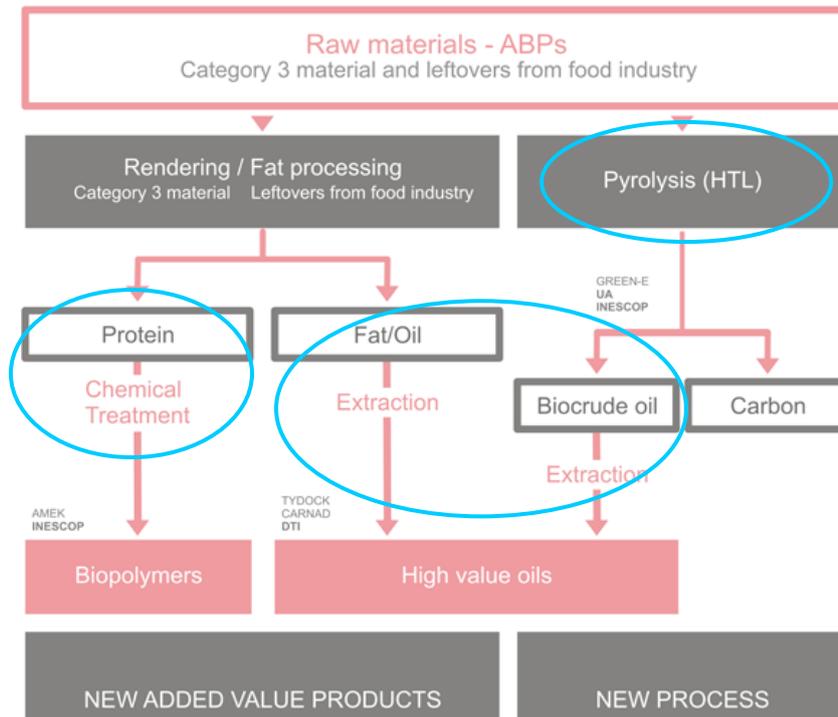


Figure 2: Schematic overview over the three pilot plants

The three pilot plants are related, therefore, the output of the pilot plants may be used as feedstock of the others. The flow diagram between samples used as feedstock in the three pilot plants is shown in Figure 3.



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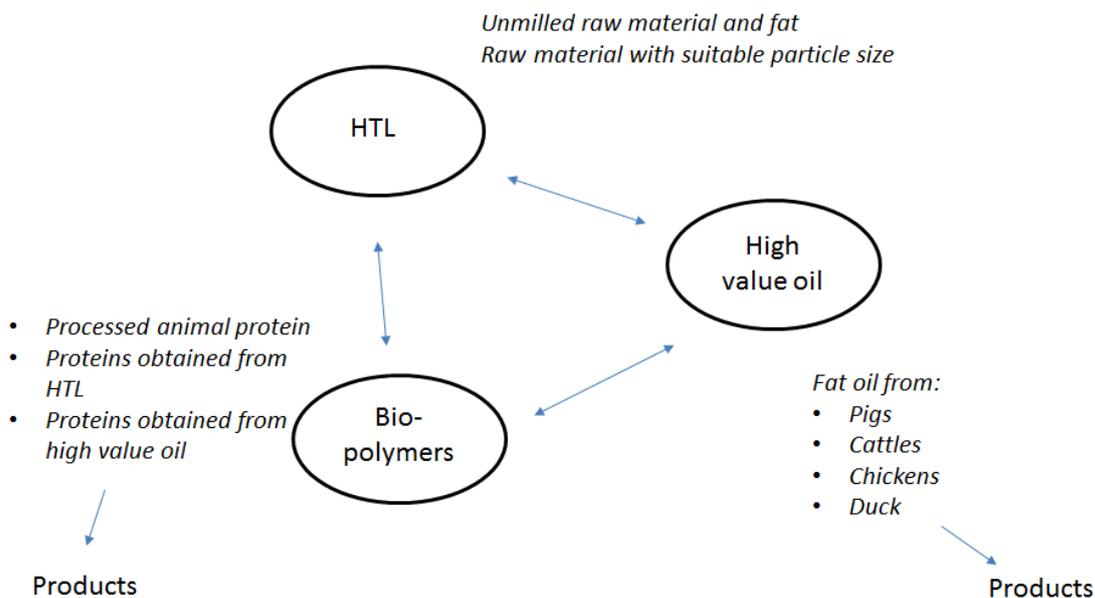


Figure 3: Flow diagram of raw material and products between the pilot plants

5. Logistics and handling procedures for transport of raw materials and products obtained between the pilot plants.

Raw materials

Transport of raw materials will take place in the most suitable way depending on the transport time and the mean of transport. If possible, frozen transport will be used to minimise changes in the material during transport. It is to be considered that due to the nature of this product, samples can easily decompose, and thus it is important to get a supplier from the region, so as to avoid long frozen transport of the product.

The HTL pilot plant, which will be located in the region of Alicante (Spain), will use raw materials as feedstock. The University of Alicante is responsible for contacting local slaughterhouses in order to provide the fresh raw materials within the shortest transport time.

One Spanish rendering company has been chosen as supplier of all the feedstock needed in the pilot plants located in Spain. They have committed to supply the products within a few days from request.

Fat/oil

The fatty fraction resulting from the treatment of raw leftovers from food industry will be delivered to the high value oil pilot plant, located in the region of Aarhus (Denmark).



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No special temperature conditions are required for the transport of this kind of material. Hence, it will be delivered following the usual procedure of shipping or transport agencies.

The oil fraction resulting from the HTL pilot plant and the residual fats from the biopolymer pilot plant will be collected in suitable containers. They should be conical shaped or with a manifold to facilitate drainage. Furthermore, they should be hermetically sealed. Containers will be shipped to Denmark all at once, in order to reduce the financial and environmental cost of the shipment.

The partners responsible for the development of the pilot plants will be also in charge of storing these products until shipment. They should keep the material in good conditions for the subsequent extraction process. Product alterations due to oxidation, hydrolysis and contamination shall be avoided.

Proteins

The protein fraction obtained after the treatment of raw material of Category 3 will be used in the Biopolymer pilot plant that will be located in the region of Alicante (Spain).

The Spanish rendering company will provide the processed proteins to the Biopolymer pilot plant. Furthermore, the protein fraction obtained as a residue from oil extraction carried out in the High value oil pilot plant will also be delivered to the Biopolymer pilot plant. It will be collected and stored in suitable containers and transported from Denmark to Spain following the usual procedure of transport agencies.

In order to reduce transport costs as much as possible, it was decided that a maximum of four shipments per year will be carried out between both countries.