Recovery of low commercial value proteins from pork slaughterhouse sub- and co-products

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https://www.innovacc.cat/2016/08/24/valoritzacio-de-proteines-de-baix-valor-comercial-procedents-de-sub-i-co-productes-descorxadors-de-porci/

Sausages made with spleen protein as a meat substitute. Photo: Operational Group.

ZnPP ingredient. Photo: Operational Group

01. Rationale

Based on the assumption that in the near future the demand for meat proteins will tend to exceed the productive capacity of traditional sources and, taking into account that the level of use of by-products and co-products from pig slaughterhouses is far from optimal, this project proposed to develop systems to make profitable use of low commercial value products as a source of high biological value proteins and ingredients with technological functionality.

Different protein fractions were obtained from various viscera such as livers, spleens and hearts. The previously minced organs were subjected to extraction under the most suitable pH conditions to obtain two fractions: a soluble one rich in haemoproteins, and an insoluble one that still contains the discoloured tissue proteins.

A system was also developed to obtain a stable dye made from zinc protoporphyrin from livers.

The general objective of the project was to obtain proteins from porcine organs of low commercial value that, thanks to their functional properties and high nutritional value, would be useful as ingredients in the food industry.

02. Results and conclusions

- Extraction conditions that make it possible to obtain insoluble fractions with a higher protein content from pig spleens, hearts and livers, were determined.
- The best conditions for obtaining a surimi-like product from the viscera are:
  - Polishing of the viscera by removing connective tissue (splenic hilum, main heart arteries and veins)
  - Extraction at acid pH (4.5-5)
  - Washing of the insoluble fraction with water, with a water-to-product ratio of 1:2 or 1:3 (between 1 and 3 washes with stirring, depending on the desired degree of discolouration)
  - Separation of the proteins by filtration/centrifugation
  - Freezing and preservation in frozen state
- The extraction and washing to obtain the protein extracts results in a significant discolouration and loss of the characteristic viscera odour, which can facilitate the incorporation of these extracts into food formulations without causing undesirable abnormal properties.
- The soluble fraction, obtained under the above conditions, has functional properties, but retains the aroma-carrying molecules and haemopigments, making it difficult to introduce into food formulations, and it is therefore suggested that it be used for the manufacture of pet food.
- Substitution of soy proteins for spleen proteins, and lean meat for spleen and heart proteins in cooked pâtés has been tested.
- Pilot trials are recommended to ensure successful industrial-scale manufacture of viscera products.
- Optimal conditions for the formation of Zn-protoporphyrin from pig livers have been established and have resulted in two types of ingredients with colouring capacity.
- The application of these ingredients allows the production of meat products with an optimal colour similar to their raw and cooked analogues. Thus, they can allow the reduction and even the elimination of nitrates and nitrites.
- The application of these ingredients can improve the colour of meat products produced without nitrifying agents.
- The design of effective strategies could allow an increase in a large number of consumers in the intention to purchase meat products made with offal extracts.

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