DETECTION OF ADDED ANIMAL AND PLANTS INGREDIENTS IN CANNED TUNA MEAT

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Background

Food products may contain ingredients unexpected by consumers. These ingredients are used because of their low prices or their technological properties. But, they could also be allergenic, such as the major food allergens (milk, egg, soy, gluten, nuts), for concerned people. Therefore, characterization of components in meat and fish products is of great interest for public health and also for economic reasons.

Objectives

To evaluate the efficiency of different laboratory techniques to detect animal and plant ingredients added in canned meat products. The experimental models were canned tuna meat in brine, or in oil.

Materials and methods

Two batches of different canned tuna meat were prepared in the IFREMER experimental processing laboratory: canned tuna in brine (1 to 4), and canned tuna in oil (5 to 8). Each batch was divided in four groups. Three groups contained a different ingredient: 0.4% hydrolysed milk proteins (1 and 5), 0.4% dehydrated vegetable extracts (2 and 6), or 0.4% vegetable broth base (3 and 7). These quantities of ingredients correspond approximately to 25% of the amounts often used in the countries where they are authorized. The fourth group (4 and 8), used as negative control, did not contain any of these ingredients. The cans were sterilized at a sterilizing value (Fo) of 6.5, corresponding to 115°C for 68 min.

Milk proteins were assayed according to direct ELISA (Enzyme-Linked ImmunoSorbent Assay) procedures using antibodies raised at CTSCCV (Demeulemester *et al.*, 1991; Demeulemester and Guizard, 1996).

Gluten detection was performed using Transia Plate Gluten kit from Diffchamb S.A. (Lyon, France) according to the manufacturer's instructions.

Histology was performed after the samples were embedded in paraffin as previously described (Barraud, 1963; AFNOR-CTSCCV, 1987), the original technique being automated and slightly modified (Bergeron *et al.*, 1993). Results of histological analyses were obtained after observation of specific images visible under a microscope (Méret *et al.*, 1998).

Results and discussions

Results of immunodetection of milk proteins were presented in table I. The threshold of detection was set at an absorbance of 0.200 because the mean of absorbances values of the negative controls x 3 was inferior to 0.200. Milk proteins were detected only in products 1 and 5 which contained hydrolysed milk proteins.

Transia Plate Gluten kit detected gluten in products 2 and 6 containing dehydrated vegetable extracts (figure 1). No gluten was found in the other products.

Histology revealed the presence of starch and pea in products 2 and 6 containing dehydrated vegetable extracts and soya-like and pea-like structures in products 3 and 7 containing vegetable broth base. Typical images of soya isolate and pea are shown on figures 2 and 3.

No added ingredient was identified in the negative control products (4 and 8).

Conclusions

The reported techniques gave very reliable results. Their use allowed to give complementary informations about the ingredients added to each experimental product, in canned tuna in brine, as well as in canned tuna in oil. They can be performed on all other meat products.

These techniques are not quantitative, but very low rates can be detected. They are a complement for chemical analysis to assess conformity of food products with labelling and practices (CTSCCV, 1997) and to warrant fairness in trades.

References

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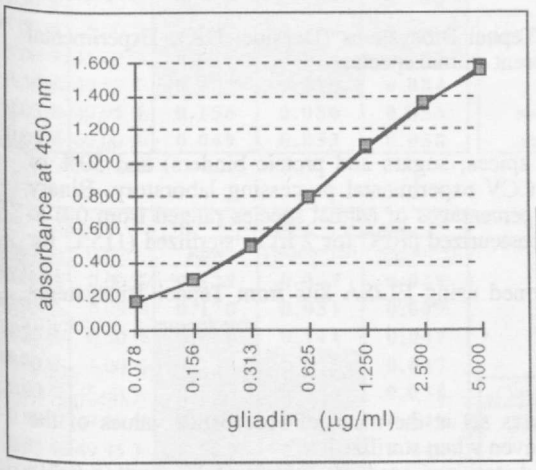
Samples	Absorbances at 405 nm	
	RaMP	RaNR
PBS	0.038 / 0.039	0.025 / 0.026
positive control	0.504 / 0.470	0.024 / 0.027
negative control	0.046 / 0.044	0.025 / 0.028
product 1	0.282 / 0.287	0.029 / 0.030
product 2	0.035 / 0.035	0.033 / 0.035
product 3	0.034 / 0.033	0.029 / 0.032
product 4	0.033 / 0.035	0.031 / 0.032
product 5	0.311 / 0.337	0.027 / 0.030
product 6	0.035 / 0.036	0.034 / 0.037
product 7	0.032 / 0.034	0.030 / 0.029
product 8	0.032 / 0.034	0.030 / 0.032

Table I. Immunodetection of milk proteins. Absorbances of the controls and samples obtained with non relevant rabbit serum (RaNR) and with rabbit anti milk proteins (RaMP) were reported. PBS: phosphate buffered saline; positive control: meat product containing milk proteins; negative control: meat product without milk proteins. Samples were performed in duplicate. The threshold was set at 0.200. Positive results are written on grey background.



Samples	Absorbance at 450 nm
product 1	0.014 / 0.013
product 2	0.590 / 0.581
product 3	0.016 / 0.016
product 4	0.013 / 0.013
product 5	0.012 / 0.012
product 6	0.575 / 0.575
product 7	0.012 / 0.014
product 8	0.011 / 0.021

Figure 1. Immunodetection of gluten. Gliadin standards were 0, 0.078, 0.156, 0.313, 0.625, 1.25, 2.5 and 5 µg/ml. The resulting absorbances of standards were read and the standard curve "absorbance = f(µg/ml gliadin)" was drawn. Absorbances of the samples were reported. All standards and samples were performed in duplicate. Positive results are written on grey background.

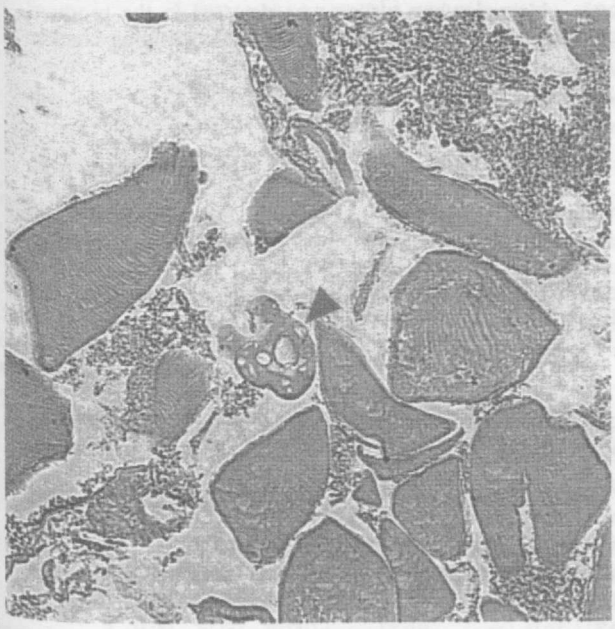


Figure 2. Soya isolate in canned tuna meat in brine (product 3). Gx200 - Calleja staining

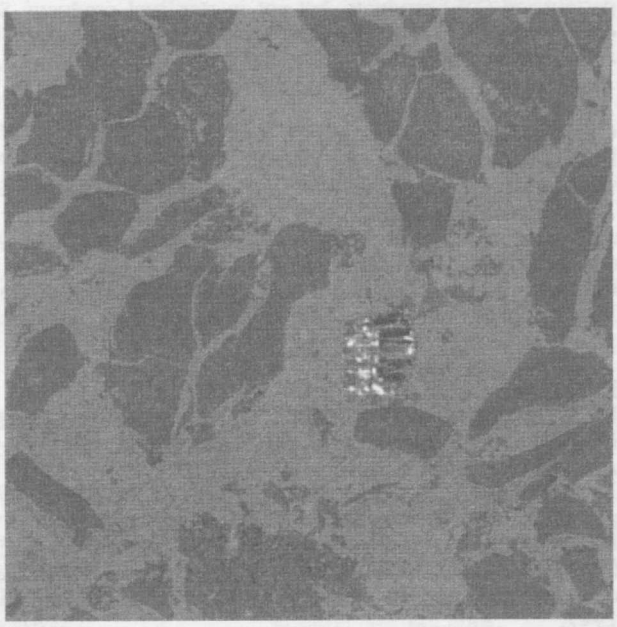


Figure 3. Typical image of pea in canned tuna meat in oil (product 6). Gx100 - Polarized light microscope.