

Contribution of Histochemical Techniques in the Identification of Polysaccharides in Meat Products

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Abstract

Nowadays, the consumption of meat products is marked by significant increase in the world. Because of the economic value of the meat, the likelihood of using products that are not desirable is possible in the meat-based products. The objective of this study is to exploit the histochemical techniques for the detection of certain additives added fraudulently, particularly the sour and starch.

For this reason, seven different meat products were randomly selected, during a period of one month, to be studied using a variety of histochemical techniques that have been carried out on sections of the paraffin-processed by coloring PAS-Calleja and Lugol-Calleja.

The technique histochemical PAS-Calleja made his way, with success, to be an original technique, in order to test the phenomenon of strafing bound to a sum fraudulent of the sugars. While the staining Lugol-Calleja, specific to the testing of starches, allowed to differentiate between the two populations of starches present in meat products : added fraudulently, and the one that comes from the spices.

Histochemical techniques have shown, for excellence, their capacity for quality assessment of meat products. Especially the determination of the addition fraudulent polysaccharides.

Keywords: *Meat Product, Quality, Histochemical Techniques, Control, And Polysaccharides*

Introduction

To describe the healthy value of a meat products, it is important to know its elements of composition. Outside of the meat and fats, various additives can be observed on the étiquètes meat products among other starch.

The starch is considered as one of the nourishment added substances the most flexible of the nourishment business. Starches are a piece of numerous nourishment items and may impact or decide fundamentally their surface and their functional properties [1]. Various sorts of starch (potato, wheat, corn, custard) can be found in meat items, in native form or modified. Local and changed starches have not just various consequences of the mechanical properties, utilitarian and rheological of the meat item the end, yet they likewise contrast in the manner in which they are utilized [2].

The reason for this study was the approval of the technique for histochemical staining for the discovery of polysaccharides in meat products and the depiction of its fundamental standards.

Materials and Methods

Seven brands of different meat products available on our market have been purchased, and in detail, of the stores, during a period of one month. Of each brand we took three samples, one has, therefore, in total twenty-one samples studied.

The brands were anonymously designated P1 to P7 (P : product) in order to avoid any bias during their evaluation. The categories of the purchased products are : hot-dog (P1), pâté, beef (P2), mortadella chicken (P3), Luncheon of chicken (P4), luncheon beef (P5), pâté of poultry (P6) and cachir (P7).

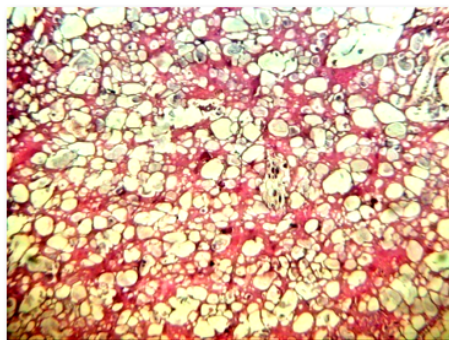
A piece of each product was fixed in buffered formalin 10% and embedded in paraffin. Histological sections of five micrometers (μm) of each sample were made and stained with hematoxylin and eosin (cuts witnesses).

The technical histochemical were used in our study, as a qualitative review to reveal the presence or absence of polysaccharides. Reason for the what two special stains, involving chemical reactions, have been used :

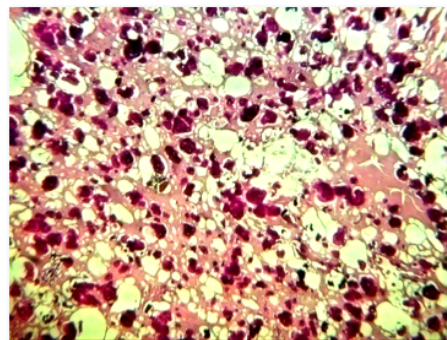
- PAS-Calleja : (*Periodic Acid-Schiff reagent*) : periodic acid reagent Schiff ; for the identification of polysaccharides which take a pinkish color. This color has been used on two slides for each sample according to the method described by Benesalem-bend-jelloul (1998). luna
- Lugol-Calleja: for the highlighting of the starch. The latter takes on a color, to dark purple to blackish. This color has been used on two slides for each sample according to the technique explained by [3,4].
- In the end, the histological sections were examined under a light microscope, pictures were taken for bioimaging.

Results and Discussion

The examination is macroscopic, and even microscopic, all products have a texture full of «holes». It is, perhaps, the phenomenon of «strafing». It is due to excess use of sugar, where the fermentation, the gas production and the appearance of holes. Reason for which it has applied the colouring NOT-Calleja-specific polysaccharides (Figure 1).



Sample section H and E.



Reaction PAS-Calleja positive. Note the deposits pinks, specific polysaccharides.

Figure 1: Meat emulsion, ($\times 40$).

The colouring PAS-Calleja, to our knowledge, has not been used, until today, on the strips of meat products in order to test the phenomenon of gunfire.

NOT-Calleja proves the hypothesis of an excess of uses of sugars in all samples with the exception of the mortadella of chicken, P3. While this adulteration is variable from one product to another (Table 1). Depending on the intensity of the purple color, which is specific to polysaccharides, the reaction is :

- Significantly positive (+++).
- Moderately positive (++) only for the Hot dog (P1).
- Weakly positive (+).

MP	P1	P2	P3	P5	P6	P7	P10
Intensity of the reaction	++	+++	-	+	+++	+	+++

Table 1 : Description of the reaction to the PAS-Calleja product type emulsion.
MP : Meat Product.

It should be noted that sugars are often added to meat products to :

- Lower the pH and reduce, therefore, the multiplication of microorganisms.
- Improve the color, especially for meat products roasting.
- Decrease the price, they are used as «fillers».
- While the content is authorized is between 0.5 and 3% [5].

At the same time, the reaction Lugol-Calleja has been applied as :

- Screening Test, in order to reveal the addition of fraudulent starch at the same time numerous studies [3,4,6,7].
- Qualitative review, in order to differentiate the two populations of starch, already quoted, added fraudulently, and that which comes spices (histological analysis «*knows how to differentiate between*» these two populations according to Durand [5] (Figure 2).



Figure 2: Reaction Lugol-Calleja positive (Lugol-Calleja × 100).

It is worth noting that the histochemical method Lugol-Calleja has been chosen for the testing of starches in meat products because of its compatibility with foodstuffs [8]. The detection limits are 100% for 10⁻³ g/kg of starch is added, and 87.7% for the concentration of 10⁻⁴ g/kg addition [7].

The starch has been indicated, as an additive, in any of the reviewed products. The same observation was observed for the spices. The results of which are summarized in the table below:

Lugol-Calleja	MP	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Starch added		-	-	+	-	+	-	+	-	-	-	-
Starch spices		+	-	-	-	-	-	-	+	+	+	+

Table 2 : Description of the reaction to the Lugol-Calleja of the samples.

MP : Meat Product.

In the meat industry, the starches of various plant species are utilized. Regularly, we can see the starch of potato, corn, wheat, and custard starch.

They are ranked among the main additives, to be effective, that increase the qualities of binding of the meat, improve the binding capacity and fat impact the texture, consistency, and stability of the final product (add to the rational structure of the item) [7]. In addition, the starch is added directly to the final product in order to increase the efficiency (ability to bind water), diminish the misfortunes during the cooking procedure, to improve the structure and quality of the cup, to enhance the succulence and extend the shelf-life thereof [6].

Nevertheless, this addition must be mentioned on the labelling. The food industry can use of starches with high amylose content or amylopectin [7]; consumers may have allergies vis-à-vis such substances.

Conclusion

Histochemistry allowed, more or less, of:

- Test, for the first time, the phenomenon of «strafing» that is linked to the addition of fraudulent of sugars. The coloring of NOT-Calleja proved the hypothesis that there was an excess of use of these in the samples examined, type emulsion.
- Differentiate between two populations of starch that may be present in a meat product : added fraudulently, and that which comes spices ; this is by means of thea histochemical method Lugol-Calleja specific in the detection of starches.
- In the end of the histochemistry can be a tool for further analysis, powerful enough and a method bench-top simple and economic, for the quality control of meat products to detect fraud in addition to, particularly those of the polysaccharides.

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