

# IMPROVEMENT OF THE PHYSICAL (TECHNOLOGICAL) AND SENSORY PROPERTIES OF MEAT PRODUCTS AND READY-TO-EAT MEALS BY THE ADDITION OF COLLAGEN HYDROLYSATES

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## SUMMARY

The addition of 2 or 3 per cent of commercial collagen hydrolysates ("Gelita-Sol", "Gelita-Collagel") in meat products and in ready-to-eat meals improves the technological and sensory properties of these products significantly. In the case of liver sausages in cans or artificial casings or when performed on pâté, pies and hot pots the addition of the hydrolyzed collagens causes an improvement of the consistency, reduction in gel and fat depositions and a lowering of the water activity ( $a_w$ -value). The application of Gelita-Sol to the frankfurter type (or scalded) sausage products, including canned meat product categories, exhibits enhanced colour and colour stability and a stabilization of the emulsion binding properties, which results in improved cutting firmness and a reduction in frying and grilling losses in a magnitude of 10 to 30 per cent. In addition the aroma and the taste of salt is enhanced in all products which enables a reduction of the common salt content of about 20 per cent, without impairing the product's desired saltiness.

## Introduction

There is a general interest in improving the technological and sensory properties of meat products and ready-to-eat or ready-to-cook food products. Research hitherto conducted has shown that the use of collagenous protein hydrolysates (Gelita-Sol<sup>1</sup> and Gelita-Collagel<sup>1</sup>) when added to cooked sausages, pâtés, stewed dishes as well as scalded sausage (frankfurter type products) and ready-to-eat dishes, does lead to substantial quality improvement with respect to the technological properties as well as the sensory parameters of the products (MARGGRANDER and HOFMANN, 1993, 1993a, 1993b). In this paper the essential results of these investigations are reported.

## Materials and Methods

Adding 2-3 per cent of collagen hydrolysate (Gelita-Sol<sup>1</sup> Collagel<sup>1</sup>; producer: Deutsche Gelatinefabriken Stoess AG, Germany), a series of different meat products was prepared and investigated sensorically as described in the text under the corresponding product groups (see next chapter). The number of testers of the taste-panel varied in the different product groups from 6 to 30. The samples have been compared with "control" samples being prepared without addition of collagen hydrolysate. Collagel is characterized by a higher range of molecular weight and higher viscosity in comparison with Gelita-Sol. The detailed product formulations were already laid down in former articles (MARGGRANDER and HOFMANN, 1993, 1993a, 1993b) and will, therefore, not be repeated here. The different products are characterized by the product's name and the supplementary additions given in the text (see "Results and Discussion"). The terms "scalded sausage products" and "frankfurter-type sausage" are largely synonymous and have been used interchangeably in this article. And finally, some German product names, for which authentic English translations do not exist, have not been changed in their original designation.

The sensory tests designed to determine distinctness of taste and flavour with respect to the product tested as well as to ascertain improvements in product colour, were performed in form of simple, subjective preference tests. Panelists involved in the taste and flavour tests were asked, for example: "Which product tastes best, which product has the strongest flavour?" All products were encoded and the product testing sequence underwent change constantly. The question into an improvement in product colour followed the same pattern. In fact, the formulation here was: "Which product has the stronger, more appealing colour?" The number of positive evaluations was estimated as a percentage of the number of testers. These results are presented in a reduced way in the Tables by

plus (or minus) signs (definitions are given in the Table's legends).

For measuring consistency and texture, a Stevens-LFRA-texture analyser was used. The following measuring heads were tested: cylinder-, cone-, sphere, needle- and knifehead. For cooked sausage products and pâtés the cone and cylinder-shaped measuring heads, and for frankfurter-type sausages heads of spherical, needle and knife shape were used. The measuring results were recorded by the electronic single channel recorder by Kipp & Zonen (Delft, Netherlands), type BD 40.

The total nitrogen content of samples made was determined by the Kjeldahl-method. Difference observed vs "control" helped determine the higher connective tissue protein level resulting from the addition of the gelatin products.

### Results and Discussion

The results of investigations are essentially presented in Table 1-3, and the following abbreviations are being used: GS = Gelita Sol<sup>1</sup>, CG = Collage<sup>1</sup>, P = product. Three groups of products (A-C) were examined and will be described and discussed separately in the following chapters.

#### **A. Cooked sausage products, pâtés, pies and hot pots.**

The products under investigation in this group are characterized as follows:

- P1: liversausage, finely comminuted, in artificial casing (2,5% GS)
- P2: liversausage, finely comminuted, canned and sterilized (2,5% GS)
- P3: liver pâté (Brussels style) baked and presented in appropriate receptacles (2,5% GS)
- P4: liver pâté, beater-prepared, fresh product (2 resp. 3% CG)
- P5: spreading paste with liver, sterilized (2% GS)
- P6: turkey pâté in portioned cans, sterilized (2% GS)

The results (Table 1) indicate that the addition of collagen hydrolysates improves the sensory properties of the different meat products.

Furthermore (results not listed in Table 1), in liversausage in casing gel deposition was reduced about 4% and fat deposition about 14%. In most products water activity was decreased which, consequently, improves their shelf-life.

Finally, it may be concluded that the positive influence of collagen hydrolysates on the sensory properties is most effective in the case of sterilized meat products.

The products investigated under this headline, table 1, are characterized as follows:

- P7: "Bratwurst" (frying sausage), finely comminuted, scalded, in natural casings
- P8: "Bratwurst" (frying sausage) medium coarse (minced), scalded, in natural casings
- P9: meatloaf ("Fleischkäse"), finely comminuted, baked in molds
- P10: hot dog-type sausages, canned and sterilized, in peel-off casings
- P11: wieners, fresh product, scalded, in collagen casings
- P12: luncheon meat, canned and sterilized
- P13: ham-sausage ("Bierschinken"), scalded, in natural casings

All products (P7-P13) contained an addition of 2% Gelita-Sol. The results of the sensory tests and of measuring the product's consistency are listed in Table 2.

The addition of 2% Gelita-Sol has a positive effect on the taste and flavour of hot dogs, wieners and luncheon meat (see Table 2). First of all the meat aroma has been intensified, and the colour and colour stability of meatloaf,



wieners and ham-sausage have been improved.

Also, a stabilization of emulsion binding properties (not shown in Table 2) with a resultant improved cutting firmness and a generally firmer consistency were in evidence in these Gelita-Sole containing product samples. In addition, a reduction in frying and grilling losses in a magnitude of 10 to 30 per cent could be determined as a substantially favourable calculatory factor. The lowering of the water activity also effectuated in these products by the use of the added collagen hydrolysate, brought about improved product keepability expressed as longer product shelf-life.

### C. Ready-to-eat-dishes

A third group of meat products, so-called ready-to-eat-dishes, were represented by the following (wet and canned) products:

- P14: liver dumplings in broth
- P15: meat patties in sauce
- P16: meat balls in caper sauce
- P17: meat dumplings in hunter-style sauce
- P18: "Maultaschen" (Swabian style ravioli, filling including ground meat) in broth
- P19: goulasch soup, canned
- P20: ragout fine with champignons in white cream sauce
- P21: ravioli in tomato sauce

The examination of the sensory and technological effects obtained by adding Gelita-Sol or, respectively, Gelita-Collagel, both at a two per cent dosage level, to the wet, canned category led to the results listed in Table 3.

Table 3: Evaluation of taste, flavour and consistency obtained from gelatin products (GS = Gelita-Sol, CG = Collagel; to products not specially assigned GS was added); frequency of positive evaluation: - < 50%, + > 50%, ++ 175%

The addition of Gelita-Sol has produced clearly a positive effect on the product's taste, flavour and colour. A point which stands out with the "ragout fine" is the fact, in this particular case, the sample made with Collagel turned out to be the one on which positive evaluations dominated.

The change in consistency of the insert materials made from basic product mixes shows that, for samples containing Gelita-Sol, a softer consistency was observed, while those containing an equal concentration of Collagel (two per cent) the consistency was firmer. In addition, for all samples, including ravioli (not listed in Table 3), the net insert weight clearly rose during storage to a higher extent than the "control" samples.

In general the results show that the following possibilities of quality improvement and controllability of product properties emerge:

- (a) improvement of taste and product-specific flavours, such as the typical aromas of meat or liver, for instance,
- (b) more beautiful, stronger product colour and improved colour retention,
- (c) ability to improve the consistency of insert materials in "wet" products,
- (d) more creamy, smoother consistency of thickened soups, sauces and gravies,
- (e) better controllability of product consistency (softer products when Gelita-Sol is used, firmer products obtained with the use of Gelita-Collagel).

In addition the taste of salt is enhanced in all products which makes possible a reduction of the common salt content of about 20 per cent, without impairing the product's desired saltiness.

### Literature

MARGGRANDER, K. u. K. HOFMANN (1993): Cooked sausage products, pâtés, pies and hot pots: On the

technological properties of collagen hydrolysates when added to meat products and ready-to-eat meals (Part 1). Fleischerei 44 (2), IX-XII.

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