PLASMA PROTEIN IMPROVES PROFITS
At the production of cooked ham and shoulders cooking yield is an important criterion. Less cooking loss (higher process yield) can be obtained at these products using plasma protein. Plasma increases the yield of cooked ham and shoulders produced both with and without phosphates. In addition, an improvement of profits can be reached as a result of meat replacement (lower costs). Plasma protein can be used by adding it to the brine or to the meat during tumbling. This can also be done in combination with other protein ingredients.

Which plasma proteins
Sonac produces different plasma proteins from porcine and bovine origin. In particular, concentrated frozen plasma and plasma powder are very suitable for application in pasteurized and sterilized ham products because of their heat-stability. At increasing content, concentrated frozen plasma and plasma powder are equally effective in reducing the cooking loss of cooked ham products. These proteins reduce the cooking loss of products both with and without phosphate. A concentration of 4% plasma protein will reduce the cooking loss of phosphate free products to the same extent as 0.3% phosphate. Plasma protein can be applied in high concentrations without negative effects on the consistency and water binding of cooked ham products. The Sonac plasma proteins distinguish themselves by the relatively high admissible concentrations without sensoric deviations in the end products.

HOW TO USE PLASMA PROTEIN
Plasma protein can be applied in different stages of ham production processes, namely to the brine and/or to the meat during tumbling. Both concentrated frozen plasma and plasma powder can be used in the brine. In that case the salt content of the brine should not be higher than 8% and the salt should be completely solved before the plasma is added. If necessary, the lacking salt can be added to the meat during tumbling. Concentrated plasma can also be applied during tumbling alone. The reducing effect on cooking loss does not differ at application of concentrated frozen plasma in the brine or to the meat during tumbling. The same holds for appearance, internal color, firmness, soundness of the slices, and water binding of ham products with phosphate. At phosphate free products, the addition of concentrated plasma to the brine gives a better strength of the slices and a smaller chance of visible protein gel formation than the addition during tumbling.

In addition, a positive aspect is that the gelling and water binding properties find more expression at higher temperatures. This is important at the production of sterilized meat products which exhibit often higher cooking losses. As the protein content of concentrated frozen plasma equals that of meat, this plasma protein can be also applied as meat replacement without affecting negatively the moisture/protein ratio of the products.
WHY DO PLASMA PROTEINS SCORE SO WELL

At the production of cooked ham and shoulders the application of plasma proteins offers benefits because of the excellent functional properties, like high solubility, and excellent gelling and water binding at heating. These properties result in the following effects in ham products:

- High solubility - good distribution in the product, by which no visible protein stripes
- Excellent gelling at heating - substantial contribution to the formation of the protein gel matrix and firmness of the product
- Strong water binding at heating essential for reducing the cooking loss, the moisture of the product and syneresis prevention

RESEARCH FINDINGS

![Figure 1: Influence of heating temperature on gel strength](image1)

Figure 1:
Influence of heating temperature on gel strength
Factor: temperature and gelling
- relatively strong gelling of plasma protein at lower temperatures
- plasma protein forms a stronger gel than other proteins
Source: International Food Marketing & Technology

![Figure 2: Influence of pH on gel strength after heating](image2)

Figure 2:
Influence of pH on gel strength after heating
Factor: pH and gel strength
- different behavior of proteins
- stronger plasma protein gel at higher pH
Source: International Food Marketing & Technology

![Figure 3: Effect of plasma protein on cooking loss of cooked ham](image3)

Figure 3:
Effect of plasma protein on cooking loss of cooked ham
Factor: cooking loss
- Progressive reduction of cooking loss
- Strong improvement of profit
- Effective in products with and without phosphate
Figure 4: Effect of plasma protein on cooking loss of cooked ham heated at 75 and 110 °C
Factor: temperature
- Effective in pasteurized products
- Effective in sterilized products


Figure 5: Sensoric value of firmness of cooked ham with plasma protein
Factor: firmness
- Positive effect on firmness
- Maintenance of good firmness at replacement of meat


Figure 6: Sensoric value of water binding of cooked ham with plasma protein
Factor: water binding
- Positive effect on water binding
- Good water binding at replacement of meat


Figure 7: Sensoric value of color and taste of cooked ham with plasma protein
Factor: color and taste
- Recommended concentrations don’t affect color and taste
- High concentrations can result in negative effects on color and taste

**Which concentration delivers optimal result**

At the preparation of cooked hams and shoulders, optimal results of the application of plasma protein are dependent on the production process. In general, the recommended maximal concentration in these meat products are as follows:

- concentrated frozen plasma maximal 7% on product basis
- plasma powder maximal 1-2% on product basis

**Legislation**

Plasma protein is an own protein to meat. On account of the excellent functional properties there is no need to treat plasma protein under special conditions or to modify the protein, so it can be applied in its natural, native form. At application, the status and labelling of plasma protein are provided by the national legislation of each country.

**PRODUCT INFORMATION ON PLASMA PROTEINS**

<table>
<thead>
<tr>
<th></th>
<th>Concentrated frozen plasma</th>
<th>Plasma powder</th>
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</thead>
<tbody>
<tr>
<td><strong>Water (%)</strong></td>
<td>77-80</td>
<td>5-8</td>
</tr>
<tr>
<td><strong>Protein (%)</strong></td>
<td>18-20</td>
<td>70-80</td>
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<tr>
<td><strong>Salts (%)</strong></td>
<td>1-2</td>
<td>± 18</td>
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<tr>
<td><strong>pH (%)</strong></td>
<td>± 10</td>
<td>7-8</td>
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</tbody>
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**THE SUCCESS FACTORS OF PLASMA PROTEINS**

- Own protein to meat
- Excellent functional properties of natural protein
- Reduction of cooking loss of cooked ham products
- Positive effect on firmness and waterbinding
- Effective concentrations without sensoric deviations
- Meat replacement
- Positive effect on slicing yield

Sonac is a leading manufacturer of reliable ingredients of animal origin. With an active R&D program, reliable processes and sustainable end products Sonac continuously adjusts to market needs. A good geographical spread of locations and a broad portfolio of fats, proteins, minerals and specialties make Sonac a trusted partner for many international producers in food, pet food, feed and fertilizers, worldwide. Sonac is part of Darling Ingredients.

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