HARIMIX FOR COLOR ENHANCEMENT BOTH INTERNAL AND EXTERNAL

In general, the color of fresh meat and meat products is mainly determined by the myoglobin content. This content differs markedly between meat of different species and between various meat raw materials of the same species. Consequently, the color of fresh meat and meat products will vary depending on the meat used and this may lead to undesirable heterogeneity of the color appearance of meat products.

Harimix proteins, including all Hemoglobin based products like Bouillonmex and Frozen Blood, are very attractive to prevent these undesirable color problems and to enhance the color of meat products. They intensify the coloring, give a natural color, improve the perception of higher lean meat content and increase the contrast between lean meat and fat. In addition, the color stability of Harimix proteins is higher than that of the meat pigment myoglobin and its derivatives in cured meat products.

By using the specific Harimix protein a marked improvement will be reached in almost any minced meat or cured meat product. Since hemoglobin is the functional protein, Harimix proteins can be considered as natural ingredients.

WHICH HARIMIX PROTEINS CAN BE USED FOR INTERNAL COLORING

Harimix proteins of bovine and porcine origin, in powder or liquid form, are available for various applications:

- Cooked meat products, such as Luncheon Meat, frankfurters and bologna
- Dry, fermented sausages, such as salami
- Cooked ham and shoulders
- Hamburgers
- Minced meat
HOW TO USE HARIMIX PROTEINS FOR INTERNAL COLORING

The use of the Harimix proteins is very simple and as follows for different categories of meat products:

- **Cooked ham or shoulder**
  Harimix is added to the brine which is injected into the meat before tumbling (sedimentation in the brine should be prevented)
- **Cooked meat products**
  Harimix is added to the dough during its preparation and mixed homogeneously
- **Hamburgers, minced meat**
  Harimix is added to the minced meat and mixed well
- **Dry, fermented sausages**
  Harimix is added to the dough during its preparation and mixed homogeneously

WHICH CONCENTRATION DELIVERS OPTIMAL RESULT FOR INTERNAL COLORING

The concentration of Harimix which delivers optimal results depends on different factors, such as type of meat product, the extent of the color problem, and the use of other coloring ingredients. As a lead the following final concentrations of Harimix are recommended in various meat products:

<table>
<thead>
<tr>
<th></th>
<th>Harimix P</th>
<th>Bouillonmex</th>
<th>Harimix C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cooked ham or shoulder</strong></td>
<td>0.1 - 0.3%</td>
<td>0.2 - 0.6%</td>
<td>0.3 - 1%</td>
</tr>
<tr>
<td><strong>Cooked meat products</strong></td>
<td>0.15 - 0.4%</td>
<td>0.3 - 0.8%</td>
<td>0.5 - 1.5%</td>
</tr>
<tr>
<td><strong>Hamburgers, minced meat</strong></td>
<td>0.1 - 0.3%</td>
<td>0.2 - 0.6%</td>
<td>0.3 - 1%</td>
</tr>
<tr>
<td><strong>Dry, fermented sausages</strong></td>
<td>0.1 - 0.3%</td>
<td>0.2 - 0.6%</td>
<td>0.3 - 1%</td>
</tr>
</tbody>
</table>

WHY DO HARIMIX PROTEINS SCORE SO WELL

Harimix proteins have some characteristics which are very important at enhancing the color of cooked ham and shoulders, cooked meat products and minced meat. These characteristics are a natural meat color with high stability, a high solubility resulting in homogeneous distribution and uniform color improvement in meat products, and easy to use.

HOW TO USE HARIMIX FOR EXTERNAL COLORING OF MEAT

In general, external coloring is established by natural smoking, liquid smoke, sugar/protein blends or caramel. Harimex proteins can be a very good alternative for these products because of the following reasons:

- Natural product, without e-number
- Natural reaction of the Harimix proteins with sodium nitrite and sugars
- Very good adhesion to the meat surface (no leaking / diffusion)
- Less heating and smoking time required to obtain desired external color, increasing yield

WHICH HARIMIX PROTEINS CAN BE USED FOR EXTERNAL COLORING

Different Harimix proteins of bovine and porcine origin are available for external coloring. The following Harimix proteins are recommended for specific categories of meat products:

- **Harimix C**
  - cooked products, ham, pork belly, Schwarzwlder Schinken etc.
  - cured (low temperature cooked) products
- **Harimix P/Bouillonmex**
  - cooked meat products, ham, pork belly, etc.
  - cured (low temperature cooked) products

HOW TO USE HARIMIX

The use of the Harimix proteins is very simple and as follows applied to raw meat, cooked and/or cured meat products just before heat treatment:

1. **Harimix C**: dip the meat in a Solution of 1 part of Harimix C with 2 parts of water. This gives a light red color after heating. Pure Harimix C can be used if a more red color is desirable.
2. **Harimix P**: dip the meat in solution of 1 part Harimix P and 6 parts of water. The result will be comparable with number 1.
RESEARCH FINDINGS
Harimix increases attractiveness of various meat products by intensifying the natural meat color.
Harimix is stable over time in various applications:

<table>
<thead>
<tr>
<th>Source</th>
<th>Harimix P</th>
<th>Carmine</th>
<th>Beet red</th>
<th>Fermented rice extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color type</td>
<td>meat color</td>
<td>red/pink</td>
<td>red purple</td>
<td>pink</td>
</tr>
<tr>
<td>Solubility</td>
<td>++</td>
<td>+/-</td>
<td>+</td>
<td>++</td>
</tr>
<tr>
<td>Color intensity</td>
<td>++</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Color stability</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Labelling</td>
<td>see &quot;Legislation&quot;</td>
<td>E120</td>
<td>E162</td>
<td>not approved by FDA</td>
</tr>
</tbody>
</table>

Figure 1
Pasteurized and vacuumed frankfurter without and with Harimix P

Figure 2
Pasteurized and vacuumed ham without and with Harimix P

Figure 3
Hamburger without and with Harimix C

Figure 4
Dry, fermented sausage without and with Harimix P
Legislation
Hemoglobin is the functional protein of the Harimix proteins. According to the Dutch food regulations hemoglobin is regarded as porcine / bovine hemoglobin or porcine / bovine protein. European regulations with regard to hemoglobin are not unified. At application, the labeling of hemoglobin in meat products will consequently differ from country to country.

PRODUCT INFORMATION ON HARMIX PROTEINS

<table>
<thead>
<tr>
<th></th>
<th>Harimix C</th>
<th>Bouillonmex</th>
<th>Harimix P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Origin</td>
<td>porcine or bovine</td>
<td>porcine</td>
<td>porcine or bovine</td>
</tr>
<tr>
<td>Protein content</td>
<td>15%</td>
<td>83%</td>
<td>60%</td>
</tr>
<tr>
<td>Appearance</td>
<td>liquid</td>
<td>spray dried powder</td>
<td>spray dried powder</td>
</tr>
<tr>
<td>Stability in brine</td>
<td>+/-</td>
<td>++</td>
<td>++</td>
</tr>
</tbody>
</table>

THE SUCCESS FACTORS OF HARMIX PROTEINS

- Natural meat color with high stability
- Intensification of coloring
- Enhancement of color appearance
- Better color homogeneity
- Improved perception of higher lean meat content
- Increased contrast between lean meat and fat
- Possible use in combination with other coloring ingredients

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.

For more information about this specialty product please contact us:
PO Box 9 NL 5690 AA Son +31 (0)499 364 800 info@sonac.biz