Understanding customer needs is our business
AAK is a world leading supplier of high value-added specialty fats. In every customer relationship, our role is to contribute to the competitiveness of our customers in their respective markets. We offer a wide range of product advantages; from highly nutritional products, products developed for better functionality, taste and longer shelf life, to cost efficiency.

Company
AAK’s wide product portfolio meets customer requirements worldwide. Our customers represent a wide range of industries; Food, Infant Nutrition, Confectionery, Cosmetics, Technical and Feed. AAK’s objective is to supply innovative and creative, vegetable fat solutions for the benefit of our customers. AAK offers a complete range of oils and fats for Ice-cream.

Quality and Food safety
AAK’s quality comprises the entire product chain – from raw material to finished product. All of AAK’s production units are certified according to international standard’s.

Research & Development
AAK’s knowledge and expertise regarding the properties of vegetable fats develop continuously through customer contacts, cooperation with research institutes and governmental authorities – regionally and globally. Our research and development take place in close coordination with the customer to tailor products to meet the customer’s requirements.

AAK ACADEMY™
AAK’s customer training programme is organised by AAK Academy™. The Academy arranges courses and seminars for entire industries as well as for individual customers.

For further information see www.aak.com
Many years' experience of both chocolate and ice-cream applications enables us to offer the know-how and ingredients needed to create both traditional and new types of ice-cream products. The range of speciality fats for use in ice-cream production offers many new opportunities.

The use of vegetable fats results in lower costs and higher production output. It also makes it possible to give the ice-cream a better nutritional profile, for example by reducing its content of saturated fat.

Of course, also the quality and safety of the ingredients are of vital importance. That is why AAK use only the best raw materials, and soft processes, to ensure that the quality of the fats is the very best.

The experience and resources are available to give the best possible support throughout the entire process of developing a new product. We can produce the samples you need and assist in plant trials. AAK’s product range offers a complete range of speciality fats for ice-cream and ice-cream coatings. The blends are mixtures of high-quality vegetable oils and are carefully evaluated at our R&D centre.

Customers become even more competitive on their respective markets. The contribution from AAK is to offer a market-oriented product range of the highest quality. We also provide technical service that improves the efficiency and provides the best total economy for customers.
Ice-cream

From a physical point of view, ice-cream is a very complicated product. Selecting the right ingredients is of utmost importance. The fat plays an important role in helping to achieve the desired eating qualities.

Replacing milk fat by vegetable fats not only reduces costs, it also makes the texture of the ice-cream easier to adjust to the demands specified and allows higher production output.

Vegetable fats also have the important advantage over milk fat that they make it possible to balance the content of saturated and poly-unsaturated fats in the composition and to reduce the cholesterol content.

Fat fulfills different functions in ice-cream. This means that a number of properties are desirable, and describe below.

Lubricant
The fat acts as a lubricant and must melt properly during eating. The mouth feel is influenced by several factors such as the amount of agglomerated fat and the ratio of solid to liquid fat. Vegetable fats used in ice-cream can be constructed in several different way to give the desired SFC curve (Figure 1).

Structure builder
The texture of an ice-cream depends on its structure. The fat’s performance during aging, freezing and aeration is very important. Fat crystals make it possible to incorporate air cells to give the desired overrun while at the same time maintaining a smooth texture.
Flavour carrier
The fat has to be of the best quality, and must also have a bland taste that does not mask any added flavours.

The structure of ice-cream
The complexity of the structure and the importance to use the appropriate blend of fats can be seen by taking a look at it under the microscope. The main ingredients are water, sugar and non-fat milk solids, and the actual fat content may be no more than a few per cent. In the finished product, however, the function of the fat is critical. It takes the form of small agglomerates on the surfaces of the incorporated air bubbles (Figure 2). Stabilizing the air cells is essential to the ice-cream's texture, and the perceived eating quality is very much dependent on it.
AAK has developed a special product range of vegetable fats for ice-cream, called Akomix. Milk fats can be replaced partly or completely by Akomix. It is important to prepare an ice-cream mix with the right physical properties. This is the form in which the mix will be frozen and together with the freezing procedure determines the final result. A good and creamy product can have exactly the same ingredients as a product with an open and icy character. The processing is the determining parameter for a quality ice-cream when the mix of ingredients is the right one.

**Preparation of ice-cream mix**

A homogenous mix is of outmost importance to be able to produce a high-quality ice-cream. There are slightly different ways to do this. For a good result it is important that the ingredients are properly dissolved.

1. Skim milk powder can be added and stirred into water at approximately 40 °C. The temperature at which skim milk powder dissolves may vary.

2. The heating is then continued to some 65-70 °C, where the rest of the ingredients are added. Sugar and emulsifier/stabiliser can be blended before addition to the hot water, often making it easier to dissolve the emulsifier/stabiliser. The fat and the glucose are added in liquid form. It is important that the fat is totally melted before addition to the mix.

During mixing it is also important that the stirring is vigorous enough to ensure that all components dissolve and that the mix is homogenous. To establish that all particles have been dissolved, a filtration can be made.

**Processing of ice-cream**

Whether the ice-cream contains milk fat or vegetable fat, the processing is principally the same.

The pasteurisation of the mix can be made either before homogenisation, in the vessel where the mix is prepared, or after the homogenisation.

The main exception from mix-preparation with milk fat is during the homogenisation step, where the pressure has to be adjusted. The homogenisation takes place at temperature between 75-80 °C, the pressure for mix containing vegetable fat is lower than for a mix containing cream or butterfat. This is due to the inherent strong emulsifiers in these systems. There is also a difference in homogenisation pressure for mixes with different fat contents. A higher fat content in the mix needs a lower pressure. The pressure is also depending upon the type of homogeniser. In figure 3, the relation in homogenisation pressure between the different products is shown.

If the homogenisation has been effective no fat droplets will show on the surface of the mix.
The mix is cooled to between 2 and 4 °C and aged at this temperature for at least four hours. If the homogenisation was successful, the aged mix is liquid and homogeneous.

An effective homogenisation and a proper aging-time are important conditions to obtain a good quality of the finished ice-cream.

After aging, the mix is frozen and air is incorporated into the mix. A temperature of the ice-cream when it leaves the freezer is -5 °C or lower. A higher temperature will give a less creamy and more icy product.

The ice-cream is normally hardened at a temperature between -30 and -40 °C.

**Emulsifier/Stabiliser**

The emulsifier/stabiliser blends are important ingredients of an ice-cream. If milk fat is replaced by vegetable fat, the same amount and type of emulsifier can be used to begin with. If necessary the level can be adjusted.

**Flavourings and colourings**

Liquid flavourings and colourings are normally added to the cold mix in the aging tank. Powdered flavourings are often easier to dissolve in the hot mix before cooling.

A vanilla ice-cream made with vegetable fat may have a slightly weaker taste than the same type of ice-cream containing milk fat. The milk fat contributes to this taste, whereas vegetable fat is bland. The taste can be strengthened by adding more vanilla flavour.
Today coatings are commonly used in the production of ice-cream. Since the fat content of a coating varies between 55 % and 70 %, its properties are mainly coming from the fat used.

Apart from economic considerations, vegetable fats have an advantage over cocoa butter in ice-cream coatings, as they are better equipped to meet the special demands. Particularly when fast crystallisation is critical and non-transparent yet thin layers are required. AAK's product range for this application is Akoice.

Below are some of the special demands that ice-cream coatings must meet:

**Melting behaviour**
A coating have a melting point lower than 30 °C. Otherwise, the coating will not melt during eating, because mouth temperature falls when eating ice-cream. A coating must have good snap, and then melt rapidly and totally to give good mouthfeel. Its SFC curve is a good indicator in this respect.

**Viscosity and plasticity**
To simplifying the production process and ensuring that the whole product is coated with a thin, non-transparent layer, an ice-cream coating should have a low viscosity. If not, “bleeding” will occur, with the ice-cream appearing in white spots on the coating.

A coating must also have a somewhat elastic structure, in order to prevent it from breaking or chipping off the ice-cream during eating.

**Rate of solidification**
A coating should have a rapid rate of solidification, so that production output can be highly efficient.

**Flavour release**
Especially in coatings, fast flavour release is essential. Since the fat is the carrier of the flavour, it should be chosen with care in order to guarantee fast flavour release.
Akoice for dippings and toppings
Ice dippings or ice toppings are other types of ice-cream coatings, applied at the point of sale or at home.

They should be liquid at room temperature, and solidify almost instantly when they come into contact with cold ice-cream. As the product may be exposed to room temperature for a longer period of time, stability against oxidation and rancidity is important. The quality of an ice dipping or ice topping is largely determined by the properties of the fat system.

The product should:

- Have low viscosity and be liquid at room temperature.
- Set rapidly.
- Have good stability against oxidation.
- Show good melt-off properties.
- Have good flavour release.

When these requirements are met, the result will be a crispy, glossy coating with good snap.

Moisture barrier
Another important application is the utilisation of fats as a moisture barrier between the ice-cream and the waffle of a cone. In such a product there is usually a migration of water, from the ice-cream to the cone, this makes the waffle soft and less appetizing. A moisture barrier in the form of a thin layer of sprayed chocolate efficiently puts an end to this problem. A fat used in this application must fulfill mostly the same demands as the ones described at page 8. For this application field, AAK has developed a product line that lives up to these requirements: called Akoice.
**Products and formulas**

**Akomix**
Akomix is the name of a group of products from AAK that have been specially developed for use in ice-cream production. Only carefully selected, top quality raw materials are used, to ensure that they meet the demands made on vegetable fats for use in ice-cream.

Akomix can be used to replace milk fat either completely or partially. Ice-cream based on Akomix has a better nutritional fatty acid profile compared to ice-cream based on milk fat.

The great advantage of the oil blends are that they make it possible to balance the composition of saturated and poly-unsaturated fats, and at the same time achieve a satisfactory SFC curve.

Akomix is solid at room temperature, and gives ice-cream an excellent consistency and taste.

**Akoice**
Akoice is the name of AAK’s range of products for use in ice-cream coatings. Only carefully selected, top-quality raw materials are used, to ensure that they meet the demands made in the production of ice-cream coatings.

These speciality fats are the ideal choice for ice-cream coating production, both in terms of price and high production output. Akoice is fluid or semi-fluid at room temperature, depending on whether the product is to be used in ordinary ice-cream coatings or in ice dippings/ice toppings or as a moisture barrier. Akoice gives fast-setting chocolate layers with no bleeding. The products have enhanced melting behaviour and shorter crystallisation times, qualities that are especially important in high-speed ice bar machines.

**Ice-cream coatings formulas based on Akoice.**

<table>
<thead>
<tr>
<th></th>
<th>Dark coating</th>
<th>Milk coating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sugar</strong></td>
<td>22.5%</td>
<td>18.5%</td>
</tr>
<tr>
<td><strong>Cocoa powder</strong></td>
<td>12.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td><strong>Akomix</strong></td>
<td>65.0%</td>
<td>66.5%</td>
</tr>
<tr>
<td><strong>Lecithin</strong></td>
<td>0.3%</td>
<td>3.0%</td>
</tr>
<tr>
<td><strong>Vanilla</strong></td>
<td>0.0075%</td>
<td>0.3%</td>
</tr>
<tr>
<td><strong>Salt</strong></td>
<td>0.015%</td>
<td>0.0065%</td>
</tr>
</tbody>
</table>

One-sixth of Akoice is mixed and milled with the other ingredients. Another sixth of Akoice is added into the conch. The remainings are mixed into the completely conched mass.

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**Suggestions for ice-cream formulas based on Akomix.**

<table>
<thead>
<tr>
<th></th>
<th>Original recipe</th>
<th>100 % veg. fat</th>
<th>60 % veg. fat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cream 31 %</strong></td>
<td>22.3</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Sugar</strong></td>
<td>14.0</td>
<td>14.0</td>
<td>14.0</td>
</tr>
<tr>
<td><strong>Skim milk powder</strong></td>
<td>2.8</td>
<td>14.9</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Milk 3.2 %</strong></td>
<td>56.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Milk powder 20 %</strong></td>
<td>2.0</td>
<td>0.0</td>
<td>18.6</td>
</tr>
<tr>
<td><strong>Akomix</strong></td>
<td>0.0</td>
<td>9.5</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>Emulsifier/Stabilizer</strong></td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Aroma</strong></td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td>1.7</td>
<td>61.0</td>
<td>61.0</td>
</tr>
</tbody>
</table>
The latest additions to the AAK range of ice-cream fats are products with improved health profiles. We have adopted a proactive approach to reducing the proportion of saturated fat in the products while, at the same time, maintaining functionality and taste. The products are, of course, trans free. Our new products are called Akomix LS 40, which contains 40 % saturated fat, and Akomix LS 30, which contains 30 % saturated fat.

What makes Akomix special?
- They give ice-cream an excellent texture.
- They provide the perfect taste experience, with great melting properties.
- They have good storage stability.
- They contain low levels of saturated fat.
- They are trans free and do not contain any hydrogenated fat.

Health trends
A strong health trend which focuses on saturated fat levels is running through the whole food industry, and AAK is now making it possible for ice-cream manufacturers to join as well. We have invested in the development of new products within the Akomix range, with the aim of minimising saturated fat levels and increasing the levels of mono- and polyunsaturated fats.

Saturated fat in ice-cream
At present, ice-cream production is based on cream fats or a vegetable alternative, such as coconut.

Ordinary cream fat contains fairly high levels of saturated fat, around 70 %, and coconut has an even higher level of saturated fat, over 90 %. In the Akomix range, we have, until now, worked with saturated fat levels of 60 % or less. We found it relatively easy to reduce the level of saturated fatty acids to 40 % and still maintain the desired properties of the ice-cream. The step down to 30 %, the level of Akomix LS 30, is significantly more challenging and requires the application of advanced fat technology.

The differences in the amount of saturated fat are shown in Figure 4. Akomix LS 30 generates the same results in serum separation tests as Akomix TS and coconut oil.

From a sensory point of view, we have created a fat which improves the creaminess of ice-cream and provides an excellent taste experience. Figure 5 clearly shows that Akomix LS 30, despite its lower level of saturated fat, provides an oral sensation which is fully comparable with that of traditional ice-cream fats.

The only differences that are significant are that the Akomix LS30 is a little softer, less icy and less porous (same density, though). This shows that choosing the right crystallisation behaviour can produce good form stability, good heat shock stability and excellent sensory properties, if the system is design in the right way.
AAK – Wherever you are

The first choice for value-added vegetable oil solutions

AAK is the world’s leading manufacturer of high value-added speciality vegetable oils and fats. The many advantages of these natural and renewable raw materials create opportunities in the market segments of confectionery, food, infant nutrition and beauty and personal care.

The advantage of AAK’s product portfolio is that it consists of natural vegetable oils and fats that have a low saturated fat content and contain desired properties that promote healthier lifestyles.

AAK offers total value-added solutions. These are comprehensive packages of benefits like new product development, customization, market advice, delivery systems, technical support and AAK ACADEMY™.

AAK’s head office is in Malmö, Sweden, and we have production facilities in Denmark, Mexico, the Netherlands, Great Britain, Sweden, Uruguay and USA. AAK also have sales offices and agents/distributors all over the world. So no matter where you are, you’re within reach of AAK, the first choice for value-added vegetable oil solutions.

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