

Palsgaard®



PRODUCT CONCEPT

# High Overrun Ice Cream

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# High Overrun Ice Cream with 180% Overrun

**BACKGROUND**

Air is an important component in ice cream, affecting its physical and sensory properties as well as its stability during storage. Overrun refers to the degree of expansion resulting from the amount of air incorporated into the product during the freezing process. Ice cream normally has an overrun of around 100%, meaning that air makes up 50% of its volume. The amount of air incorporated into the mix influences sensory attributes – with less air, the resulting ice cream is dense and heavy and feels colder to eat; with more, the texture is lighter and creamier and feels less cold.

With the possibility of increasing the overrun of their ice cream manufacturers get a new tool for reducing the cost of the ice cream, and at the same time reduce the calories per serving size as most ice creams are sold by volume and not by weight. In the table below shows how increased overrun will affect the cost of the final ice cream.

Recipe used for the below calculation:

10% vegetable fat, 11.40% Skimmed milk powder, 11.50% Sugar, 2.50% Glucose Syrup, 42DE, powder, 0.60% Palsgaard® Extrulce 285, 64.00% Water.

OVERRUN	SERVING SIZE	WEIGHT / SERVING	PRICE INDEX / SERVING	COST REDUCTION / SERVING
100 %	100 ml	54.60 g	100.00	
120 %	100 ml	49.60 g	90.84	9.2 %
140 %	100 ml	45.50 g	83.33	16.7 %
160 %	100 ml	42.00 g	76.92	23.1 %
180 %	100 ml	39.00 g	71.43	28.6 %
200 %	100 ml	36.40 g	66.67	33.3 %

Opting for high overrun can be a useful strategy for reducing the costs of ice cream production, but its impact on perceived quality has to be considered. Sensory attributes such as creaminess and smoothness, as well as resistance to shrinkage and melting, should not be compromised because they are very closely linked to consumer preferences.

Creaminess, as well as melting resistance, is related to the distribution of air cells – a more uniform air cell distribution results in a creamier and slower melting ice cream. High overrun broadly means that there are more air cells, with a larger total surface area. This means that the walls of the air cells are thinner and weaker, with higher risk of deterioration in quality and stability.

## CHALLENGES IN PRODUCT DEVELOPMENT

Preliminary studies on the production of high overrun ice cream, have shown that there is a limit in the amount of overrun that can be achieved using standard Palsgaard® emulsifier and stabiliser system, based on mono- and diglycerides MDG.

In other whipped emulsions, such as whipping cream, lactic acid esters of mono- and diglycerides (E472b) called LACTEM, are often used as the whipping agent, and based on this experience we discovered that the combination of LACTEM with MDG had a positive influence on the foam stability and texture of high overrun ice cream.

In order to obtain an ice cream with high overrun and homogeneous air cell distribution, it was necessary to apply higher shear, so the dasher speed in the continuous freezer was increased. Additionally, the cylinder pressure was increased to facilitate finer air cell distribution. Higher shear meant a higher degree of churning out in the freezer, and therefore stronger air cell walls and higher stability, which was confirmed in the melt-down and heat-shock tests.

## PALSGAARD TECHNOLOGY

Palsgaard® Extrulce 285 is an integrated product that results in a uniform ratio of emulsifier and stabilisers, hence no deblending. It is a free-flowing powder that ensures a dust-free handling. No pre-mixing is needed, meaning that it can be dispersed directly at any temperature, without lumping giving the correct proportional dosage of emulsifiers and stabilisers.

Palsgaard® Extrulce 285 is specially developed for ice cream with increased overrun and suitable for high overrun ice cream with up to 200% overrun, based on vegetable fat, dairy fat or combinations thereof. The composition of the total recipe also affects which overrun it is possible to achieve.

## PRODUCT ADVANTAGES

### Key benefits:

- Facilitates the incorporation of air into the mix, giving a high and stable overrun, at up to 200%
- Provides dryness and excellent stand-up properties on extrusion
- Prevents the formation of coarse ice crystals giving a smooth and uniform texture
- Improves sensory properties, such as creaminess, chewiness, and warm-eating sensation
- Provides a slow melt-down of the high overrun ice cream
- Protects the ice cream against heat shock damages, when exposed to fluctuating temperatures during distribution and storage
  
- Cost-cutting without quality loss
- Calorie reduction per serving size of ice cream

### Key Features:

- Custom-designed emulsifier and stabiliser system for high overrun ice cream
- Integrated mixture of emulsifier and stabilizers
  - Ensure dust-free handling
  - Free-flowing uniform powder
  - Dispersibility at any temperature
  - No pre-mixing required before addition to the ice cream mix
- Kosher/Halal certified
- Produced in CO<sub>2</sub>-neutral factories

PALSGAARD® EXTRULCE 285

# High Overrun Ice Cream – Recipe Suggestion



## Recipe

	Recipe with 10% vegetable fat
Palsgaard® Extrulce 285	0.60
Vegetable fat, Coconut oil	10.00
Skimmed milk powder	11.40
Sugar	11.50
Glucose syrup, 39DE, powder	2.50
Vanilla flavour	0.10
Water	63.90
<b>Total</b>	<b>100.0%</b>

## Procedure

- Melt the vegetable fat at approx. 50 °C
- Mix dry ingredients and add to the water while stirring.
- Heat the water phase to 50 °C and add Palsgaard® Extrulce 285 while stirring.
- Add the melted fat to the ice cream mix.
- Add the flavour.
- Homogenization: 140 bar at 75 °C.
- Pasteurization: 85 °C for 5 sec.
- Cool below 5 °C.
- Age for min. 4 hours at below 5 °C.
- Freeze on a continuous freezer with 180% overrun.
- Hardening 1 hour in a blast freezer at -40 °C.
- Storage at below -20°C.

### ORDER SAMPLES

To order samples of Palsgaard® Extrulce 285, please contact your local Palsgaard office via [Palsgaard.com](http://Palsgaard.com)