Fat Spreads



Spreads have a similar composition to margarine but are usually lower in fat.

- >Low fat spreads have fat content of 40 g/100 g.
- Spreads may be fortified with vitamins A and D.
- Production of margarine and spreads are very different to that of butter.
- ➢ Butter is pure and natural and has undergone minimal processing whereas; margarines and spreads are heavily processed and contain number of additives, preservatives and colour compounds.

Classification of Fat Spreads



In Indian contest fat spreads can further classified as:



Amul lite: 10% Milk fat and 49% vegetable fat

Based on fat content, spread and margarine products are classified

as:



Fat Content %	Milk fat products	Mixed Fat Products	Margarine Products
80 – 95	Butter	Blend	Margarine
>62 - <80	Dairy spread	Blended spread	Fat spread
60 - 62	3/4 fat or reduced fat buter	Reduced fat blend	Reduced fat margarine
>41 - <60	Reduced fat dairy spread	Reduced fat blended	Reduced fat spread
		spread	
39 - 41	1/2 or low fat butter	1/2 or low fat blend	1/2 or low fat margarine
<39	Low fat dairy spread	Low fat blended spread	Low fat spread

Classification of Fat Spreads (FSSR-2011)



Definition of Fat Spread

- According to FSSR-2011, fat spread is a product in the form of water in oil emulsion
- Product may contain not more than 80% fat and not less than 40% fat by weight
- □Moisture should not be more than 56% and not less than 16% by weight
- May contain edible salt not exceeding 2% in aqueous phase
 Starch not less than 100 ppm and not more than 150 ppm
 Diacetyl may be used as flavouring agent not exceeding 4.0 ppm
 Permitted class II preservatives namely sorbic acid, and its sodium, potassium and calcium salts (calculated as sorbic acid), benzoic acid and its sodium its sodium and potassium salts (calculated as benzoic acid) singly or in combination not exceeding 1000 parts per million by weight.

May contain sequestering agent

- Permitted emulsifier and stabilizer, permitted antioxidants (BHA or TBHQ) not exceeding 0.02% of fat content of the spread
- ❑May contain annatto and/or carotene as colouring agents
 ❑Shall be free from animal body fat, mineral oil and wax
 ❑Vegetable fat spread shall contain raw or refined sesame oil in sufficient quantity (so that when separated fat is mixed with refined groundnut oil in proportion of 20:80, red colour produced by Baudouin test shall not be lighter than 2.5 red units in 1 cm cell on Lovibond scale.)
- □Vegetable fat spread shall contain not less than 25 IU synthetic vitamin 'A' per gram at time of packing
- **Acid value of extracted fat should not be more than 0.5**

- Melting point of extracted fat should not be more than 37
- C in vegetable fat spread
- **Unsaponifiable matter of extracted fat:**
- (a) In case of milk fat and mixed fat spread not more than 1% by weight

Life source

- (b) In case of vegetable fat spread not more than 1.5%
- (c) Acid value of extracted fat not more than 0.5

Labelling of Fat Spread

The word 'butter' will not be associated while labeling the product. Fat content shall be declared on the label. In mixed fat spread, milk fat content shall also be declared on label along with the total fat content. Shall be compulsorily sold in sealed packages weighing not more than 500 g under Agmark certification mark.



Manufacturing Process of Fat Spread

- **Production of spreads is divided into following parts:**
- ✓ Preparation of water phase and fat phase
- ✓ Emulsion preparation
- ✓ Pasteurization
- ✓ Crystallization
- ✓ Filling
- Emulsion consists of fat phase and water phase. Minor ingredients (emulsifiers, salt, preservatives/additives, colour, flavour, vitamins) are dispersed in respective phases according to their solubility. Raw materials used in emulsion preparation prior to processing of spreads can be divided into fat phase and water phase.

Major ingredients in fat phase are:

Fat blend, normally consist of blend of different fats and oils in order to achieve a defined solid fat content. In regard to reduced fat products, fat phase constitutes <60% of the total emulsion.

Minor ingredients such as emulsifier, lecithin, flavour and colour are dissolved in the fat phase before emulsification.
 Fat-soluble flavour and colour, butter flavour and β-carotene are added to achieve products which taste and look like butter. β-carotene has pro-vitamin A activity.

Major ingredients in water phase are:

Salt and preservative, whey powder, skimmed milk powder or other types of milk can be added.

Since high water content is available in spreads, stabilizer(s) system is needed in order to have necessary stability in final crystallized product. Water-soluble flavour and colour can also be added, but are primarily used in low fat spreads. Alginates, pectin and carrageenans have a good water binding effect and gives stable emulsions.



Schematic diagram of manufacture of vegetable fat spread

- In low fat spreads, water phase and oil should have similar temperature and should be combined slowly when forming emulsion.
- Emulsion to be properly agitated to ensure homogeneity.
- *****Air should not incorporate during emulsification.
- Prior to entering crystallization equipment, emulsion is pasteurized, preferably in a scraped surface heat exchanger.
- Typical pasteurization process include heating and holding sequence of the emulsion at 75-85 C for 16 s and subsequently cooling to 45-55 C.
- End temperature depends on melting point of fat phase: the higher the melting point, higher the temperature.

Emulsion is pumped to crystallization line by means of high pressure plunger pump (HPP). Crystallization line for the production of margarine and related products typically consists of high pressure SSHE which is cooled by ammonia/Freon type cooling media.

Heart of crystallization line is high pressure SSHE, in which the warm emulsion is super-cooled and crystallized on inner surface of chilling tube.

Emulsion is efficiently scraped off by the rotating scrapers, thus emulsion is chilled and kneaded simultaneously.

✤When the fat in emulsion crystallizes, fat crystals form three dimensional network entrapping water droplets and liquid oil, resulting in products with plastic semi-solid nature.

Crystallization process, processing conditions and processing parameters have great influence on characteristics of final spread product.

Limitations of Conventional Process

- >Additives designed to thicken the product tend to form agglomerates which agitators cannot easily break down.
- >Long processing times are required to complete hydration.
- Poor hydration may lead to unsatisfactory mouthfeel, and an unstable product.
- Leading to storage problems once product has been opened.

To overcome these limitations, venturi assembly is introduced......



Schematic diagram of manufacture of vegetable fat spread with venturi system

Selection of ingredients for fat spread: Major ingredients commonly used in preparation of spreads are milk fat, milk proteins, vegetable fat, emulsifiers, stabilizers, acidulants, salt, colouring/flavouring agents, vitamins and antioxidants.

Source and role of fat: Milk fat - cream, butter, butter oil, vegetable fat - sunflower, corn, soyabean and groundnut oil are preferred, milk fat fractions/vegetable oil fractions can also be used. Fat provides structure, energy and taste including creaminess. Carrier of flavour and vitamins. Good source of essential fatty acids. Improves spreadibility, firmness, plasticity depending on amount of fat used in the spread.

Source and role of protein: Milk Protein-SMP, whey powder, WPC; Vegetable protein - Soy protein isolate improve organoleptic, functional and nutritional properties. Proteins play a role in viscosity, water holding capacity and enhancing emulsion stability of spreads. **Emulsifiers:** Fat soluble emulsifiers are preferred because of fat is the major portion in the product also fat present in continuous phase. Monoglycerides of saturated fatty acids, unsaturated fatty acids, lecithin, egg yolk solids are used at a level of 0.1-0.6%. Emulsifiers help in reducing size of aqueous droplets and create stabilizing films at water/oil interface, so product will be more softer and spreadable.

Stabilizers: Especially important in reduced/low fat spreads wherein high water holding ability of stabilizer improves body and texture of spread. Help in increasing viscosity and also inhibit the coalescence of aqueous phase droplets during processing. Carboxy methyl cellulose, modified starch, sodium alginate, starch can be used as stabilizers at a level of 0.1-0.5%.

Packaging

- □ Moisture and air proof containers are required to pack this product.
- Suitable packaging materials for this purpose are polystyrene based/polypropylene based cups or tubs, polyethylene coated paper packs along with parchment paper.



Shelf-life and storage:

- Various factors that influences the shelf-life of fat spreads:
- ✓ Moisture content
- ✓ Process treatment
- ✓ Type of ingredients
- ✓ Salt content
- \checkmark pH of the product
- ✓ Temperature of storage
- ✓ Preservative level
- Refrigerated storage is preferred for long life at 5 C, shelflife varies from 90 days-180 days.

Uses....

