

CHARACTERISTICS AND PRODUCTION OF VANASPATI, GHEE, BUTTER AND OTHER SOLID FATS

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CHARACTERISTICS AND PRODUCTION OF VANASPATI, GHEE, BUTTER AND OTHER SOLID FATS

PRODUCT TYPES

- Vanaspati (or Vegetable Ghee)
- Ghee
- Butter/Butter blends
- Other solid fats

TOPICS FOR DISCUSSION

- 1) Key product characteristics
- 2) Product development criteria
- 3) Production methods and process regimes
- 4) Future trends

VANASPATI

KEY PRODUCT CHARACTERISTICS

- All purpose cooking fat
- Substitute for ghee
- Cost & availability
- Generally all vegetable
- Granular or grainy texture
- Degree of oil separation
- Melting point

VANASPATI

PRODUCT DEVELOPMENT CRITERIA

- Texture
- Oil separation
- Types of vegetable oil
- Melting point
 - Higher melting points used in Gulf countries ; 40-46 deg C
 - Mid-range melting points used in Egypt & North Africa eg :- 38-42 deg C
 - Lower melting points used in India & Pakistan eg :- 31-37 deg C

VANASPATI

EXAMPLES OF TYPICAL FORMULATIONS

GULF COUNTRIES

- Commonly marketed as Vegetable Ghee
- Generally, blends of palm oil & palm fractions
- Melting points usually in the range 40-45 deg C
- Often contain added colour & flavours

COMPONENT

Palm oil

Palm stearin

Antioxidant

Colour (Beta Carotene)

Butter flavour

AMOUNT

40-60%

60-40%

0.1-0.2%

200 ppm

qs

VANASPATI

PRODUCTION METHODS AND PROCESS REGIMES

General points :-

- 1) Processed in much the same way as other types of shortening and bakery fats.
- 2) Process conditions dependent on :-
 - a. Formulation type
 - b. Degree of granular/grainy texture required
- 3) Packaging used usually either :-
 - a. Cartons with plastic liners
 - b. Tins ; sizes ranging from 500 gms to 10 Kg

Typical process line configuration :-

DAY TANK – A – A – PW – PW – PACKING M/C

TYPICAL PROCESS LINE FOR MANUFACTURE OF VANASPATI



VANASPATI

FUTURE TRENDS

- 1) Sales volumes likely to increase in future years due to :-
 - a) Price
 - b) Health considerations
- 2) Scope for improved product quality :-
 - a) Interesterified oils becoming cheaper and more readily available
 - b) Improvements in hydrogenation technology
 - c) Greater choice in palm fractions
- 3) Packaging innovations?

GHEE

KEY PRODUCT CHARACTERISTICS

- All purpose cooking fat ; widely used in India, Pakistan, Middle East & SE Asia
- Granular or grainy texture ; required extent of graininess dependent on geographical location
- Degree of oil separation
- Large scale production requirements :-
 - Simulation of traditional methods
 - Control of quality
- Health & nutrition aspects

GHEE

PRODUCT DEVELOPMENT CRITERIA

- - Source of the anhydrous milk fat
- - Control of the degree of graininess
 - Grain size
 - Number of grains
- - Degree of oiling-off
- - Post-production storage regime
- - Flavour & aroma characteristics

GHEE

PRODUCTION METHODS AND PROCESS REGIMES

General points :-

- AMF in liquid form
- Filling into tins
- Controlled cooling regime :-
 - Gradual cooling ; grainy texture & some oil sepn.
 - Rapid cooling ; smooth texture/minimal oil sepn.
- Storage & delivery

BULK STORAGE – FILLING - COOLING – STORAGE

GHEE

FUTURE TRENDS

- - Usage likely to continue to decline due to :-
 - ○ Higher cost
 - ○ Health implications
- - Development of 'healthier' versions
- - Blends of AMF and vegetable oils
- - Packaging improvements

BUTTER

KEY PRODUCT CHARACTERISTICS

- Used for cooking primarily ; useage as a table spread increasing

- Generally in recombined form ; based on AMF

- Sweet cream or lactic types available

- Regional preferences :-

- Sweet cream ; North Africa, Southern CIS countries

- Lactic ; Gulf countries, Egypt

- Shipped in frozen form due to high ambient temperatures

- Pack sizes usually either :-

- 250 gms & 500 gms (or ½ lb & 1 lb) – Retail

- 25 Kg bag-in box carton - Bulk

BUTTER

PRODUCT DEVELOPMENT CRITERIA

- Source of the AMF
- Use of reconstituted milk powders
- Sweet cream type :-
 - Buttermilk
 - pH close to neutral
- Lactic type :-
 - Skim milk
 - Use of lactic cultures in the aqueous phase
 - Lower pH (~4.5)
- Control of texture & consistency via selection of process regime

BUTTER

EXAMPLES OF TYPICAL FORMULATIONS

GULF COUNTRIES

Lactic-type butter is preferred

Packaging used usually either :-

- a. 25 Kg cartons with plastic liners
- b. Packets ; sizes ranging from 250/500 gms to ½ lb/1 lb

COMPONENT	AMOUNT
Anhydrous milk fat	65-67%
Decolourised/Deoderised AMF	16-17%
Skim milk powder	1.5-2.0%
Water	16%
Lactic cultures	qs
Lactic acid	To pH 4.6

BUTTER

EXAMPLES OF TYPICAL FORMULATIONS

NORTHERN MIDDLE EAST COUNTRIES

Generally prefer a sweetcream-type butter :-

- Deeper yellow colour
- Rich flavour with dairy/creamy notes

Packaging used usually either :-

- a. 25 Kg cartons with plastic liners
- b. Packets ; sizes 250/500 gms

Unsalted butter is the norm

COMPONENT

Anhydrous milk fat
Buttermilk powder
Water

AMOUNT

82-83%
1.5-2.0%
16%

BUTTER

PRODUCTION METHODS AND PROCESS

REGIMES

General points :-

- 1) Process regime is dependent on type of packaging.
- 2) For packets & wrapped blocks, a chill-work-chill configuration is required.
- 3) For bulk cartons, a chill-chill-work configuration is preferable

Typical process line configurations :-

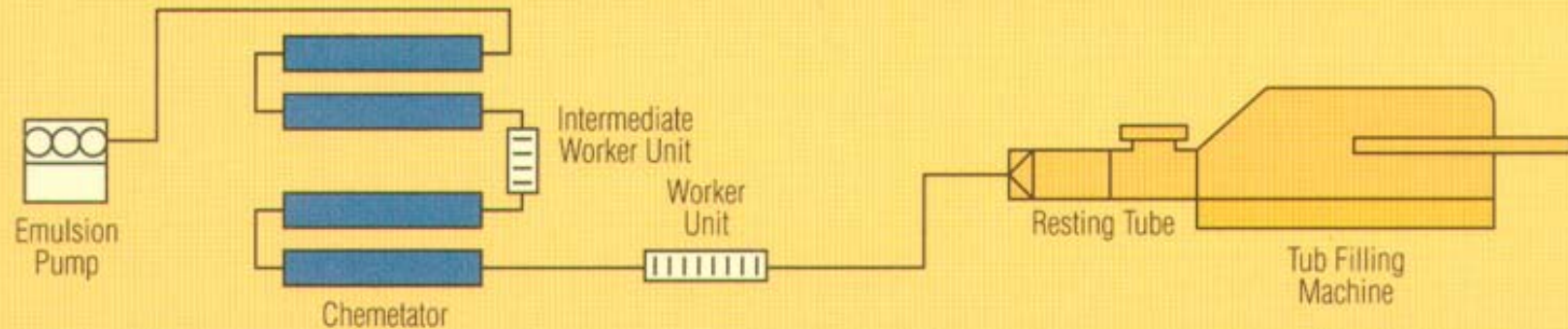
DAY TANK – A – PW – A – PACKING M/C ;Packets
& blocks

DAY TANK – A – A – PW – PACKING M/C ;Bulk
cartons

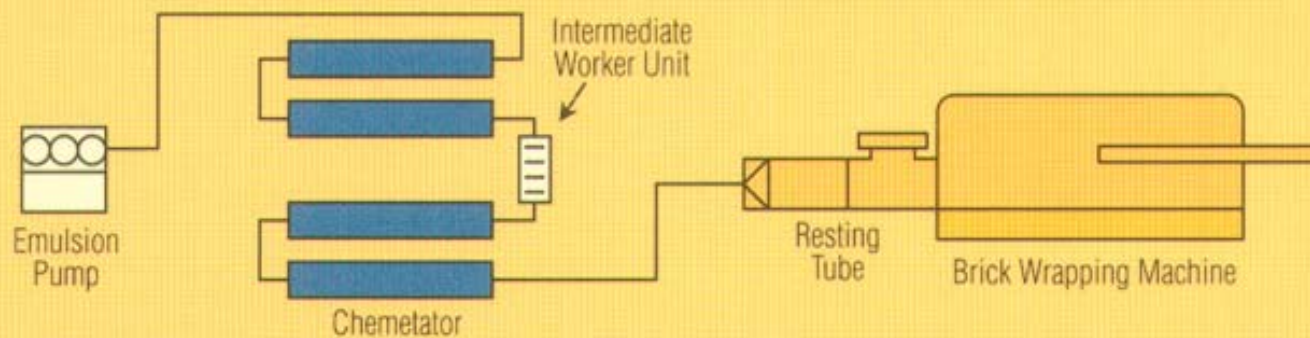
DAIRY FATS

High pressure Chemetator® chilling systems also offer high flexibility and hygienic processing when producing a range of products from milk based raw materials. Even very low fat content products can be formed with optimal crystal structure.

LOW FAT SPREADS/LOW CALORIE BUTTER



RECOMBINED BUTTER



TYPICAL PROCESS LINE FOR MANUFACTURE OF RECOMBINED BUTTER



BUTTER

FUTURE TRENDS

Volumes are likely to decrease significantly due to

- High costs relative to other products

- Availability of cheaper alternatives eg:- butter blends

Increased production in the Middle East region using imported AMF

Introduction of spreadable butters based on AMF blended with liquid vegetable oils such as rape/canola :-

- Convenience

- Healthier fatty acid profile ; lower sats/higher w-3

Different packaging options ; plastic tubs with tamper-proof seals

BUTTER BLENDS

KEY PRODUCT CHARACTERISTICS

- Used for cooking primarily, but useage as a table spread increasing
- Substitute for butter ; cheaper alternative & more readily available
- Based on AMF blended with hydrogenated vegetable oils and/or vegetable oils
- Similar physical and organoleptic properties to butter
- Flavour & colour enhancement used to simulate quality of butter
- Tailored to regional preferences for either sweet cream or lactic butter types

BUTTER BLENDS

GROWTH IN NORTH AMERICAN MARKETS

- Most butter blend products in the US contain lower levels of added butter than similar products in the Middle East
- Standard retail butter blend products contain as low as 2% butter
- Premium retail butter blends contain higher levels of butter (5 – 10%)
- Based on butter blended with hydrogenated vegetable oils and/or vegetable oils
- TFF versions use veg oil blends based on palm oil & palm fractions or palm kernel oil
- Butter blends for industrial applications sometimes contain higher levels of butter (up to 30%)

BUTTER BLENDS

PRODUCT DEVELOPMENT CRITERIA

- Use of hydrogenated oils blended with AMF
- Use of reconstituted milk powders
- Sweet cream type :-
 - Buttermilk (reconstituted buttermilk powder)
 - pH close to neutral
- Lactic type :-
 - Skim milk (reconstituted skim milk powder)
 - Use of lactic cultures/flavour in the aqueous phase
 - Lower pH (~4.5)
- Control of texture & consistency via selection of process regime
- Selection of flavours to mimic organoleptic properties of butter

BUTTER BLENDS

FORMULATIONS - GENERAL POINTS

- Minimum butter content can be as low as 14%
- Melting points of butter blend products tend to be slightly higher than butter - usually in the range 35-39 deg C
- Generally use a steep-melting hydrogenated oil
- Palm & palm fractions also incorporated in blends with lower butter content
- Fat levels can be reduced as low as 40%
- Usually contain added colour & natural butter flavours
- Shipped in frozen form due to high ambient temperatures
- Pack sizes usually either 250 gms & 500 gms or ½ lb & 1 lb

BUTTER BLENDS

PRODUCTION METHODS AND PROCESS

REGIMES

General points :-

- 1) Processed in much the same way as butter.
- 2) Different process conditions used for reduced fat formulations

Typical process line configurations :-

DAY TANK – A – PW – A – PACKING M/C ; Packets
& blocks

DAY TANK – A – A – PW – PACKING M/C ; Bulk
cartons

PROCESS SYSTEM FOR MANUFACTURE OF BUTTER BLENDS



BUTTER BLENDS

FUTURE TRENDS

- Significant increase in sales volumes over the last 10 years
- Excellent alternative to butter :-
 - Lower cost
 - Comparable quality
- Further improvements likely as a result of :-
 - Better control of hydrogenation conditions
 - Use of more effective selective catalysts
 - Availability of steep-melting palm fractions
- Increased production in the Middle East region using imported AMF

SOLID VEGETABLE FATS

KEY PRODUCT CHARACTERISTICS

- Primarily used for baking applications rather than frying

- Usually based on combinations of palm oil & palm fractions due to :-

- Increasing availability

- Lower cost compared to blends containing hydrogenated fats

- Good functionality in baking applications

- Reduced levels of trans fats

- Tendency for melting points to be higher due to high ambient temperatures in the region

- Largely sold in bulk packaging to wholesale/catering markets

SOLID VEGETABLE FATS

RECENT TRENDS IN THE US

- Bakery shortenings have been reformulated to obtain low trans versions

- Palm oil-based formulations are commonly used, but still some resistance due to :-

- Saturates levels

- Concern over 'tropical oils'

- Sustainability issue

- Price differentials & general market volatility

- Alternative low trans formulations based on :-

- Blends of liquid oils and fully hydrogenated oils

- IE soy/cotton-based blends

- Gradual switch from cube shortenings to pumpable shortenings using low trans formulations

SOLID VEGETABLE FATS

PRODUCT DEVELOPMENT CRITERIA



Typical end-product applications include :-



Frying



Biscuits/cookies



Cakes, pies etc.



Bread



Pastries



Melting point tends to be application-dependent



Content of hydrogenated fats generally kept to a minimum to keep costs down

SOLID VEGETABLE FATS

EXAMPLES OF TYPICAL FORMULATIONS

- Generally use blends of palm oil and palm stearin
- Emulsifiers can be added to enhance product functionality

COMPONENT

Palm oil

Palm stearin

Antioxidant (BHA/BHT)

Lecithin

AMOUNT

80-20%

20-80%

0.005%

0.1-0.2% (if
required)

SOLID VEGETABLE FATS

PRODUCTION METHODS AND PROCESS

REGIMES

General points :-

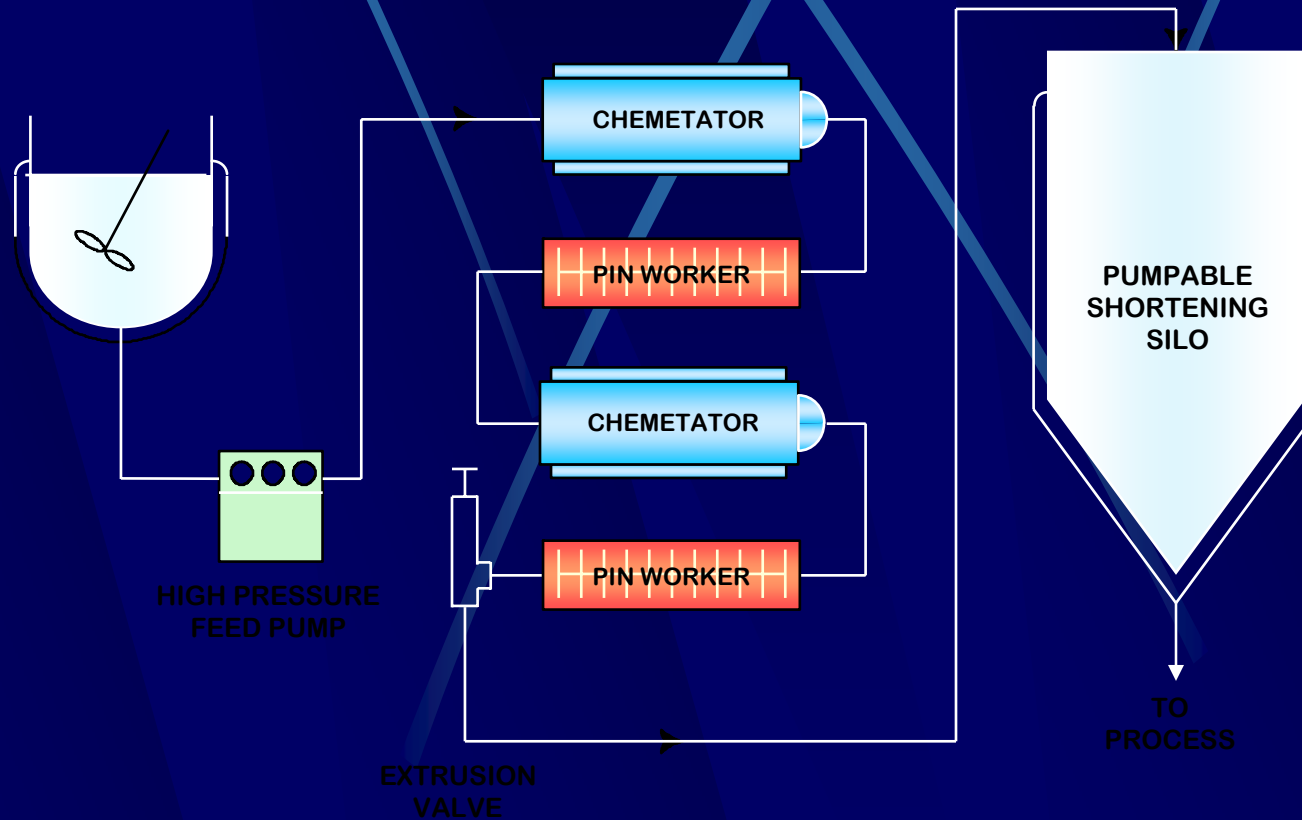
- 1) Processed in much the same way as vanaspati/vegetable ghee.
- 2) Piston/Triplex pump preferred for higher m.p. oil blends
- 2) Usually packaged in cartons with plastic liners
- 3) Reduced throughput beneficial for product plasticity

Typical process line configuration :-

DAY TANK – GP- A – A – PW - PW– PACKING M/C ; Bulk
cartons



The Pumpable Shortening System



SOLID VEGETABLE FATS

FUTURE TRENDS

- Further reduction in useage volumes
 - switch to liquid vegetable oils for frying applications
- Decreased use of hydrogenated fats – largely due to concerns over trans fats
- Interesterified blends & steep melting palm fractions could offer improved product functionality
- Increased use of specialty emulsifiers to obtain improvements in product performance

CONCLUSIONS

- Opportunities in this product sector will increase as the Middle East markets become more advanced.
- Volumes of imported products continue to decrease as the number of indigenous manufacturers continues to grow
- The growing product sectors – butter blends and vanaspati – will continue to flourish.
- Products in the commodity sectors facing threats from low cost imported versions from SE Asia
- Potential growth in exports of the more sophisticated products from the region.