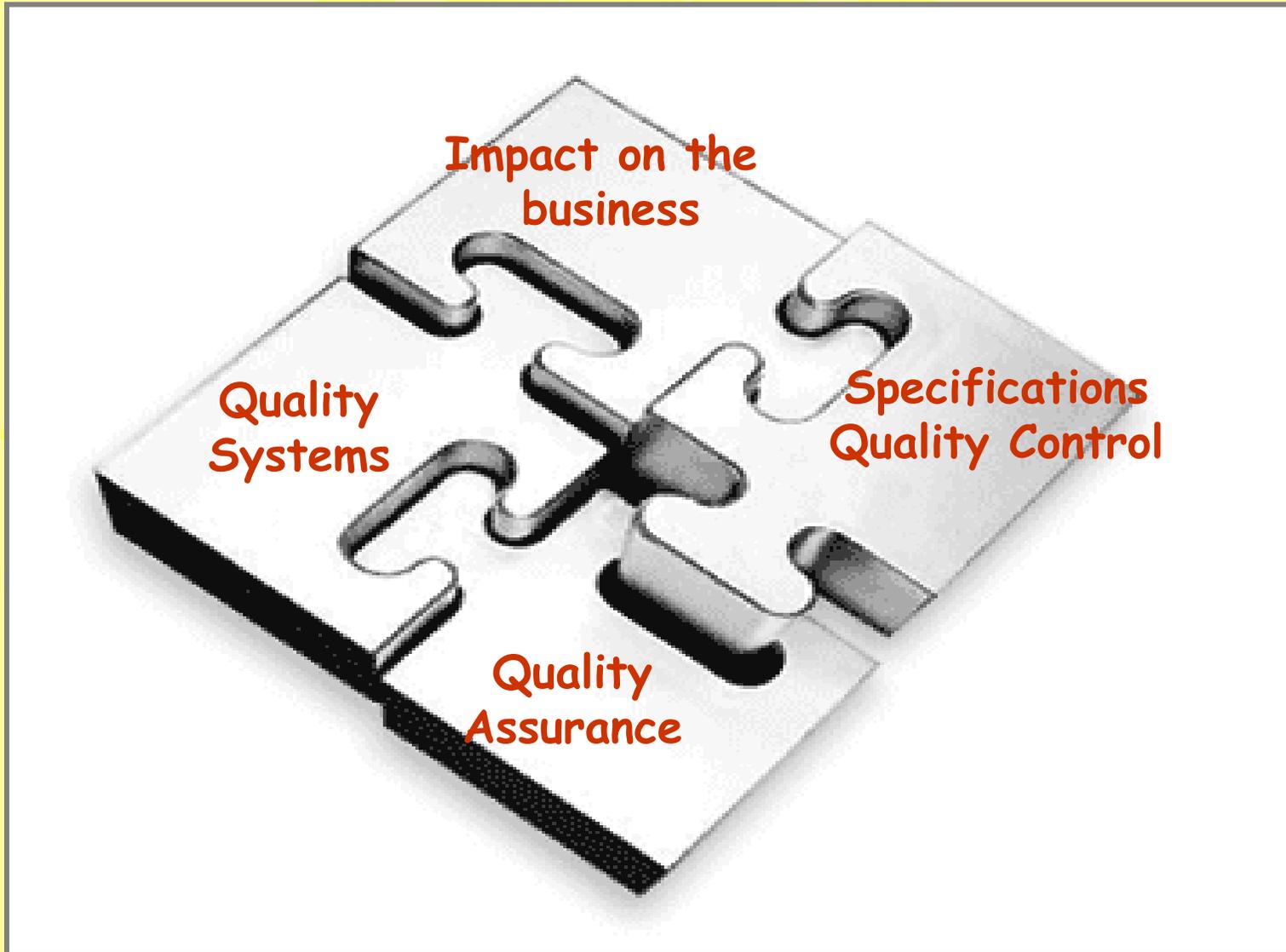


# QUALITY CONTROL CRITERIA of TURKISH MARGARINES



*Dr. Müjde OLÇAY*  
*R&D and QA Manager*

# PRODUCT QUALITY



# IMPACT ON THE BUSINESS

Production - No defects

Distribution - On time

Third party&Suppliers-Quality audits

Development-Formulate faults out of products

Operations - Consistent

Customer Service - Handle issues smoothly



## Quality Control

Specifications  
Sampling scheme  
Monitoring methods  
Data handling  
Corrective Action

## Quality Assurance

Material conditions  
and management systems  
to assure that products are:

- safe
- legal
- meet consumer expectations

## Quality systems

HACCP, ISO, TPM

Why?

Improve products  
Save money  
Customers

## Specifications

Specify only what is  
relevant  
want vs. expect?  
Signed contract with:  
supplier & customers



Clean packaging material  
Pack type/size  
Gloss colour

Appearance

Homogeneity  
Hardness  
Plasticity  
Spreading  
Flavour  
Odor  
Melting  
Taste  
After taste

Sensoric  
Experience

Origin

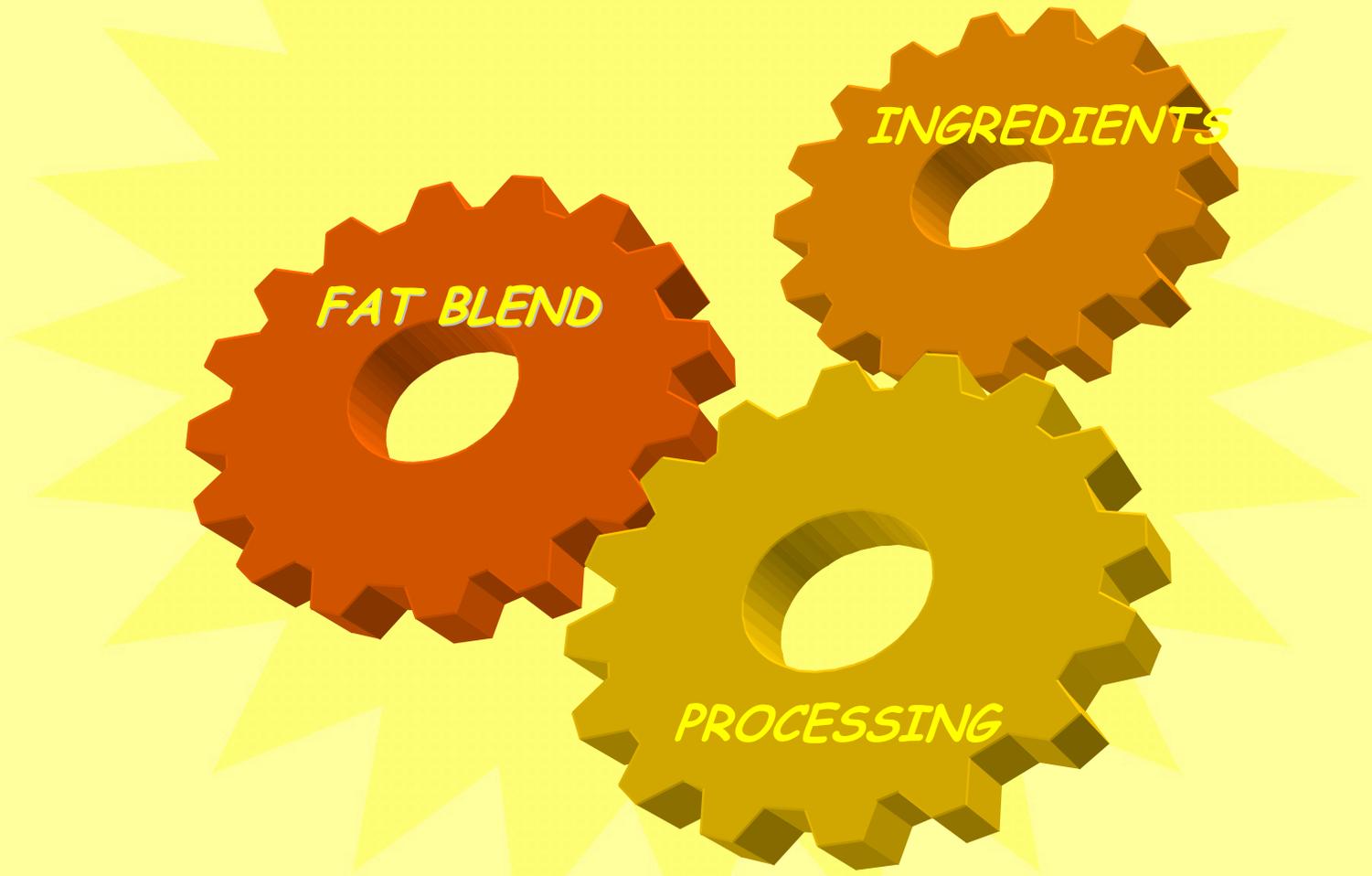
**MARGARINE**

Performance in use

Milk  
Salt  
Lecithin  
Vegetable  
Fatlevel  
Safa/trans  
Pufa/mufa  
Cholesterol  
Lactose free

Spreadability  
Baking, frying, melting  
Taste and smell of prepared foods

# MARGARINE QUALITY DEPENDS ON...

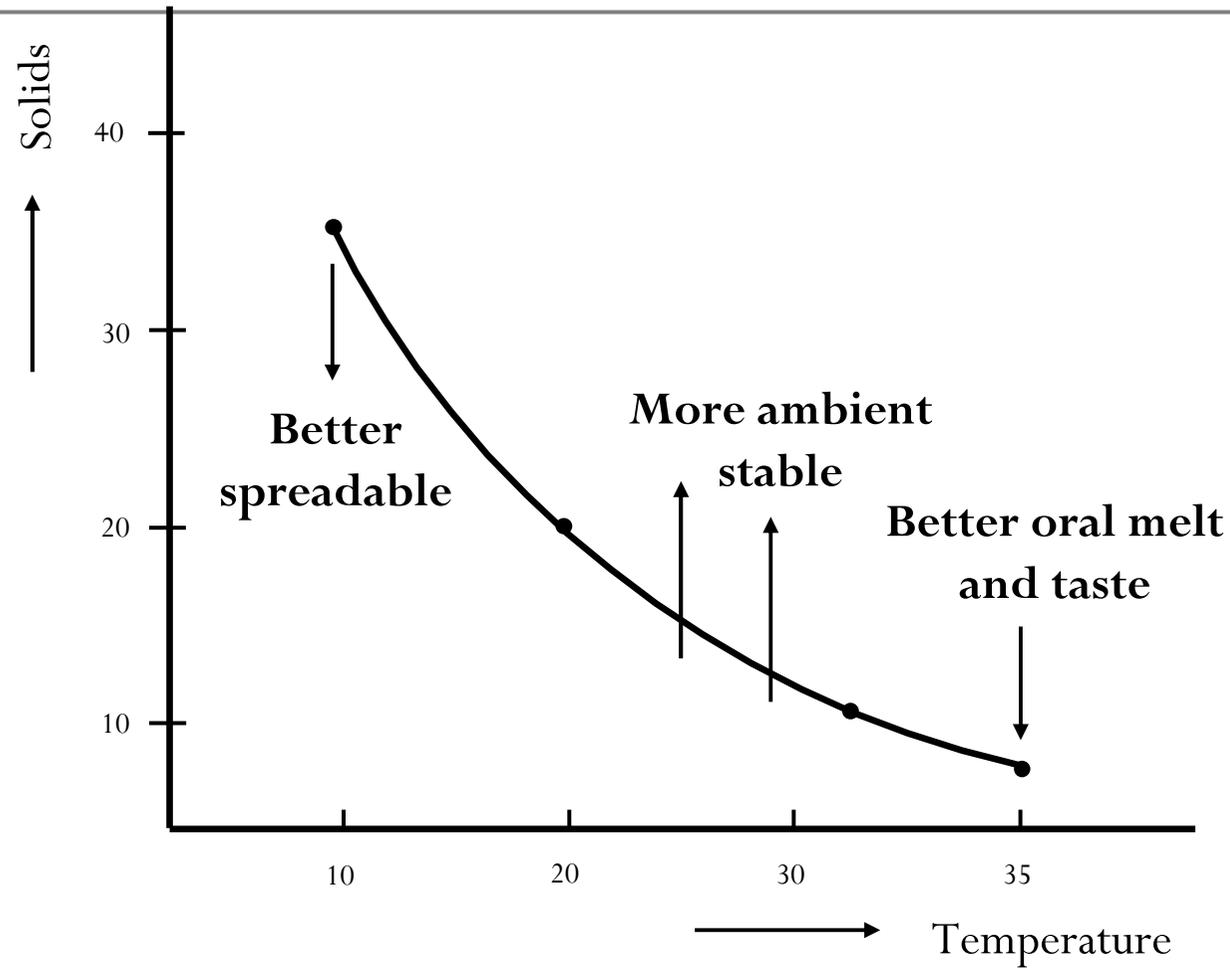


# QUALITY PARAMETERS

Parameters	Blend
Taste	XX
Taste keepability	XXX
Homogeneity	X
Hardness	XXX
Spreadability	XXX
Heat stability	XXX
Oral melt	XXX
Emulsion stability	X
Plasticity	X
Baking performance shallow frying	X

# FAT BLEND

Product characteristic defines N-line



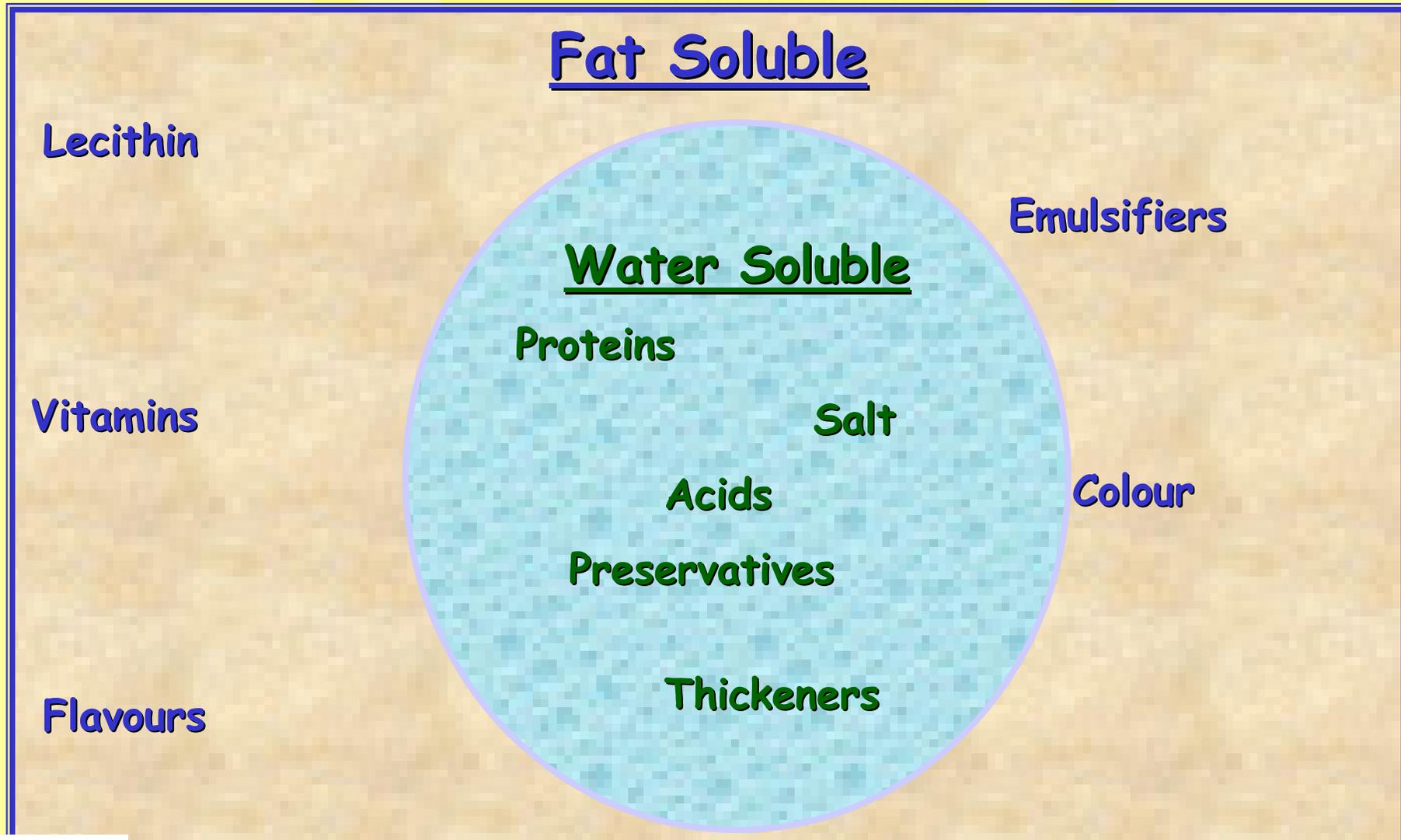
# FAT BLEND

## Product characteristic defines N-line

- **Spreadability**
  - from the refrigerator; N10
  - at ambient temperature; N20
- **Stability**
  - mainly N20 or N25
- **Heat stability**
  - at which temperature; N30
- **Oral melt and Taste**
  - mainly N35



# Common Ingredients



# QUALITY PARAMETERS

Parameters		Ingredients
Taste		XX
Taste keepability		XX
Homogeneity		
Hardness		
Spreadability		
Heat stability		XX
Oral melt		X
Emulsion stability		XX
Plasticity		X
Baking performance shallow frying		XX

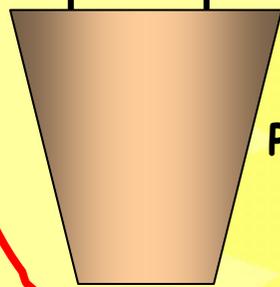
# QUALITY PARAMETERS

Parameters	Processing
Taste	
Taste keepability	
Homogeneity	XXX
Hardness	X
Spreadability	X
Heat stability	X
Oral melt	X
Emulsion stability	XX
Plasticity	XX
Baking performance shallow frying	X

# MARGARINE PRODUCTION

FAT PHASE

WATER PHASE



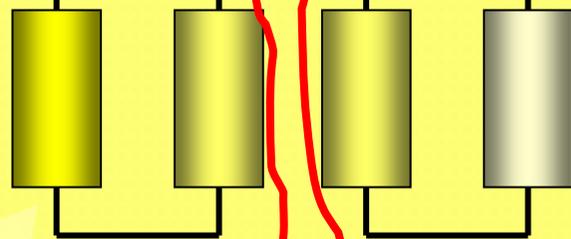
EMULSION PREPERATION

Right emulsion, no nuclei , no air

Working in C-unit or in B-unit  
residence time  
sieve plates

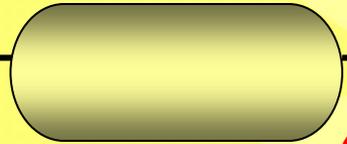
Packing hardness  
homogeneity

Enough cooling  
area in A-units



COOLING &  
CRISTALLISATION

MIXING



RESTING



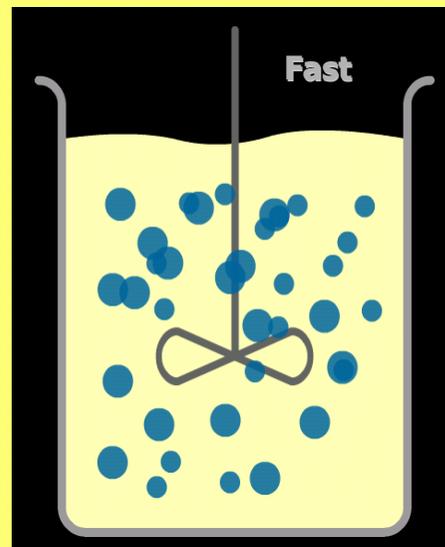
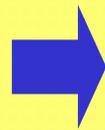
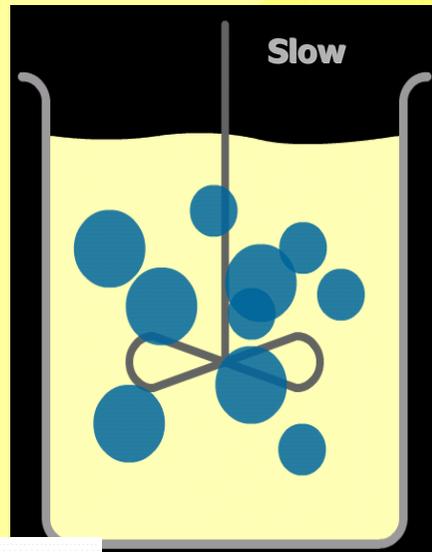
PACKAGING



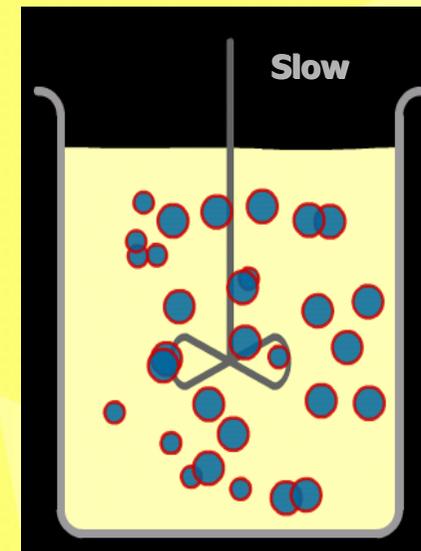
# Emulsion preparation

Accurate dosing  
Keeping homogeneous  
Temperature

Small droplets created by:

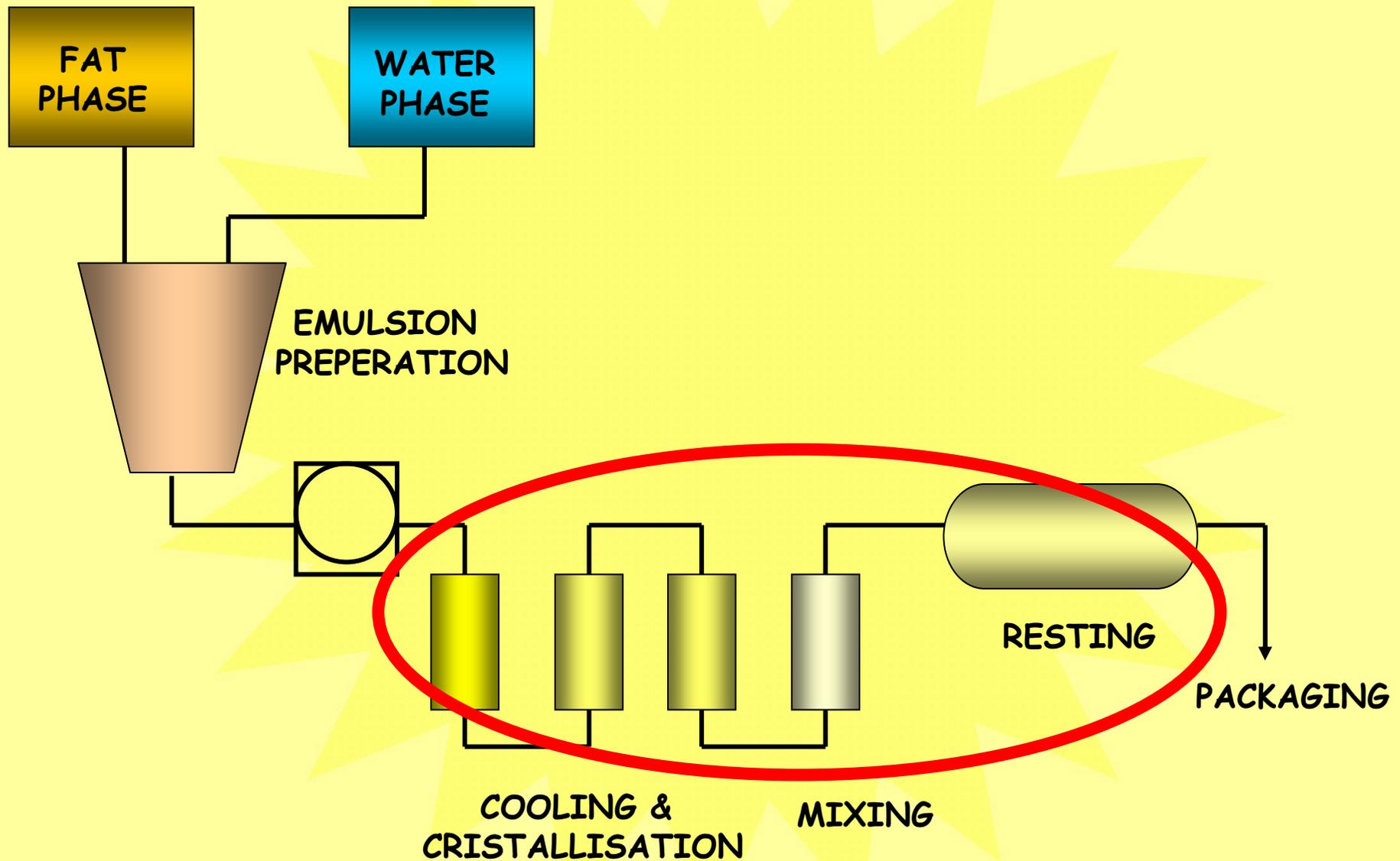


Higher shear



Emulsifier

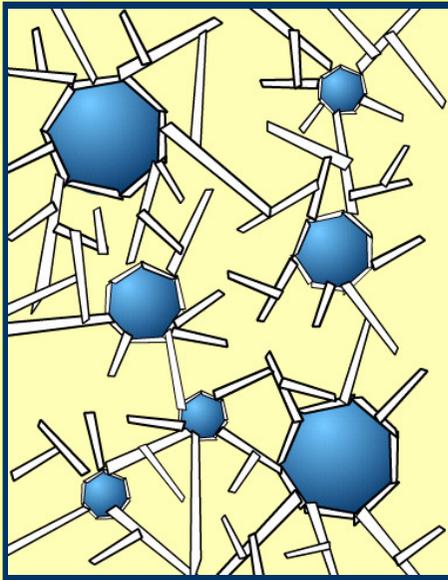
# MARGARINE PRODUCTION



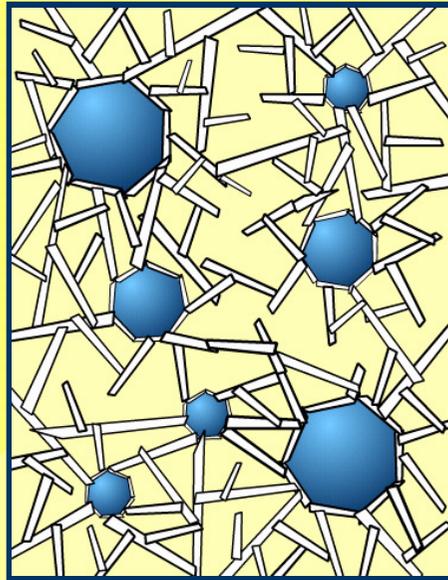
# Margarine processing

Each type of product has its own optimal process

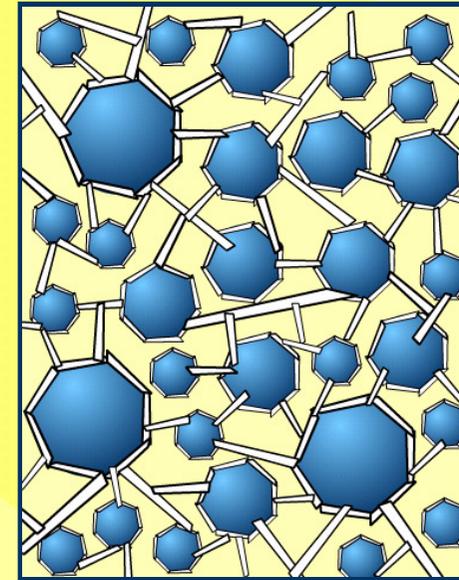
Tub	<----->	Wrapper
Soft Fat	<----->	Hard fat
Slow crystallising	<----->	Fast crystallising
High Fat	<----->	Low fat



**Tub Product**



**Wrapper Product**



**Low Fat Product**

# Function of the Margarine Production Units



**Cooling**

**Crystallisation**

**Emulsification**

**Working**

# Function of the units in the MPU

A-unit	C-unit	B-unit
Cooling		
Crystallisation	Crystallisation	Crystallisation
Emulsification	Emulsification	
(Working)	Working	Working by Sieve plates

# Crystallisation and emulsification

**WHY ?**

**Stable emulsion: no free water**

**Better network of crystals**

- no lumps; well spreadable
- no free oil; good heat stability

# Strength Crystal Network

Depends on

- amount of crystals
- temperature
- N-line of the fatblend
- type of triglycerides
- working

## DIFFERENCE IN NETWORK

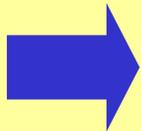
1. at packing
2. after storage or at use

# Homogeneity

Crystallisation without working  
will result in:

**lumpy, grainy, very hard product**

- not well spreadable
- free oil
- free water



**Working is required !**

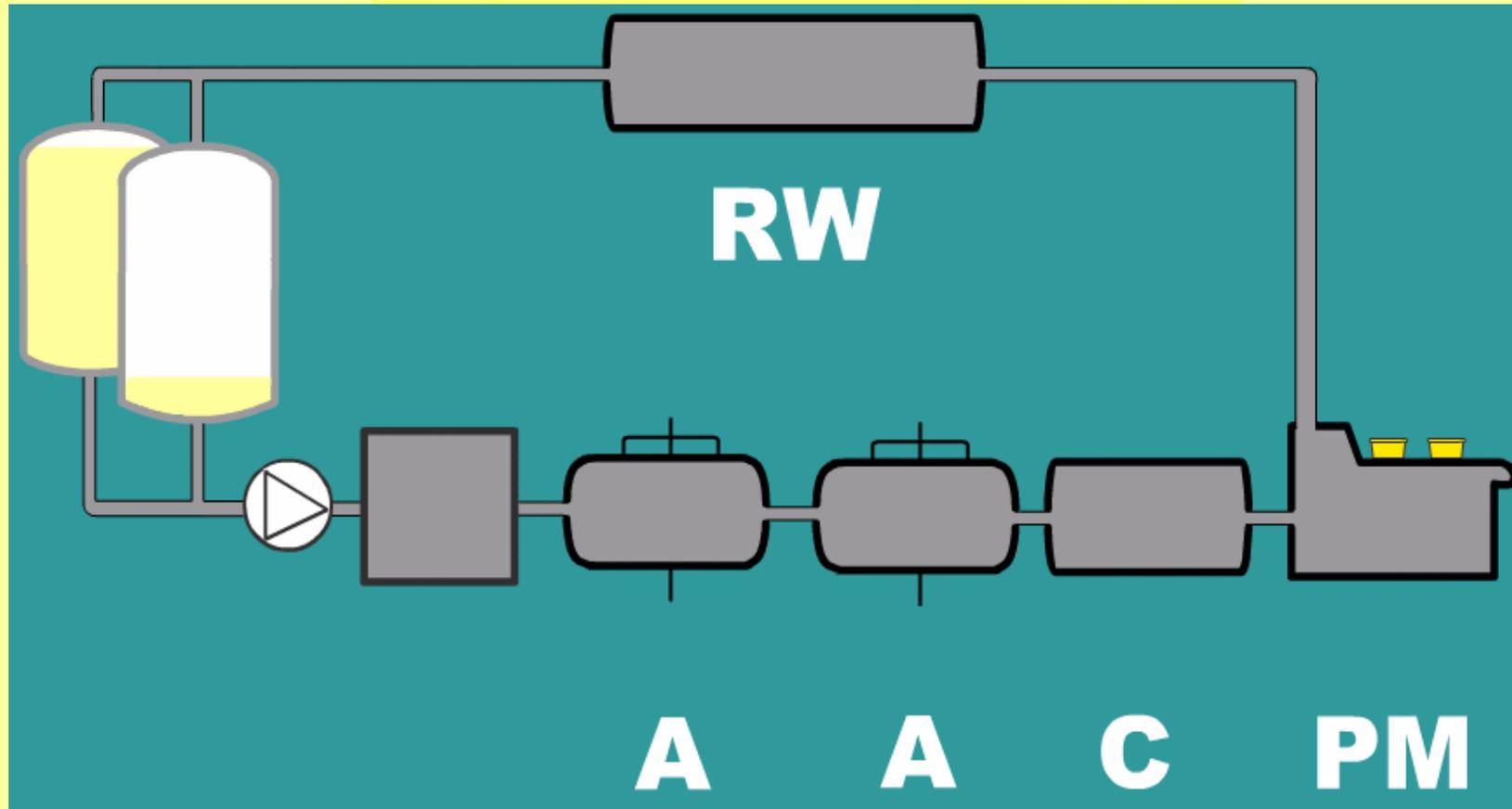
# Working

- C-unit : higher rpm -> more working

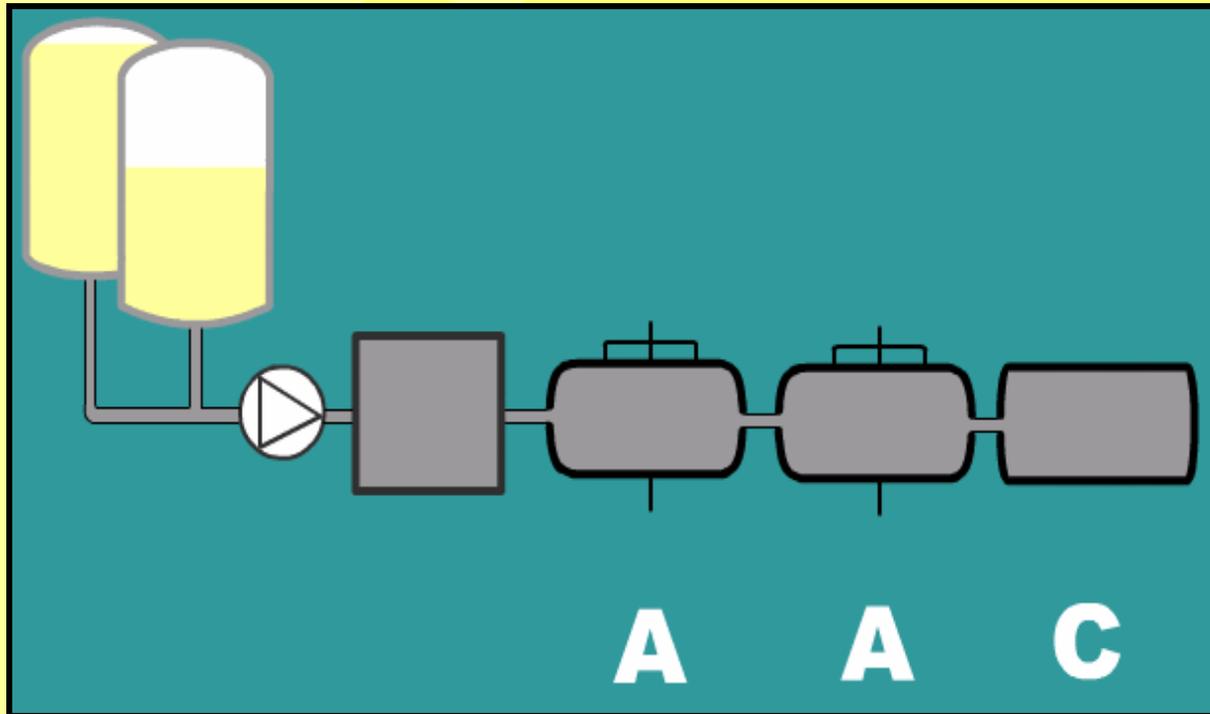
- B-unit - sieve plates :

smaller/less holes -> more working

# Total MPU Layout



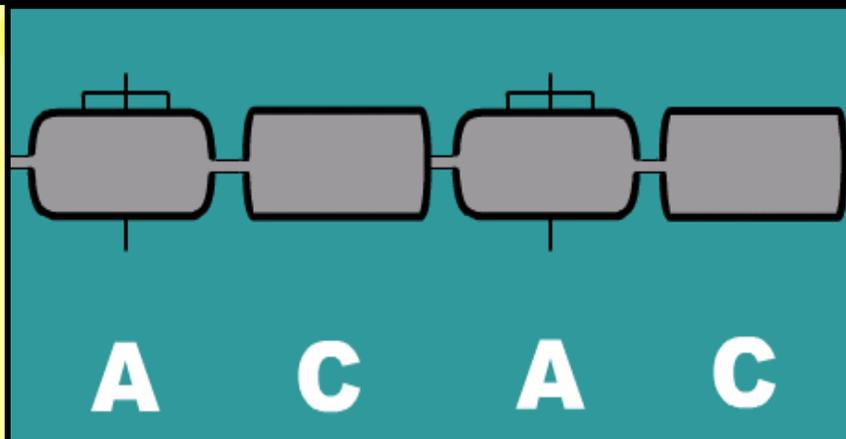
# MPU Layouts - Tubs



Tub products

- Soft tubs: AC

- Hard tubs: ACAC

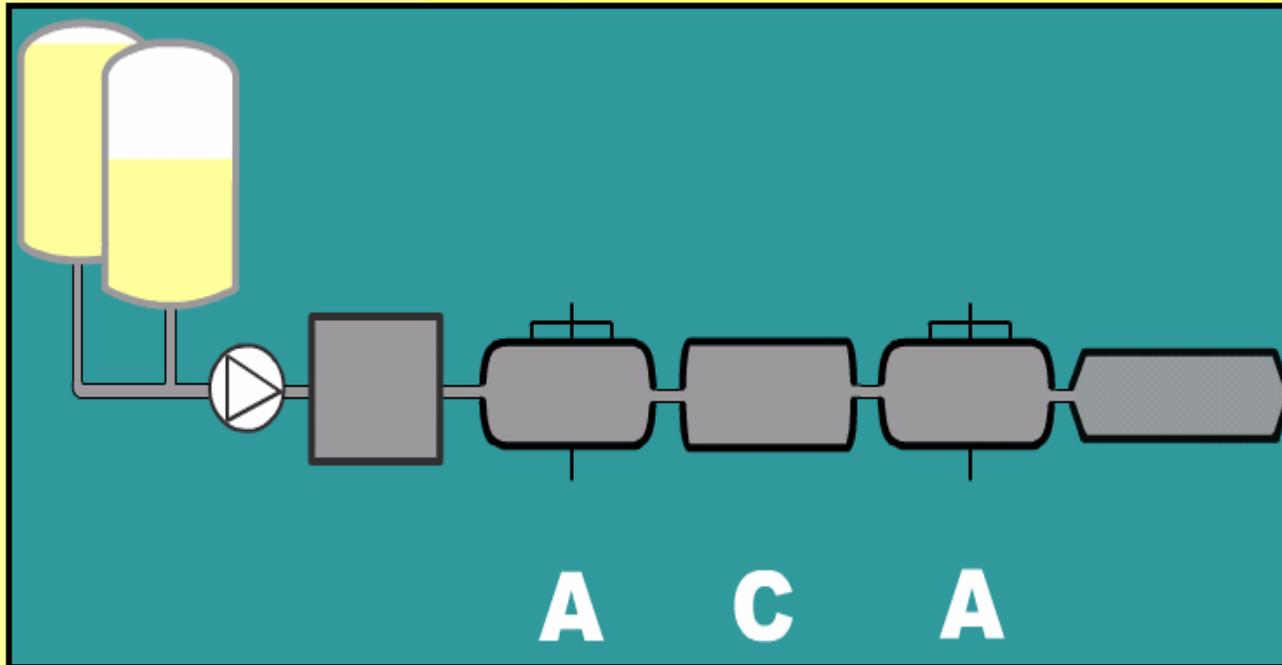


**IMPORTANT**

temperature ex A1  
temperature increase in C1

homogeneity at packing  
packing/filling  
consistency

# MPU Layouts - Bricks (Wrapper)

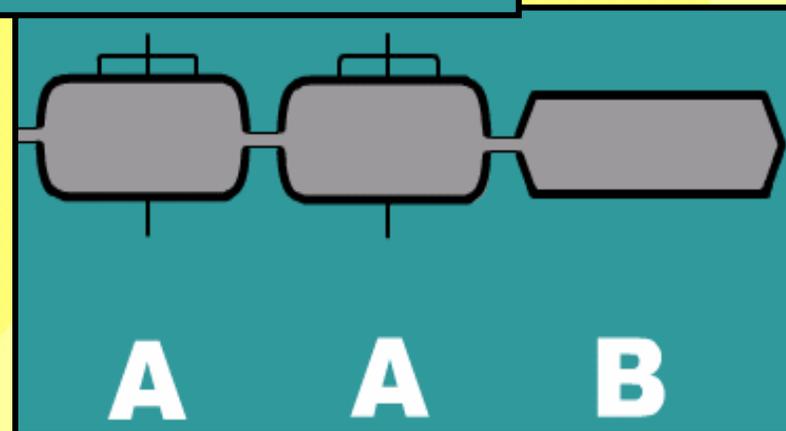


## IMPORTANT

- \* temperature ex last A-unit
- \* homogeneity at packing

## Wrapper products

- fast crystallising: AB
- rest: ACAB



# Critical parameters



- **Temperatures**
  - after A-units and C-units
  - increase in C1
  - at packing/filling
  
- **RPM of C-units**
  
- **Sieve plates in B-unit**
  
- **Amperage**
  - A-units
  - C-units
  
- **Pressure of the line**



## QUALITY CRITERIA

## *CONSUMER PRODUCTS*

# CONSUMER PERCEIVED QUALITY

- Taste
- Spreadability
- Clean tub or wrapper  
no free oil
- Good kitchen performance  
baking  
shallow frying
- Healthy



# CONSUMER PERCEIVED QUALITY

- Wrapper
  - kitchen performance
  - hardness
  - no oil exudation
  
- Tubmargarine
  - taste - oral melt
  - spreadability from fridge
  
- Healthy tubmargarine
  - no hardened components
  - pufa - safa
  - ratio C18.2/C18.3
  
- Bakery and Industrial Fats and Marg.
  - Performance

# SENSORY EVALUATION

*Linking the Consumer to the Margarine Producer*

## Sensory Evaluation Methods

### FOR TUB MARGARINES;

- Spreading on the bread
- Tasting

### FOR WRAPPER MARGARINES;

- Cooking Performance
- Baking Performance
- Spattering Test



# PRODUCT SPECIFICATIONS TURKISH MARGARINES

Criteria	Wrapper & Tub Margarines	Bakery Margarines	Bakery & Industrial Fats
* Fat, %	40- 82	Min.82	Min.99
Water, %	16- 60	max.16	max.1
* FFA, %	max. 1 (0,5)	max. 1 (0,5)	max.0,2
* POV	0	0	0
pH (acidity)	4,4-4,7	2,5-4,5	-
* sMp	max.36	max.45	max.45
Colour	3,5-5 R	3,5-5,5 R	5-6 R
Salt, %	0,18- 0,3	Max.0,2	-

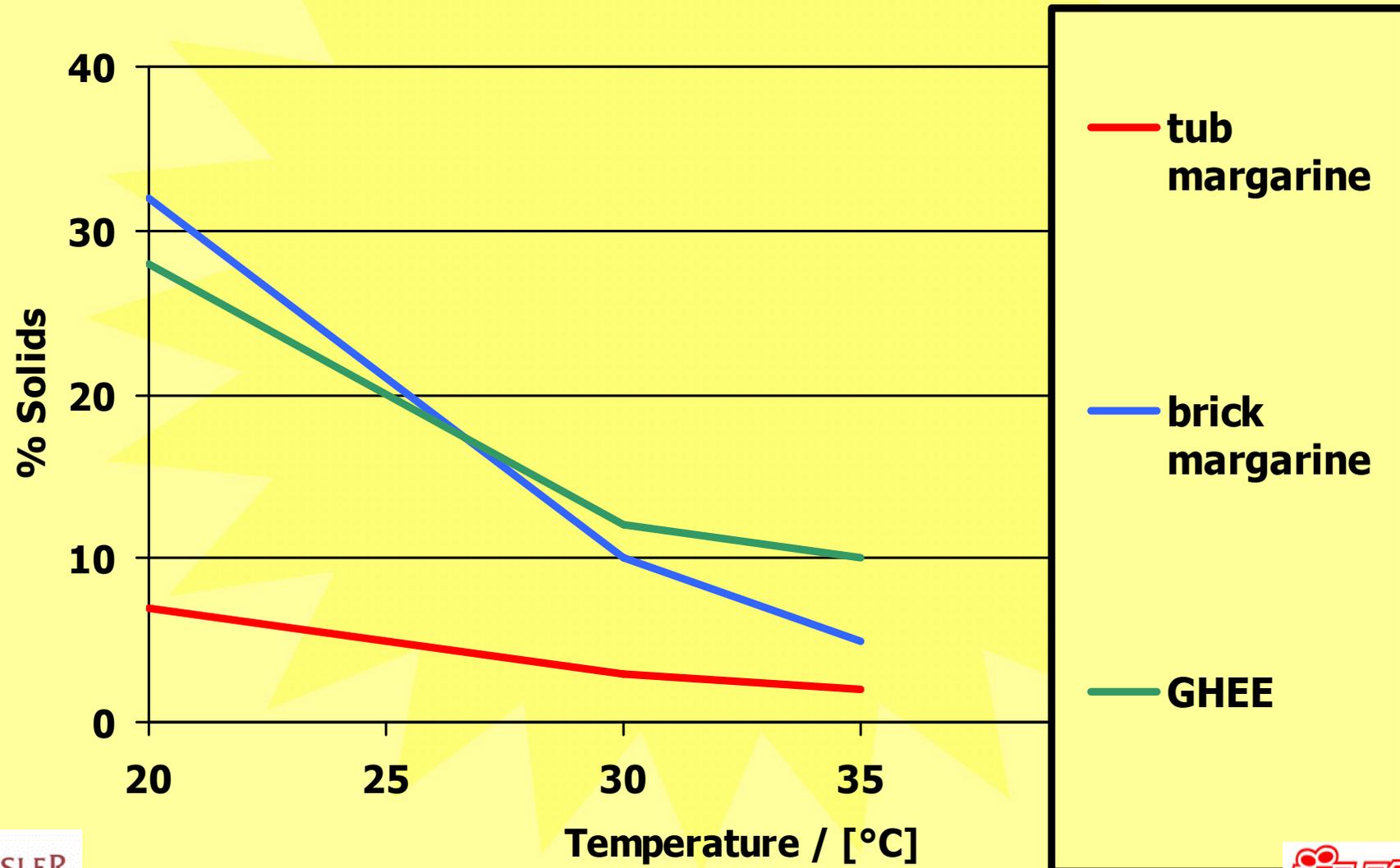
\* TSE (Turkish Standarts Institute, Margarine Standart)

# CONSUMER PRODUCTS in TURKISH MARKET

	TUBS (100 g margarine)			BRICKS (100 g margarine)
	Heart Health	Family Brand	Functional	Cooking/Kitchen Expert
<b>Fat, %</b>	60-61	60-61	40-60	70
<b>SAFA</b>	15-17 g	18-20 g	9-15 g	38-39 g
<b>MUFA</b>	14-16 g	15-16 g	11-15 g	-
<b>PUFA</b>	28-30 g	24-28 g	19-30 g	-
<b>TRANS FAT</b>	< 0,6 g	<0,6 g	<0,6 g	<0,6 g
<b>Sterol / Stanol</b>	-	-	7,5-8 g	-
<b>OMEGA-3</b>	2-4 g	2-3	2-4 g	-
<b>OMEGA-6</b>	25-27 g	22-23	16-26 g	-
<b>Vitamin A</b>	900 micg (110 %)*	600-800 micg (75-100 %)	900 micg (110 %)*	600 - 800micg (75%)*
<b>Vitamin D</b>	7,5 micg (150 %)*	2,5-7,5 micg (50-150%)*	7,5 micg (150 %)*	2,5 -7,5 micg (50 %)*
<b>Vitamin E</b>	20-37,5 mg (200-375 %)*	18-20 mg (180-200%)*	20-37,5 mg (200-375 %)*	18-20 mg (180-200%)*
<b>B6</b>	5 mg (250%)*	-	5 mg (250%)*	-
<b>B12</b>	5 micg (500 %)*	-	5 micg (500 %)*	-
<b>Folic Acid</b>	1000 micg (500 %)*	-	1000 micg (500 %)*	-

\* : % of Recommended Daily Allowance

# Brick & Tub Margarines





## QUALITY CRITERIA

*BAKERY and INDUSTRIAL FATS*

# PERFORMANCE EVALUATION

*Linking the BAKER to the Margarine Producer*

## Performance Evaluation Methods

- Physical Tests
- Baking Performance Tests



# PUFF PASTRY FATS & MARGARINES

During the baking,  
Fat between the layers melts  
Layers opened  
Dough widens  
Crispiness increases

The FAT be:

- Not broken easily
- Homogenous structure
- in good plasticity
- Not be sticky
- Rheology of the dough be equal to rheology of fat



# CREAM FATS

## CONSTRAINTS

- Neutral taste
- good sticking to biscuit
- good creaming properties
- rapid setting
- good cooling effect

## BY

- Good refining deodorisation
- not too hard  
not too soft
- well plasticised  
homogeneous
- crystallisation rate
- steep N-line



# ALL PURPOSE FATS & MARGARINES

## Bakery margarines

Consistency/hardness

not too hard at 10-15 °C

not too soft at 30-35 °C

Plasticity, Worksoftening

Creaming performance (high air intake)

Taste keepability, Taste after baking



# INDUSTRIAL FATS & MARGARINES

## Industrial fats

Crystallisation rate

Fatty acid composition

Rancimat

Stability

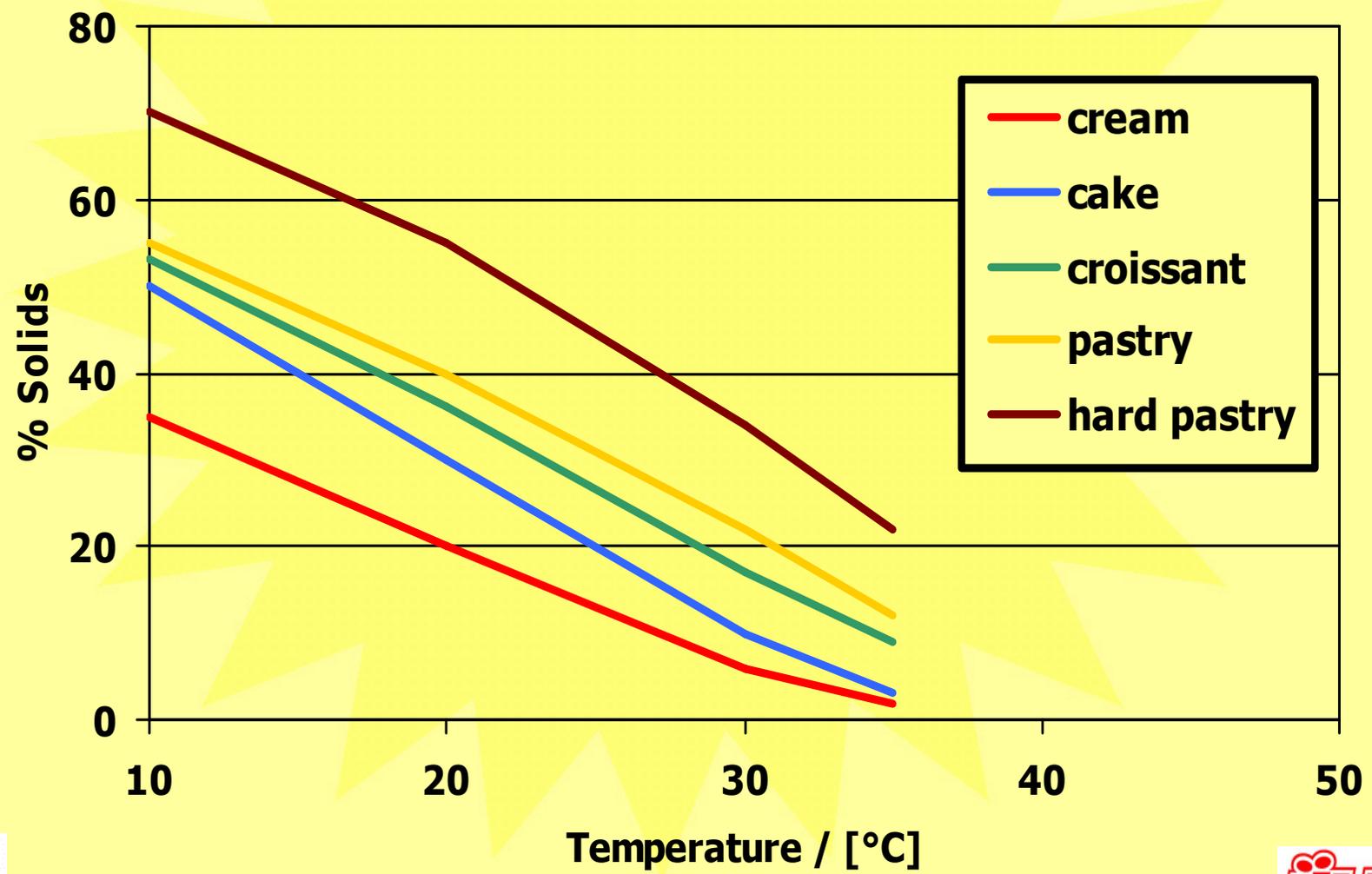
Consistency

Colour

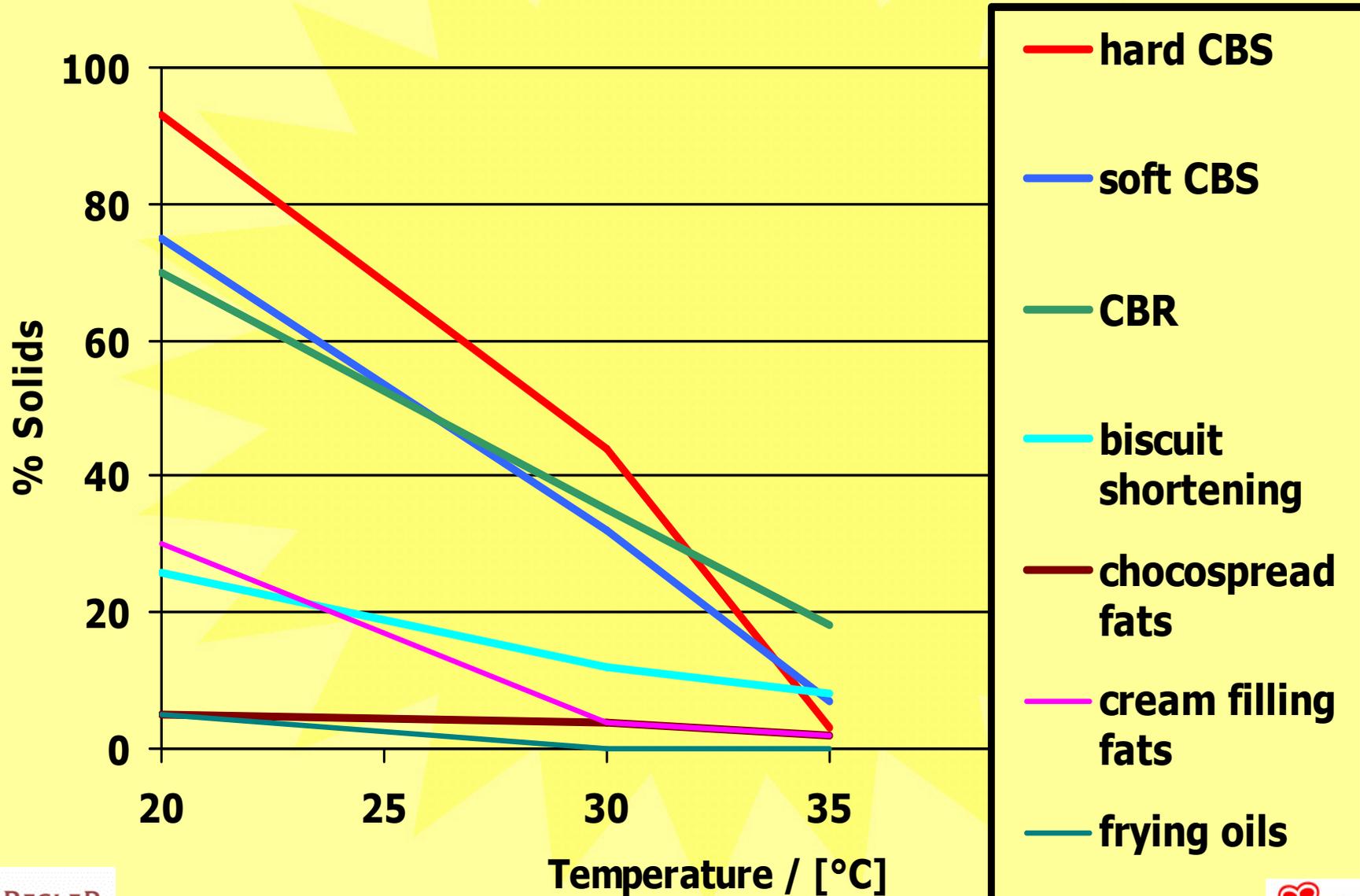
Foaming / Smokepoint

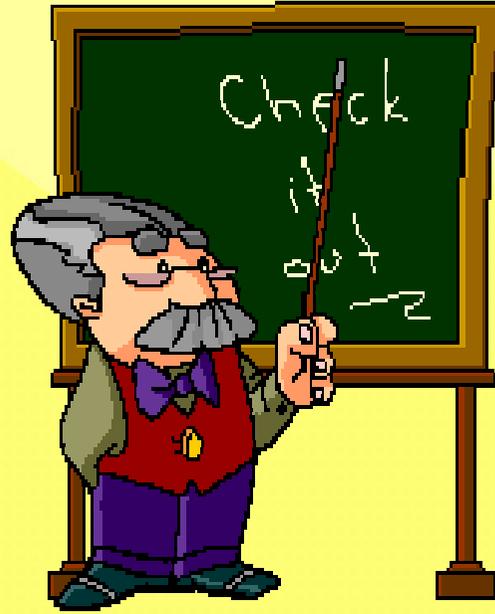


# Bakery Margarines



# Industrial Fats





## CONCLUSION

# 1. Fat Blends / Processing / Ingredients

## Main factors for Margarine Quality

2. Blends can be slow or fast depending on the triglycerides
3. Vatator processing is more than cooling down from 60°C to 15°C
4. With processing we can influence homogeneity filling/packing consistency
5. Optimal processing by understanding of the products
  - Required hardness; wrappers; bakery fats
  - Proper filling consistency; tubs
6. Quality is defined by the CUSTOMER