

#### Basic Science for sustainable and authentic Food



#### Fons Voragen

Keep Food Simple













## Achievements in past 50 years

- Broadening and Globalization of supply
- Safe, healthier and affordable *abundance of food*
- Decrease of famine in the world
- Less time for gathering and preparing food
- Lowering of the cost of Food
- Contributed to Increase in Life Expectancy







- Shortage of nutrients
- Uneven distribution of calories
- Growing demand for healthy products that fit in healthy diet
- Reversing wasteful trends into better utilisation of raw materials

## Current concerns for Food and Health (1)

Worldwide there is a rapidly increasing number of **overweight and obese** people due to unbalanced and unhealthy eating habits. Today this amounts to 2 billion people, a number which has doubled since 1980. This will present a huge bill to worldwide healthcare systems in the future.



# Current concerns for Food and Health (2)

In the light of this health-crisis the food industry recognises the *need for change in supplying healthier products.* However there is also growing concern that the speed of change is not rapid enough.



There is consensus that a *healthy diet* consists of food with higher fibres, proteins and micro-nutrients and less sugars, less saturated and trans fatty acids and salt.

### Current concerns for Waste and Hunger (1)

Worldwide 30 – 40% of raw materials and food is **wasted**. There is a multitude of reasons: crops are left unharvested, products don't meet standards set by retailers, inadequate logistics ; in households products are not used in time or overcooked; in restaurants servings are too large or waste is inadequately handled; very often there is confusion in homes, shops and restaurants between the significance of 'sell-by' or 'use-by'

dates.





KEEF

FOOL

## Current concerns for Waste and Hunger (2)

An increasing number of initiatives tries to *address wasteful trends*. This includes food banks, recycling and reprocessing schemes.







## Preferences and Perception (1)



A growing number of consumers chooses *fresh food*, often at higher costs, rather than processed food: consumption of fresh foods in the USA grew 20% over the past 10 years to more than 100 billion portions per year and will exceed 120 billion by 2018.



There is an increasing preference for *regional, organic and natural* products because they are perceived to be better. There is also a growing perception that industrially manufactured food is not good for us.

## Preferences and Perception (2)

Because of recent developments in *medical science*, consumers are more aware of restrictions such as intolerances and allergies. Also mechanisms in nutrition are better understood. All these developments increasingly determine food choices.

*Modern lifestyle* with emphasis on 'eat less, eat healthier and exercise more' requires products that are lower in calories, rich in vegetable protein and fibre and other health benefiting qualities.

Unfortunately the majority of consumers is still persisting in *unhealthy lifestyle and eating habits.* Herein lies a common responsibility in society to encourage the necessary changes, both in consumers' attitudes as well as in industrial strategies.







## Perceived disadvantages of Processing

#### **Processing Effects Food Quality:**

#### NEED FOR FOOD ADDITIVE

- o Preservation
- o Nutrition
- Convenience Foods
- Appealing Foods
- To aid in the processing and preparation of foods



- Flavour
- •Colour
- Taste
- Mouthfeel
- •Stability
- Nutritional value

#### <u>Restored by adding additives:</u> > Perceived as Food manipulation

# Additives to restore/profide quality aspects to processed and manufactured food

- Food colours
- Taste enhancers
- Flavours
- Stabilizers
- Emulsifiers
- Thickening and Gelling agents
- Anti-oxidants
- Sugar substitutes
- Sweeteners

- Salt and Buffers systems
- Acidulants
- Preservatives
- Fat substitutes
- Humectants
- Anticaking agents
- Bleaching agents
- Clarifying agents
- Propellants

#### But Additives also guarantee food safety and shelf life





 Tremendous growth of body of knowledge in Food- & Nutrition Sciences and Food Process Engineering: Excellent Handbooks

But also:

- Confusing messages of Food and Nutrition Scientist
- Still to much "Tunnel" approach
- Premature and "soapbox" communication on "inventions"
- Sloppy Science





## Role Food Industry (1)



- Food Companies more and more realize that they should listen more and better to the consumer and not only operate from a point of view of how do I process my raw material and how can I increase my market share and increase my profit.
- Strong drive for cost control and economy of scale



## Role Food Industry (2)

- The Food Industry can regain consumer confidence by responsible marketing based on *validated* new insights of the Nutrition and Health science world.
- Process and product development/innovation decisions should be more based on food quality and health aspects.
- Food legislation and Food regulations are often misunderstood by consumer, should be more transparent





## Role Consumer and Marketing (1)

- KEEP FOOD SIMPLE
- Many consumers have no idea where their food is coming from, which nutrients it contains and are unable to develop a healthy diet. Next to a sedentary lifestyle they are prone to many health risks.
- Society is divided in informed consumer, follow the mainstream and fully ignorant consumers

#### A Change of Mind How do companies approach their clients

*Production orientation*: mass production, client doesn't have much choice more sales by efficient production

Product orientation: more sales by quality improvement

*Sales orientation*: more sales by more communication and better distribution

*Marketing orientation*: more sales by better listening to what consumer wants and adapt products accordingly

*Societal marketing orientation*: more sales by better listening to what consumer wants and adapt products accordingly in a sustainable way

## **Role Consumer and Marketing**



- A growing segment of consumers has lost confidence in the food industry, part of them look for sane and sensible alternatives, others choose out of conviction irrational and even bizarre diets, often following "religious" consumer groups or Food Goeroes
- Marketing is mainly directed to increase sales and market share. Quality, health aspect and fit in healthy diet are hardly and often not properly addressed.

### Keep Food Simple: Our Criteria



We support initiatives and projects directed to:

- the development of healthy, nutritious food
- maximising the nutritional potential of raw materials
- minimising the use of extra ingredients (E-numbers)
- using 'minimal'processing with low waste and low CO2 footprint
- food that tastes great
- the commercialisation of such foods in new or existing businesses

#### Short history of bread baking

De hofbakkerij van farao Ramses (grafschildering)



- Bread was already baked in the time of the pharaoh's
- Through the Romans baking of bread also developed in Europe
- Bread made by fermenting wheat- and rye flour with water and yeast
- Since French Revolution white bread became popular, preferment replaced by yeast
- By increasing mechanization in the bakery the process time for making bread has been reduced from 24h > 2<sup>1/2</sup>h
- To achieve this Bread improvers were necessary like: Oxidants, Bleaching agents, Emulsifiers Enzymes, Baking powders
- Founders of Pandrix with long experience in conventional baking, developed a new process based on the old process of 100 years ago, with special designed equipment and baking oven.
- The bread is preferred by consumers because of its attractive smell and taste
- According to research in several universities more healthy due to further degradation of the gluten protein.

### Baking of Bread



#### Conventional

#### **Prolonged Fermentation**

Mix all ingredients incl. <i>bread improvers</i> Knead mix into soft and elastic dough,	5 <sup>1</sup> 10 <sup>1</sup>	Make preferment with flour and waterStore in proofing and fermentation chamber,9001
Divide dough in bread units and round them, Put dough trays in proofer, first proof,	10 <sup>1</sup> 45 <sup>1</sup>	Knead preferment with flour, water, salt and yeast, Continue proofing of resulting soft and elastic dough
Roll raised balls in dough pills, put in dough trays, Put dough trays in proofer, second proof	10 <sup>1</sup> 70 <sup>1</sup>	Roll raised dough carefully into bread shapes, Bread shapes undergo long final proofing and fermentation
Bake leavened dough in trays,	<b>30</b> <sup>1</sup>	Bake leavened dough in trays,35à401
Total time circa	<u>1801</u>	Total time circa14401+
Fully studied: numerous publications, books!!!		Mechanisms hardly known! Indigenous enzymes!

#### Innovations in Fruit Juice Industry over last 50 years



SEEE

- 50<sup>ties</sup>: Concentrates. No exotic juices in Europe.
- Developments in juice processing systems
- Use of enzymes, limits > Slide
- Image damaged by sugar content
- Developments in fruit juice products: fruit juice, fruit drink, fruit pulps, nectars, smoothies, protein and fibre enrichment, sugar reduction. ACE drink
- Anaerobic juice extraction: vacuum or modified atmosphere.
- Reduction heat load. HP technology, Ice slurry juice. Type of fruit dependant







## Schematic overview of the production of apple juice concentrate.





WAGENINGENUR

KEEP

FOOD

#### Many Innovations in Fruit Juice Technology as a Result of:









- New Insights in the Chemical Fine Structure of Cell Wall Polysaccharides and - thanks to molecular biology - better characterization of excisting and new enzymes
- Innovations in fruit and vegetable processing operations: Juice extraction systems, HP technology, new homogenizer principle, process and products optimalization.



### Keep Food Simple: Projects



We support projects at BSc and MSc level at various Universities:

- Wageningen University and Research
- Maastricht University
- HAS Den Bosch

Further information on Keep Food Simple at: <u>www.keepfoodsimple.nl</u> (also this presentation) Contact us at keepfoodsimpel@gmail.com



## Thank you for your attention



