food innovations gmbh
biozoon®

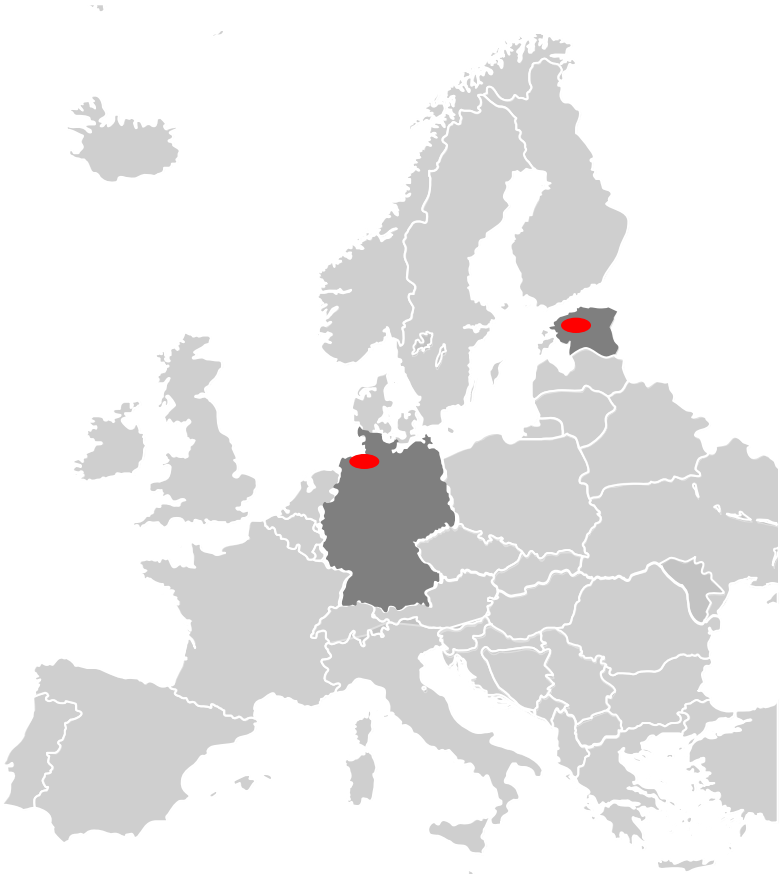
Bioeconomy in the Baltics - Inspiration conference Tallinn, 15th June 2012

The potential of modern biotechnology(ies) for use in the traditional food industry

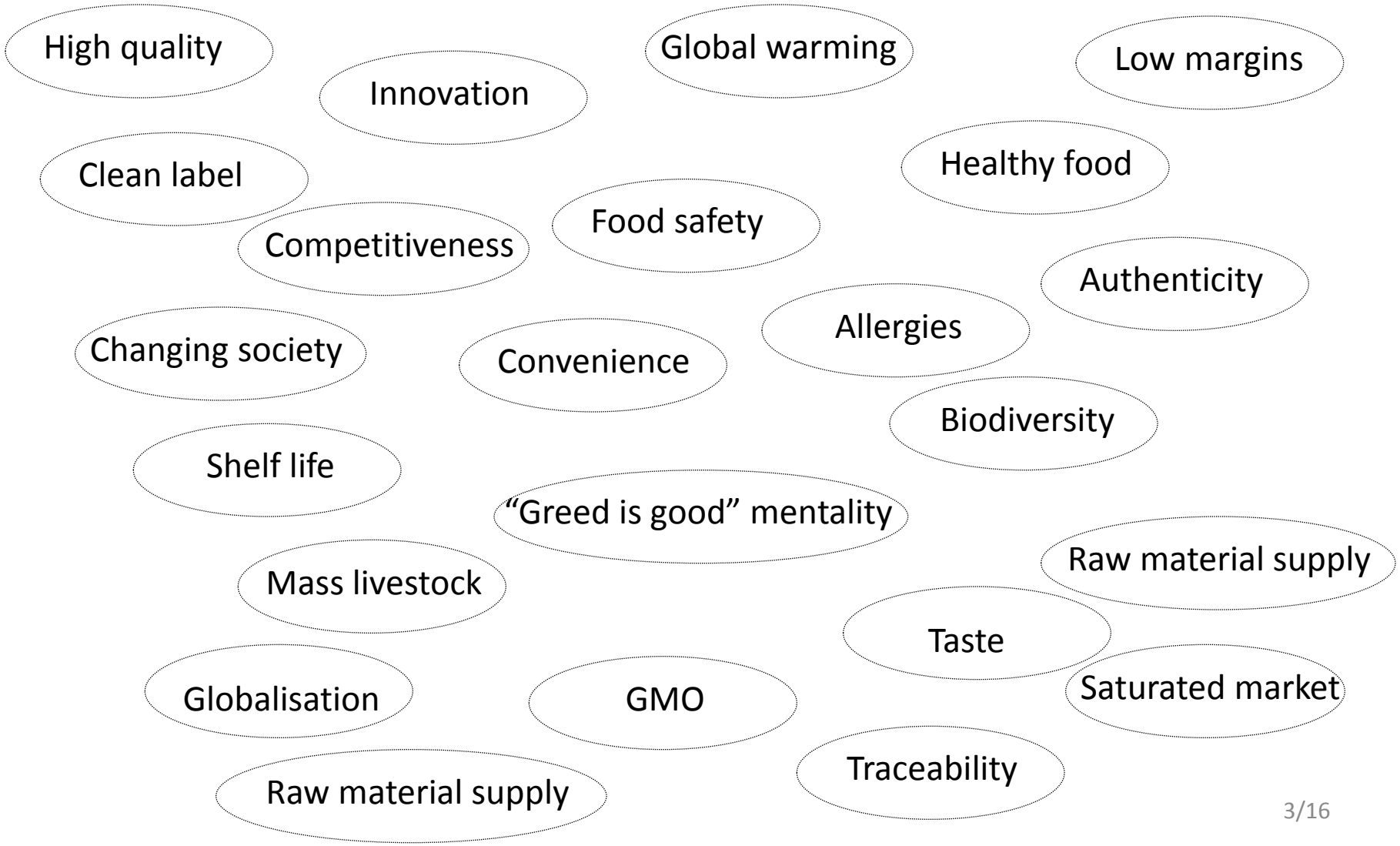
Profile

We …

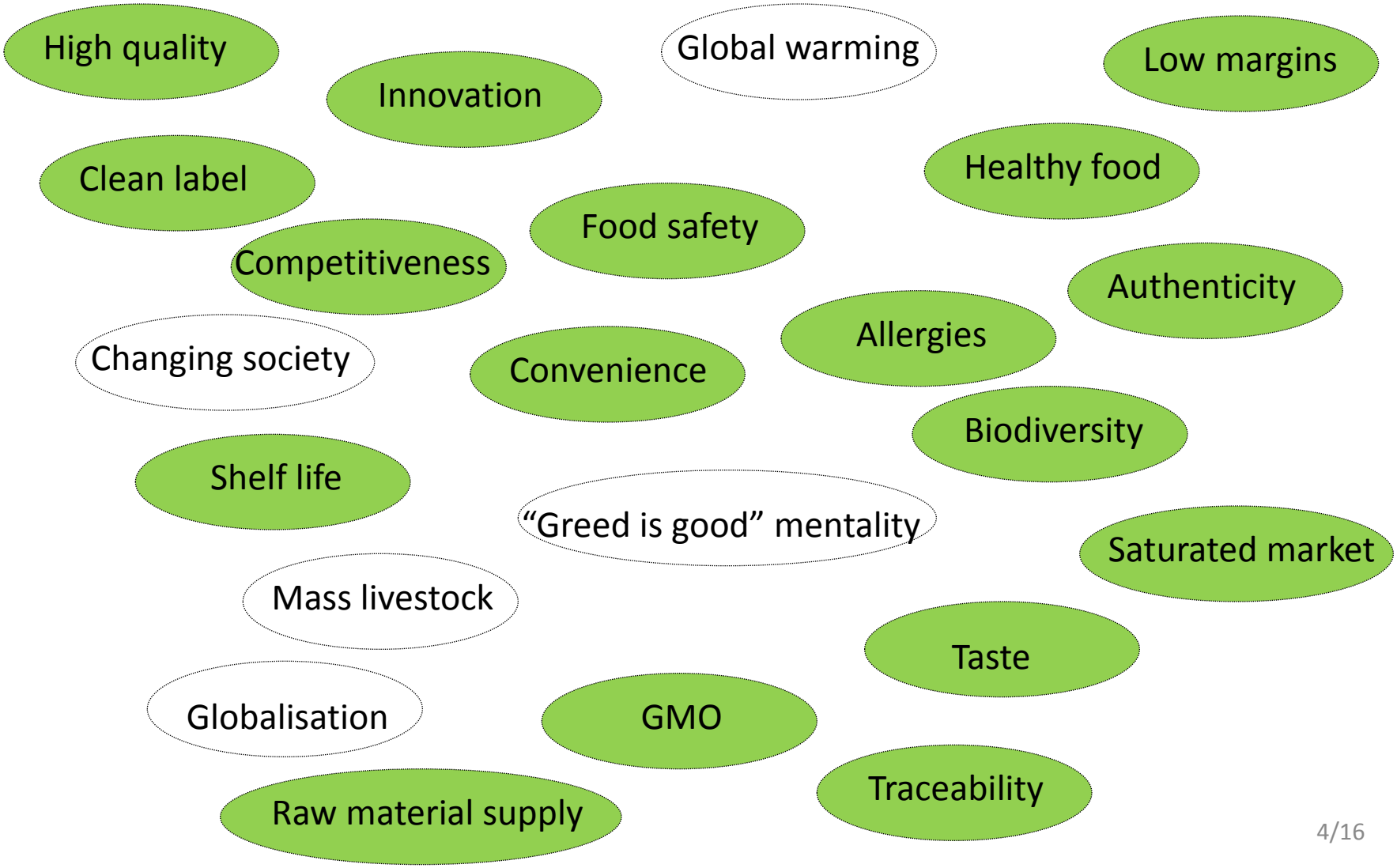
- were established in 2001 as a spin-off from a food research centre and today have 30 employees;
- are a research-driven food company focusing on specialty products for niche markets;
- invest 20% of annual turnover in research;
- own two patents and more than 40 trademarks;
- are active in European research projects as they offer access to complementary partners, future markets and excellent research expertise.



The challenges of the modern food industry



The challenges of the modern food industry



food innovations gmbh
biozoon®

Biotechnology (DECHEMA definition)

- Application of biological processes and engineering principles on an industrial scale.
- Application of science and engineering to the direct or indirect use of living organisms, or parts or products of living organisms, in their natural or modified forms.
- Biotechnology is the scientific application of microbiology and biochemistry in close connection with chemical, process and plant engineering for the utilisation of biological phenomena on a technical and industrial scale.

Modern biotechnology & traditional food industry

- Genetics – In nuce and application examples
  - GM plants
  - Detection methods for GMOs
  - Nutrigenomics
- Microorganisms – In nuce and application examples
  - Microorganisms in food processing
  - Detection methods for pathogenic microorganisms
- Use of enzymes– In nuce and application examples
  - Enzymes in food processing

GM plants & food industry

In nuce

- Breeding and cultivation of GM plants for agricultural use to increase yields and improve crop resistance

Application examples

- Soy bean is the No. 1 GM agricultural crop globally. Approx. 75% of soy produced globally is genetically modified *
- Soy bean contains approx. 18% oil and 38% protein
- Oil is used in food processing (like margarine) and nowadays increasingly for biodiesel production; the protein fraction is used mainly for animal feed

Other important crops are maize (30%) and rapeseed (25%)*

*Source: www.transgen.de

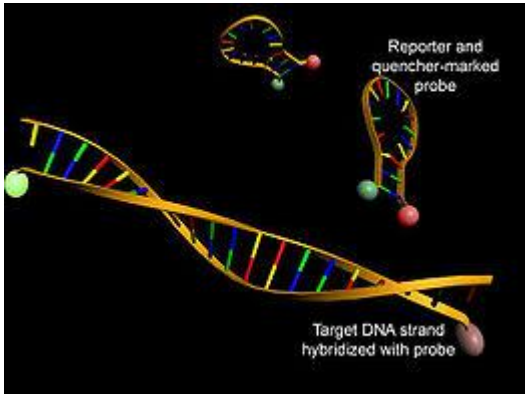
Identification of raw materials & food industry

In nuce

- Many food producers analyse their products to ensure they are “GMO-free” or to identify product origin
- State-of-the-art methodology is (real-time) qPCR method
- Challenge is that in many processed foods (like refined oils) there may not be enough DNA left for analysis

Application examples

- Determination of fish species
- Detection of GMO in food

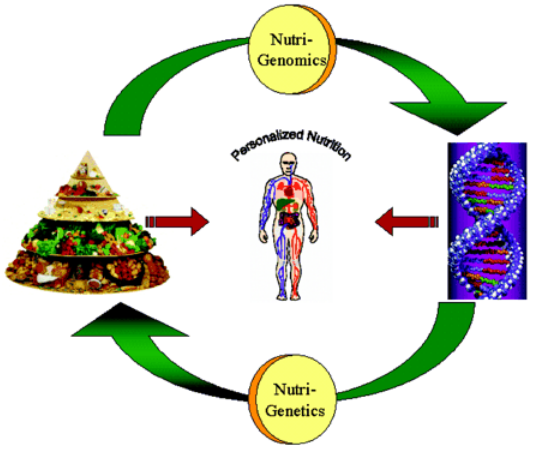


Source: Wikipedia

Nutrigenomics & food industry

In nuce

- Nutrigenomics is the science which studies how certain human genes react to given nutrients
- In the long-term future it may allow the development of “personalised” food and diets according to gene deposition



Source: Journal of the Federation of American Societies for Experimental Biology

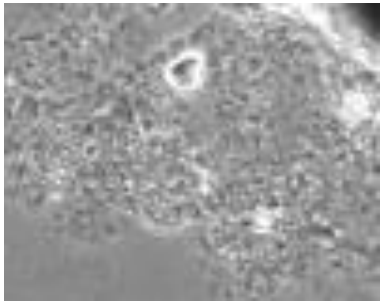
Application examples

- No known application in the food industry
- Nutrigenomics is a very complex subject which still requires years of further basic research before it can be applied in the food industry

Microorganisms & food industry

In nuce

- Microorganisms means bacteria, fungi and yeast
- Used as processing aids in traditional food production
- Used for the production of processing aids (e.g. enzymes) and additives for traditional food industries



Application examples

- Starter cultures (e.g. Lactobacillus) to accelerate cheese making and flavouring
- Fungi (e.g. Aspergillus) for raw sausage production
- Yeasts (e.g. Saccharomyces) to accelerate dough forming and improve machinability

Detection of pathogenic microorganisms & food industry

In nuce

Source: www.immunolab.de

- Presence of pathogenic bacteria like salmonella, E.coli in food presents a severe health risk and is an important quality and safety issue for the food industry
- Strong thresholds by law
- Identification requires sensitive and highly specific analytical techniques

Application examples

- Microarray kits are not yet used in routine analysis of food as they are too expensive
- ELISA test kits for the detection of aflatoxin B1, salmonella
- Polymerase Chain Reaction (PCR) test kits for the detection and identification of salmonella and E.coli (EHEC)

Enzymes & food industry

In nuce

- Used as processing aids in traditional food production
- Used for the production of processing aids and additives for traditional food industries
- Often used in combination with microorganisms

Application examples

- Amylases are a group of enzymes for starch modification to produce e.g. syrups (used in ketchup, sweets, ice cream)
- Proteases to extract spices and aromas (e.g. cheese aromas) from plant and animal protein
- Lipoxygenase in combination with Saccharomyces in dough production

Future trends & potential of biotechnology in the traditional food industry

- Trend to replace genetically modified microorganisms and enzymes by natural ones against the background of the political debate on GMO labelling of food products. Therefore there is a need
  - to screen for new microorganisms and enzymes and combinations thereof
- Increased application of biotechnological processes in food processing (white biotechnology) which offer large growth potential for biotechnology companies. The demand concerns in particular
  - replacing traditional chemical processes
  - development of new processing aids and ingredients

Future trends & potential of biotechnology in the traditional food industry

- Continuous demand for new biotechnological rapid test methods to improve the quality and safety of food. Their further development offers great potential in particular for biotechnology SMEs. Examples are
  - Improvement of rtPCR technologies
  - New biotechnological approaches like gene sensors
  - .....
- Nutrigenomics is a young scientific discipline with an as yet largely unknown application potential

European research

Novel process for reducing sugar and adding fibre to natural apple juices

Novel processing approaches for the development of food products low in fat, salt and sugar reduced

The continuation of European research funding in the framework of HORIZON 2020 in the field of biotechnology for food application is an important asset for the future of the European food industry

Thank you very much for your attention !

food innovations gmbh
biozoon®

Matthias Kück, CEO
info@biozoon.de; www.biozoon.de