Are Organic Foods Functional and Healthy?

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Task force:

„Quality Assessment of Foods from Alternative and Conventional Production“

References available from

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Are Organic Foods functional and Healthy?

1. Functional Foods
2. Organic Foods
3. Product Quality (Quality Assessment)
4. Process Quality
5. Socio-economic Aspects
6. Conclusions

Food irritations and consumer suspicions

- BSE
- Red and Green Gen Technology
- Dioxin, Nitrofene, Acrylamide...
- Salmonella, Listeria, EHEC...
- Hormons
- ?
- Mysterious production and distribution chanels,

Consumers targets

- Health
- Well-being
- Beauty
- Long live
- Quality of live

But

- Nutrition diseases

Solution:

„New Foods“

Functional Food

Organic food

others…..?

Yesterday and today: functionalized!

1904 - 1912

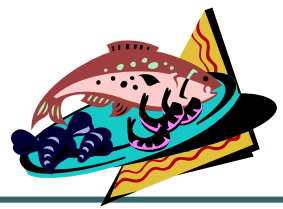
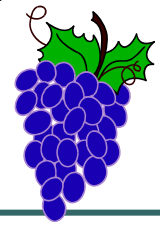
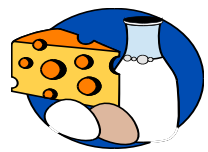
Association suisse pour l'alimentation (ASA)

Strategies

- From well balanced nutrition: **An appropriate mixture of food that provides, at least, the minimum requirements of nutrients and a few other food components needed to support growth and maintain body weigth, to prevent the development of deficiency deseases and to reduce the risk of diseases associated with deleterious excesses.**
- To optimized nutrition: **Optimized nutrition that shall aim at maximizing physiological functions of each individual in order to ensure both maximum well-being and health but, at the same time, a minimum risk of desease through lifespan**

Roberfroid, 1999



Functional Foods

- They are a **concept**, not an individual component
- They are foods **not** therapeutics (nutraceutical, pharmafood, medifood, designer food, vitafood, brainfood, moodfood...)
- They influence **well-being** and **health**, they reduce the risk of disease rather than to prevent it

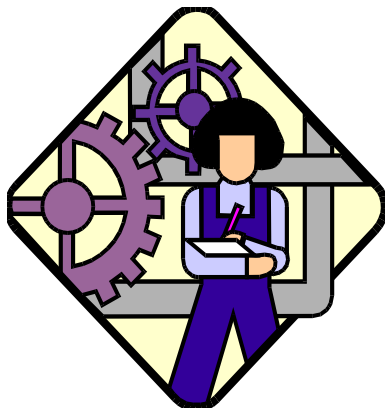
Functional Food: an european consensus

„A food can be regarded as functional if it is satisfactorly demonstrated to affect beneficially one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to either improved stage of health and well-being and/or reduction of risk of disease“

FUFOSE: EU concerted action FFScienceEurope

Functional Food: an european consensus ctnd.

- If from a given food potential harmful ingredients being removed by processing even that food might be „functional“ e.g. cholesterol free egg yolk...



Unique features of Functional Food

- Being a conventional or everyday food
- To be consumed as part of the normal/usual diet
- Composed of naturally occuring (as opposed to synthetic) components perhaps in unnatural concentration or present in foods that would not normally supply them
- Having positive effects on target function(s) beyond nutritive/basic nutrition

Unique features of Functional Food ctnd.

- That may enhance well-being and health and/or reduce the risk of disease or provide health benefit so as to improve the quality of live including physical, psychological and behavioral performances
- Have authorized and scientifically based claims

Which food might be functional?

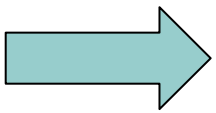
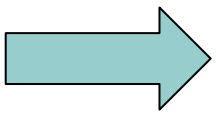
- A natural food
- A food to which a component has been added
- A food from which a component has been removed
- A food where the nature of one or more components has been modified
- A food in which the bioavailability of one or more components has been modified
- Any combination of these possibilities

Concerns Functional Food

- Scientific: gaps in our knowledge about the physiological mechanisms of food and their individual ingredients need to be filled. Health claims and safety have to be approved.
- Legislative: regulations should be laid down as to the health claims (advertising), safety and labeling
- Industrial: research on purchasing and eating habits of the population. No compensation of bad eating habits by functional food!

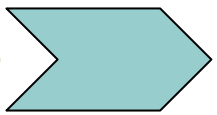
Claims

- Claims for functional food should be based on the scientifique classification of markers (indicators/ factors) for target functions and on the effects on these markers
- Codex Alimentarius has defined

-  „type A“ claim
- and
-  „type“ B claim

„Type A“

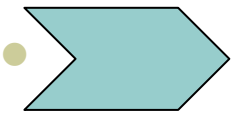
- Effects of foods on physiological or psychlogical or biological actvities but do not include nutrient functions. Positive contribution to health or to a condition linked to health

-  „enhanced function“

- „type A“ claim

„Type B“

- Reduction of a disease risk related to the consumption of a food or a food constituent in the daily diet.

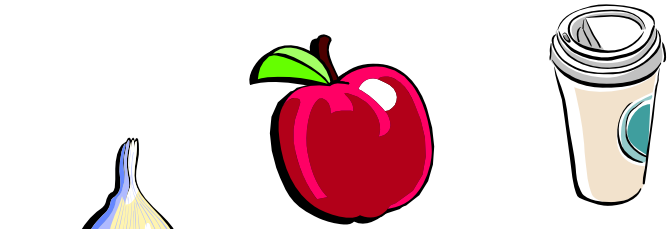


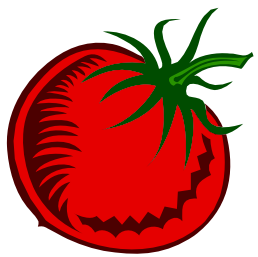
„Risk of disease reduction claim“

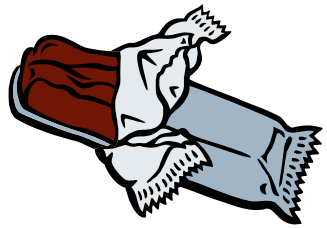
„type B“ claim

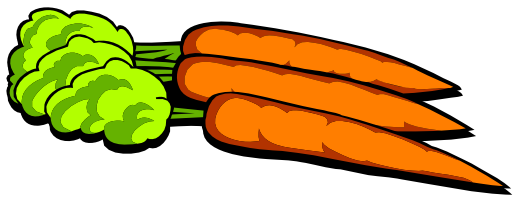
„Functional ingredients“

- Probiotics, Prebiotics, Synbiotics
- Antioxidadive compounds
- Secondary plant substances
- Structured lipids
- Multiple unsatturated fatty acids
- Fat supplements, Fat displacements
- Bioactive peptides
- Dietary fibres
- Vitamins
- Minerals









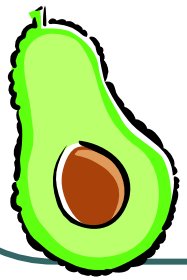
Pro-, Pre- und Synbiotics

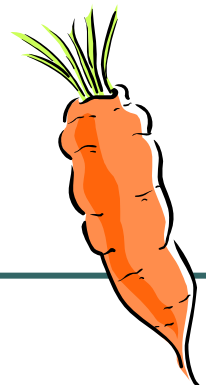
- Probiotics: are living microorganisms (lacto-bacilli, bifido-bacteriae) that beneficially affect the host by improving its intestinal balance
- Prebiotics: non digestible oligo- and polysaccharides which selectively stimulate the growth and/or activity of lacto-bacilli or bifido-bacteriae in the colon
- Synbiotics: combination of pro- and prebiotics

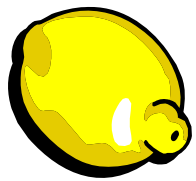
Antioxidants

- Vitamins C and E, beta-Carotin are well investigated

- Proven effects: protecting effect of vitamin E on cardiovascular diseases
- Synergistic effects of vitamin C and E
- Indications on effects of beta-Carotin, vitamin C und E to prevent from cancer







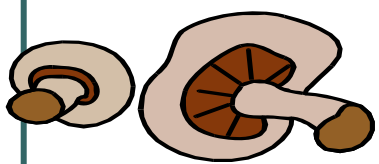
Secondary Plant Substances

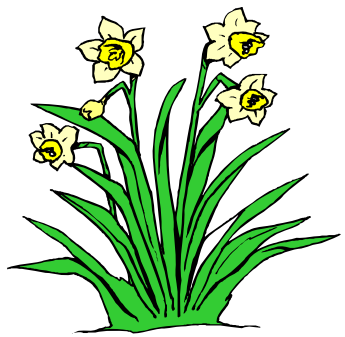
- Carotinoids
- Phytosterols
- Saponins
- Glucosinolates
- Polyphenoles
- Protease-Inhibitors
- Terpenes
- Phyto-oestrogens
- Sulfides
- Phytic acid

They act in a broad range not only as anticarcinogens, antimicrobics, antioxidants, antithrombotics and against inlammations but also on blood pressure, blood sugar and blood cholesterol level

Secondary plant substances

- Investigated: antioxidative and anticancerogenic properties of carotinoids and phyto-östrogens
- Antimicrobial properties of sulfides
- Antioxidative properties of flavonoids
- Cholesterol lowering effects of phytosterols

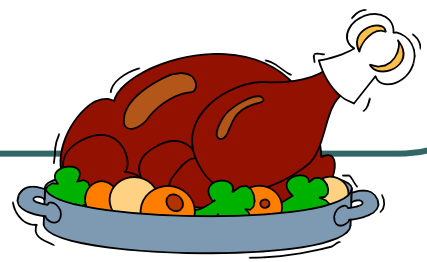





Fat replacements and fat exchange substances

- Fat replacements: made from fatty acids, low energy content
- Fat exchange substances: made on the basis of proteins and carbohydrates, similar consistency to fats

- Enhancement of desirable fatty acids in the diet e.g. long chain, multiple unsatturated fatty acids (brain development in children, immune system, blood pressure)



Bioactive Peptides

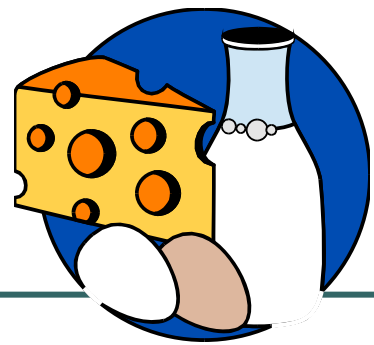
Bioactive peptides might not only have properties like:

hormons (orexines, casomorphines),

regulating agents (casokinines, alpha-lactalbumin)

But they can act also as:

antimicrobics (lactoferrin, lactoperoxidase, lysozym, lactoferricin)



Organic Foods

- Organic Foods are foods that are produced using methods that do not involve modern synthetic inputs such as synthetic pesticides and chemical fertilizers, do not contain modified organisms, and are not processed using irradiation, industrial solvents, or chemical food additives

Are Organic Foods Categorically Better ?

Quality Criteria

- product quality

  chemical properties (e.g. pollutants), nutritional physiological value, regulated by law (e.g. hygienic reg.), convenience (processing)

- processing quality - quality of food processing

  environmental effects, resource usage, animal welfare

- socio-economic aspects

→ consumer behaviour, market aspects

Ecological Plant Production Methods

structure of organic farming: low intensity, high organizational intensity
organic-ecological **production**
versatile **crop rotation** with high percentages of legumes, crop growing of animal feed
soil fertility: cultivating soil with care, soil resting period, ploughing,
minimal losses of solid dung, organic fertilizers and harvest residues
supply of nutrients nitric(N)-fixation; less supply of fertilizer
(max. 170 kg N/ha), additional mineral-bound fertilizer
no synthetic **plant pestizides** (stabilizing the system),
plant protection on the basis of natural (copper !)
environment protection and ecology: treating unrenewable resources with care,
no genetic engineering

Conventional Plant Production Methods

high **intensity**, little organizational intensity
biologically, chemically und technically characterized **production**
simplified **crop rotation**: corn dominates, reduced biodiversity
partly intensive, partly minimal soil cultivation, preserving of soil fertility according to law,
plant feeding according to fertilization-rule: easily dissolvable mineral nitrogenous fertilizer, growth regulators
plant protection according to law: chemical-synthesized plant protection
pollution control and ecology: utilization of existing resources, resources treated with care due to integrated concepts, *precision agriculture,* genetically modified techniques permitted

Product Quality of Foodstuffs of Plant Origin




Groups of Foodstuffs: vegetables, fruits, wine, corn and potatoe as well as products

Tendencies with Organic Foods

- vegetables/fruits: taste better (particularly organic apples) more potential health benefits through phytochemicals, more nutrients, less residues
- wine: more potential health benefits through phytochemicals, less residues, contains copper
- corn: little mycotoxine
  whole grain bread: more mineral nutrients
  yeast pastry: tastes delicious

Product Quality of Organic Foodstuffs of Plant Origin: Health Promoting Phytochemicals

- Activation of plant defence mechanisms (insects, microorganisms, stress) by excluding synthetic plant protection agents and fertilizers under organic conditions, active soil, balanced mineral uptake

  Resveratrol (grapes), Sulforaphane (broccoli), antioxidants in peaches and pears, total phenolics in berries

- But: production of defence substances might create toxic substances for human as well

Ecological Production Methods: Foods of Animal Origin

Diversity of Breeds: e.g. breeding of endangered farm animals, regulations as to the keeping of animals in their natural environment, zoo technical measures restrictively regulated

feeding: own animal feed on farms, for ruminants minimal portion of roughage, restrictive additives, no transgenic animal feed, no synthetic amino acids supplementation

management of animal welfare: based on breeding, prevention, complementary medical therapies, allopathy, prophylaxis is prohibited, twice the waiting period before slaughtering after medication

animal transport according to law, aimed at short journeys

Conventional Production Methods: Foods of Animal Origin

effective special breeds

animal livestock: uses potential to its full, takes into account livestock regulations for different breeds

feeding: according to food law, extra bought animal feed, animal feed additives (also transgenic), side products

management of animal welfare: tolerable animal medication

reproduction: artificial insemination, embryo transfer

animal transport according to Law

Product Quality: Foodstuffs of Animal Origin

Groups of Foodstuffs: milk, meat, fish as well as products, eggs

Tendencies with Organic Foods

- milk/dairy products — less aflatoxine, less egg white (buffalo and cow dairy products: higher UFA levels caused by clover feed)
- poultry — less fat, less tender
- meat/meat products — neither brined nor salted

EU no. 2092/91 → foodstuffs of animal origin

→ data not yet fully comprehensive

Eco-Conclusions: Advantages of Organic Farming under Different environmental conditions

Soil	mold substance, risk of erosion, biological activity, biomasses, recycling of nutrients, soil structure, improved mycorrhizal association
Water	leaking of pestizides and/or fertilizers into ground and/or surface water (n-/p-balance, NH3-emisssion), eutrophication, microorganisms
Air	green house gases, substances from pestizides, carbon dioxide re-fixation into soil
Energy	less fuels and lubricants per space as well as less fetilizers and pestizides, high energy efficiency
Biodiversity	agricultural genetic resources (including insects, microorganisms), natural/wild flora and fauna
Territory	diversified territory, network of subnatural biotopes

Socio-economic Quality of Organic Food

Shopping Incentives for Organic Food:

- they are healthy
- no fertilizer
- no pestizides (residues)
- taste more „natural“
- better,
- help animals,
- protect environment

Socio – economic quality of Organic Food

psycho-social effects

I by organic foods because....

- I feel better
- I consciously maintain a responsible life style
- I protect and increase my health and well being
- I‘m doing something for our environment and our planet
- I support farmers that protect our environment
- „My just eaten chicken has had a happy life“
- I reduce my carbon food print
- ……
- ……

Socio – economic quality of Organic Food,

Consumers impact

Reluctant to Buying

far too expensive: increase of 10 - 20% is accepted, not „genuine“

Expenses

5 - 10% of the requirements when shopping more or less occasionally (eggs, fruit and vegetables, potatoes, bread, milk/dairy products, meat/meat products)

Increased Consumption of Organic Foods

stronger orientation towards healthy foods and dietary life styles, can reduce health care costs in the long run

Socio – economic quality of Organic Food

psycho-social effects

- The perceived process quality of food can have effects on the individual well-being of consumers
- Positive judgements of the food quality can provide positve feeling (salutogenesis) to the consumers
- Psycholgical effects and their impact on the consumers must find consideration as quality criterion

Conclusion: Clear Advantages as to Organic Production

product quality independent of production schemes,

organic vegetables/fruits have higher positive tendencies

process quality of organic production and organic processing advantageous to the environment, resources, animal-welfare

to-date no scientifically secured documented evidence, indicating higher and healthier quality of organic foods

Basic Recommendation:

Well-balanced diet,

plenty of fruit and vegetables,

little fat and meat,

eating less altogether!

Move more!

Keep your energy balance well balanced

Thank you for your attention

Functional Foods: Targets

- Influence on cell development and differentiation (anticarcinogens)
- Defence of reactive oxidative species
- Prevention of heart and circulatory disease (lowering of blood pressure, cholesterol level), stimulation of digestion (fibres),
- Effects on the immune system or inflammation
- Reduction of the allergenic potential
- Influence on behavior and mood (hormons)
- Wellness and well-being

Demonstration of an enhanced function?

- All data available to be grouped in three categories:
- 1. Biological observations
- 2. Epidemiological data
- 3. Intervention studies, mostly based on markers
- All supporting evidence should be:
- 1. Consistent in itself
- 2. Statistical and biological significant (dose-effect relationship, if relevant)
- 4. Plausible in terms mechanism(s)

Minerals

- Calcium: Prevention of osteoporosis
- Magnesium: Magnesium deficiency -Tetanie
- Sodium: high blood pressure
- Phosphor: bone and tooth hardening

Iron: Anemie, oxygen-, electron-transport
Fluorine: Karies
Iodine: Struma, thyroid gland

Selenium: antioxidative and regulative enzyme systems, Thyroid gland, male fertility
Zinc: Enzymes, stabilisation of membranes, storage of Insulin, antioxidative

How do Organic Produced Foods Differ from Conventionally Produced Foods?

Food Production and Production Quality (Process quality)

- agricultural productivity, commercial/industrial processing, marketing
- each process regulated by law
- organic foods: by-law EU-no. 209/91 „positive list of permission“

- closed cycles, treating resources with care, environmental-friendly,
- banned: genetically modified organisms, fertilizer, synthesized pesticides, ionizing irradiation, etc.
- restriction: additives, processing additives and processing procedures
- labelling

Environmental Activity Areas Regarding Ecological Statements Process quality

Species and biodiversity, natural scenery, function of soil, acidification, quality of drinking water, eutrophication, greenhouse effect and utilization of resources

as well as

- eco-toxicity, human toxicity
- emission of volatiles
- animals rights (animal welfare)
- diversity of crops and farm animals
- ozone depletion
- application of genetically modified organisms

Application of Antibiotics

1999 approx. 13.000 tons used in EU (regarding pure substance) used for

human medicine	65 % bzw. 8.500 t
veterinary medicine	29 % bzw. 4.000 t
feed additives	6 % bzw. 800 t

2006 application of antibiotics generally prohibited in the form of additives

- less than 4% of resistency problems in human medicine has its seeds in the administration of antibiotics to animals
- warning against malpractice, in terms of utilization of pharmaceuticals for animals