



ORGANIC FOOD – ONGOING GENERAL ASPECTS

COMPENDIUM

SEMINAR

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One of the essential objectives in organic farming is to produce healthy food products of a high quality. Therefore the high priority research is regarding to the effect of cultivation and manufacturing methods on final health, nutrition and safety of organic products. There is a great need for research that contributes to a better understanding of consumer conduct and reactions because the success of organic agriculture basically depends on the acceptance of its products by the public, the consumers.

The term 'Organic' is protected by European Union (EU) law. In 1991 the EU passed regulation 2092/91, which laid down in detail how crop products must be produced, processed and packaged to qualify for the description 'organic'. This means that the product meets the standards of an approved independent control body, which has inspected all aspects of its production.

'Organic' is a labeling term that denotes products that have been produced in accordance with organic production standards and certified by a duly constituted certification body or authority. The organic label is not a health claim; it is a process claim. There is a high demand for organic products in industrialized countries. It is therefore important to carefully consider the quality and safety of organic foods in order to identify problems and issues that require attention. Organic food handlers, processors and retailers are required to adhere to standards to maintain the integrity of organic agriculture products.

IFST (Institute of Food Science and Technology (UK): Current Hot Topics. Organic Food
<http://www.ifst.org/hotspot24.htm>

I What types of organic products exist?

Organic foods are available in all food groups.

- Organic vegetable, fruits and grains:
 - Any certified organic plant product must come from fields that have remained free of chemical application of fertilizers and pesticides for at least three years, and must follow regulations.
 - Foods grown on lands not yet meeting organic standards may receive a "transitional" label if they follow the strict requirements for conversion.
 - All crops have specific regulations for post-harvest handling; this results in a paper trail that includes the date of sale, purchase, and origin of the commodity.
- Organic dairy products:
 - Milk from all dairy animals, including cows, goats, and sheep, may be certified organic. Certified organic products cover nearly the full dairy spectrum, including milk, cheese, yoghurt, ice cream, and more.
 - At no time may organic milk be blended or otherwise come into contact with non-organic milk.
 - Standard hygiene and dairy safety procedures are followed, including pasteurisation. Certification requires humane treatment of the animals, clean water and bedding, and access to the out-of-doors for pasture, exercise, and fresh air.

- To qualify for organic certification, a dairy farmer must feed 100% certified organic feed produced on land untreated with synthetic fertilizers, pesticides, herbicides, or fungicides for at least three seasons prior to harvesting the crop.
- The farm on which the herd is pastured must be certified organic as well. In addition, organic dairy products must be free of drugs, including growth hormones or antibiotics.
- Organic meat and poultry:
- Organic provisions require animals to be raised without receiving antibiotics, hormones, or growth stimulants.
- Humane treatment and access to the out-of-doors are stipulated, and the animals must be fed 100% certified organic feed and must graze in certified organic pastures.
- All meat and poultry processing must be done according to strict standards in a plant certified and regularly inspected for organic production. Animals designated for dairy may not be sold for slaughter.
- At the packing plant, animals are isolated from conventional herds and fed organically. Few plants process exclusively organic products, so the entire line is cleaned to organic specifications before any meat or poultry product is run.

Organic foods and products <http://www.mothenature.com/Library/Ency/Index.cfm?id=2031008>

II Top reasons why you should buy organic food:

- **Protect generations** - a child can receive four times more exposure than an adult to pesticides in food.
- **Prevent soil erosion** - care of the soil is one of the fundamentals of organic farming.
- **Protect water quality** - the Environmental Protection Agency (EPA) estimates that pesticides contaminate the ground water in 38 States, polluting the primary source of drinking water for more than half of the country's population.
- **Save energy** - organic farming is more likely to use labor-intensive practices, and cover crops, natural fertilizers and rock powders instead of synthetic fertilizers.
- **Keep chemicals off your plate** - the EPA considers many of pesticide substances to be carcinogenic (implicated in birth defects, nerve damage and genetic mutations).
- **Protect farm workers** - farmers exposed to herbicides had six times more risk than non-farmers of contracting cancer. Field workers suffer high rates of occupational illness.
- **Help small farmers** - most organic farms are small, independently owned family farms. Organic farming could be one of the few survival tactics left for family farms.
- **Support a true economy** - although organic foods might seem expensive, conventional food prices don't reflect hidden costs, including subsidies, pesticide regulation and testing, hazardous waste disposal and cleanup.
- **Promote biodiversity** - mono cropping has tripled farm production, however the lack of natural diversity of plant life has left the soil lacking natural minerals and nutrients, makes more susceptible to pests, making farmers more reliant on pesticides.
- **Better flavour** - a good reason why many chefs use organic foods in their recipes; they taste better. We believe foods grown in a nutrient rich soil and picked fresh have a richer flavor.

<http://www.maplecreekfarm.com/page7.html>

Is organically grown products healthier than other products?

Certified organic produce is not essentially healthier than produce that has been grown under non-organic conditions - the nutritional content of a particular vegetable doesn't change. But the lack of synthetic pesticide residues on organically grown produce definitely makes for a safer product.

In studies have looked at vitamin levels of food plants treated with certain pesticides. They showed that application of some pesticides would significantly lower the vitamin levels in the plants they were applied to. This is different than the notion that plants raised with chemicals are low in nutrients because the soil is depleted. This shows that chemicals actually reduce the amount of nutrients in plants after application. The nutrients most often affected are vitamin C, beta carotene, and the B vitamins.

<http://edition.cnn.com/HEALTH/indepth.food/organic/explainer.html>

Walter J. Crinnion N.D Are organic foods really healthier for you? <http://lookwayup.com/free/organic.htm>

Preferential

- Health issues, pleasure and concerns about the environment, GM food and animal welfare are amongst the many reasons why more people are now choosing to eat organically.

Pesticides are a major reason for the change. Nobody knows the long-term, combined impact of all the chemicals we eat. The organic movement is also against genetically modified food and has high standards of animal welfare.

- The food is fresher, healthier and tastes better. Studies have also shown organic food has, on average, higher levels of some vitamins and minerals.
- Organic farming encourages wildlife and uses green and animal manures to enrich the soil sustainability.

Drawbacks

- The lack of artificial preservatives means organic produce tends to have a shorter shelf life. Buy what you need, use it reasonably quickly and you also get the added benefits of freshness and flavour.
- Organic food is generally more expensive than conventional.

The cost of organic food is higher than that of conventional food because the organic price tag more closely reflects the true cost of growing the food: substituting labor and intensive management for chemicals, the health and environmental costs of which are borne by society. These costs include cleanup of polluted water and remediation of pesticide contamination. Prices for organic foods include costs of growing, harvesting, transportation and storage. In the case of processed foods, processing and packaging costs are also included. Organically produced foods must meet stricter regulations governing all these steps than conventional foods. The intensive management and labour used in organic production are frequently (though not always) more expensive than the chemicals routinely used on conventional farms. There is mounting evidence that if all the indirect costs of conventional food production were factored into the price of food, organic foods would cost the same, or, more likely, be cheaper than conventional food.

Price still remains the biggest barrier for consumers who do not eat organic foods to them who try organic foods. Nearly, seven out of ten (69 percent) who do not eat organic foods claim price is a major factor in their decision.

Why eat organic? <http://www.five.tv/accessibility/programmes/thefarm/features/>
 Frequently Asked Questions About Organic Farming http://www.ofrf.org/general/about_organic/
 Organic Trend Survey Supports Growth of Organic Foods into Mainstream
http://www.wholefoods.com/company/pr_10-14-03.html

The production of organic food of animal origin is done in many ways and uses many breeds. Therefore, a real comparison with conventionally produced food is difficult and there is a limited amount of published data. No clear trends have been established in terms of nutritional and sensory quality differences between organic and conventional food.

- Organically produced food has lower levels of veterinary drugs and pesticides.
- Organic farming potentially reduces the risk of *E. coli* infection and food poisoning by other organisms.
- The 'organic' label provides also assurance to consumers that no food ingredient has been subject to irradiation and that genetically modified organisms have been excluded.
- organic farming leads to a higher risk for the contamination of products by parasites of livestock and by microbes present in manure.

In summary, in some cases, organic food gets better marks, in others, conventionally produced food scores higher. In view of consumer expectations, it is important to carefully examine issues related to organic food quality and safety and make whatever interventions may be necessary to ensure an appropriate level of consumer protection.

Kouba M. (2002) The product quality and health implications of organic products// Proceedings of a joint international conference organised by the Hellenic Society of Animal Production and the British Society of Animal Science, Athens, Greece, 4-6 October 2001. Wageningen Academic Publishers, Wageningen, Netherlands, pp. 57-64.

- Growing international trade driven by tremendous farmer price differences and structural differences in supply;
- Organic milk is most successful organic animal product;
- Pork, poultry and egg production have high costs;
- Meat: Limited additional willingness to pay for organic.

Richter, Toralf (2003) The Market for Organic Products in Europe, Focus: Animal Production. [oral] Presentation at International Symposium: Organic Animal Production: National and International Experiences, Italy, Arezzo, 27.-28.03.2003. <http://orgprints.org/2616/>

III Assessment of food quality from different farming systems.

What is Food Quality?

- Process quality: influence of food production and processing on resources and social issues from farm to fork.
- Product quality

Absence of hazards:

- artificial: e.g. pesticides, heavy metals, veterinary residues
- natural: e.g. poisons, pathogens in plants
- undesired ingredients: e.g. fat, GMOs

Presence of healthy nutrients

- e.g. vitamins, minerals, secondary compounds
- e.g. functional food additives

Quality of plant products: **is organic better?**

Products	Nutritional quality	Sensory quality	Processing quality
Cereals, field	+ (/-) (less mycotoxins)	No difference	-
Cereals, processed	+ (/-) (minerals)	No difference	(+)/ - less
Potatoes	Not clear		
Oilseeds, field	+	No data	No data
Vegetable oil, fat	+ (less residues)	No difference	No difference
Vegetables and fruits	+ (less residues)	+	No difference

Quality of livestock products: is organic better?

Product	Nutritional quality	Sensory quality	Processing quality
Milk	Less protein, unclear aflatoxin	No difference	No difference
Beef	No data	No data	No data
Pork	No data	No difference	No data
Poultry	Less fat	Less tender	Less meat

The knowledge gap must be filled:

- What defines good or poor product quality?
- How can the difference between healthy or unhealthy food be measured?
- What impact do production, processing, transport and trade have on the chain of organic products?

Conclusions of the study:

Clear scientific evidence can be shown for organic farming products vs. conventional foods in the field of process quality. Organic food is better.

No clear scientific evidence is available on differences in product quality between organic and conventional farming.

Future research areas are listed for process quality, specific product quality assessment, complementary methods, consumer studies, market research and lifestyle and health.

Angelika Meier-Ploeger, Are organic foods better? German report 2003, Organic Food Quality and Health – ongoing and future research, Nuremberg, February 20th, 2004

Comparative study was done:

- on literature review of 300 publications
- comparative studies since 1980
- 44 French experts involved (only 5 from the organic agriculture research), 1 Swiss expert
- The results confirm similar studies (DK, DE)

Nutritional aspects of organic food

- Dry matter
 - no significant difference in fruit and fruit vegetables. Higher dry matter content of root and leaf vegetables (weak tendency).
- Minerals
 - strong variation depending on soil and cultivation conditions: no clear tendencies except for magnesium and iron. Higher content of magnesium and iron in certain vegetables (weak tendency).
- Vitamins
 - higher content of Vitamin C in certain vegetables and potatoes.
- Protein
 - in general lower raw protein content in cereals. Lipids, glucids, proteins: strong variation, only tendencies. For cereals more balanced composition of essential amino acids, higher content of non-saturated fatty acids in meat. In the majority of studies higher content of polyphenols or flavonoids in organic food.

Food safety aspects

- pesticides, nitrates, heavy metals
 - large majority of studies no residues of conventional pesticides
 - very few cases of contamination with conventional pesticides but with very low residue levels.
 - Majority of studies show lower nitrate contents of organic vegetables.
- Micotoxins, microbial risks, parasites/veterinary treatments
 - Mycotoxins: controversial view points with regards to risks of because of the non-use of many fungicides and small scale processing. Conclusion: no higher risks with organic food with mycotoxins.
 - Microbial risk: no scientific evidence of higher risk in organic farming. Less risks because of the non-uses of sewage sludge and the application of composting practices for manure treatment.
 - Parasites: risk associated with limited use of medicaments and use of non-registered products.
 - Veterinary treatments: less risk with residues.
- Additives, GMO, heavy metals
 - Additives: very limited list of additives for organic food – less risks with allergic reactions.
 - GMO: non-use of GMO reduces risk.
 - Heavy metals: less risk (no sewage sludge, copper restrictions, less feed concentrates).

Conclusions of the study:

- Confirmation of most of the findings in other similar studies.
- Several negative prejudgments about safety of organic food have **not** been confirmed.

Otto Schmid (FIBL CH) French study on Quality and Safety of Organic, Summary of the results Food Organic Food Quality and Health – ongoing and future research, Nuremberg, February 20th, 2004

Plant foods have more:

- Conventional – nitrate, protein, beta-carotene, synthetic pesticides;
- Organic – dry weight %, minerals, vitamin C, % essential amino acids, natural pesticides;

Studies reporting higher infection and/or mycotoxin levels in conventional samples.

Carlo Leifert and Nander Roberson (2004) Quality and safety aspects associated with Organic Food, report Acorn Conference, Canada

http://www.organiccentre.ca/DOCs/Carlo%Leifert%20Organic%20Food%20Markets_quality.pdf

Nutrient content of an organic and conventional diet: milligrams of vitamin C, iron, magnesium, and phosphorus in one day's vegetable intake

Diet	Vitamin C (mg)	Iron (mg)	Magnesium (mg)	Phosphorus (mg)
Organic	89,2	3,7	80,0	124,0
Conventional	67,9	3,0	68,6	111,8

For organic crop:

- Higher mean mineral content for all 21 minerals considered in this analysis;
- Contained lower amount of the heavy metals
- Quantity of crude protein was lower in organic compared to conventional crops but the quality was better as measured by essential amino acid content.

Virginia Worthington (2001) Nutritional quality of organic versus conventional fruits, vegetables and grains, the Journal of Alternative and complementary medicine, Vol. 7, No. 2 pp. 161.173

http://www.organiets.com/organic_info/articles/downloads/organic.pdf

A US study in April 2001 quantified for the first time the difference in nutrient levels between organic and conventional food. It reviewed all the available comparative studies on crops produced with organic matter and inorganic fertilizers (41 studies) and found that organic crops had higher average levels of all 21 nutrients analysed. The results were statistically significant for Vitamin C (27% more), magnesium (29%), iron (21%) and phosphorus (14%).

UK Soil Association reported that 50 to 93 per cent of pesticide residues remained on potatoes, apples and broccoli after washing.

Facts about Organic Foods http://www.downtoearth.org/articles/organic_facts.htm

IV Why is organic food more expensive?

Organic food is generally more expensive than intensively farmed food. It contains more vitamins, minerals, enzymes and taste than intensively farmed produce. It is also free from insecticides, pesticides, growth hormones, antibiotics, fertilizers and a whole host of other toxic artificial additives, flavourings, colourings and preservatives. So if it contains less added chemicals, why does it cost more?

At first glance, you might expect organic food to cost less to produce than foods with added extras. However, it's a lot more complex than that.

The main reasons that intensively farmed foods are cheaper to buy in the shops is:

- **you are paying for them in your taxes.**

Agro-chemical agriculture is heavily subsidised by the taxpayer through the government, whereas organic farming subsidizing system is not fully developed.

- **agro-chemicals are designed to make food cheaper to produce.**

The chemical designers' remit was to make mass production of food cheaper.

Professor Jules Pretty from Environment and Society at Essex University (UK) has been looking at the hidden costs of intensive farming for many years. The consumer pays three times when they buy intensively farmed food:

- pay at the shop till.
- pay for the same food through their taxes, as modern farming is subsidized through the tax system.
- pay again to clean up the damage to the environment caused during the growing and the raising of the food.

<http://www.organicfood.co.uk/sense/tooexpensive.html>

Organic produce, since it is grown without synthetic pesticides or chemicals, is more labour-intensive. Organic crop yields are often not as high as those grown under non-organic conditions, and fewer farmers (only about 4%) use organic methods and sustainable agriculture practices; therefore the price of organically grown produce reflects the greater demands placed on the grower.

<http://edition.cnn.com/HEALTH/indepth.food/organic/explainer.html>

Walter J. Crinnion N.D Are organic foods really healthier for you? <http://lookwayup.com/free/organic.htm>

V Consumer Awareness

The market for organic food is increasing in most Europe countries and it is expected to increase in the future. The present market share of organic food in European countries is however quite low (0-4%). The market shares are very different between countries. The highest market shares (3-4%) appear in Austria, Switzerland and Denmark. Market shares below 1% are seen in many other European countries.

The market shares are also very different from product to product. Drinking milk/milk for consumption shows some of the highest market shares. Market shares for meat from ruminants and processed milk (i.e. cheese) are often considerable lower than for drinking milk/milking for consumption.

The main barriers for increased organic sales can be identified as:

-Confusion or mistrust in organic standards and labelling systems.

- High prices and low product quality.
- Poor product availability and visibility.

The future market for organic products from ruminants might be promising. This is mainly because organic production based on ruminants is relatively easy to adopt to organic standards, the products can be produced at a competitive price and quality, and it is relatively easy to make available and visible to the consumers. This is exemplified very well by milk, which is a high ranking organic product in many countries. In addition agricultural systems based on ruminants add multi-functionality to agriculture in particular in regard to nature and landscape values. However it is very important to be aware of the last barriers: confusion or mistrust in organic standards and labelling. So this is a great challenge to the organic movement and producers.

Kristensen, Erik Steen and Thamsborg, Stig Milan (2002) Future European market for organic products from ruminants, in Kyriazakis, I. and Zervas, G., Eds. *Organic meat and milk from ruminants*, page pp. 5-15. <http://orgprints.org/510/>

Domestic organic food sales increase faster in Czech Republic than elsewhere in Europe. A recent report from the Green Marketing Agency, a Czech agency that provides consultancy services for organic businesses in Central and East European countries, showed domestic sales of organic foods shot up 17 percent last year, compared with an average annual growth rate of 15 percent across Europe. According to a 2004 report published by the International Federation of Organic Agriculture Movements, Germany has the largest organic food market in Europe, valued at \$3 billion annually. The Czech Republic, determined to be a major player in the industry, has converted more than 5 percent of its agricultural land to organic management, giving it the highest percentage of organic agricultural land in Europe, almost twice the percentage of Germany.

- **Growing industry-organic restaurant and stores**

There are two kinds of people who shop organic products: those who are already into health food and those who are just trying it out. The second group keeps getting larger. Interest in healthier foods is definitely on the rise. More newcomers are opening stores because they can see the business potential.

The arrival of organic foods in supermarkets helped increase business interest in the products.

- **Price of quality**

While consumer interest is growing, organic foods still make up only a sliver of the domestic food market. Those in the industry say the combination of higher prices and a lack of marketing are keeping people from fully embracing the organic movement. One of the reasons is because people are not informed and they don't have a good trust relationship with printed materials. Once people are informed about the potential health and environmental benefits of organic foods, they will choose to spend a little more at the grocery store, especially as domestic buying power increases. There are enough clients now who appreciate the quality and can accept the increased price.

Shopping for healthy alternatives http://eedi.org.ua/eem/1-czech_eng.html

Czech organic food awards promote tiny but growing market <http://www.radio.cz/en/article/59089>

- The success of organic agriculture basically depends on the acceptance of its products by the public, the consumers.
- Results of consumer surveys show that personal health is a far more important purchasing factor than environmental concern.

- The main reason for the slow market development, however, is the consumers' limited purchasing power in part of European countries.
- customers who are on special diets or are vegetarians are far more precisely informed about organic quality, and they prefer that quality when buying.
- consumers of organic products generally have higher levels of education and higher incomes, and their age range is between young and middle-aged.

http://www.organic-europe.net/country_reports

Integrated project Improving Quality Safety and Costs in the European Organic and Low Input Supply Chain (Quality Low Input Food) <http://www qlif.org/> is funded by European Union and involve thirty-one research institutions (the list in the website), industrial companies and universities throughout Europe and beyond.

The research will cover the whole food chain from fork to farm for protected crops, field vegetables, fruit, cereal, pork, dairy and poultry. It will measure consumer attitudes and expectations, and will develop new technologies to improve nutritional, sensory, microbiological and toxicological quality/safety of organic foods. All the project innovations will be assessed for their socio-economic, environmental and sustainability impact.

The project involves the following investigations:

- will ask consumers what they want from low input foods, and measure what they actually buy, to determine what producers need to do to satisfy consumer demands.
- will compare "low-input" and conventional products for qualities such as nutritional value, taste, shelf life, and processing characteristics, and for risks related to reduced fertility, pathogens and toxins from fungi. The aim here is to understand how these benefits and hazards can be optimized and controlled throughout the chain.
- will develop novel techniques to produce better products as cost-effectively as possible, and disseminate them to professionals in the food industry.
- will be focus on farm-based research in cereals, vegetables, dairy, poultry and pork production. For example, agronomists will test different management strategies for improvements in soil fertility, disease, weed and pest control to improve yields of high quality, organic plant foods, while livestock experts will assess how improved husbandry methods and feeding regimes can improve the nutritional quality of organic milk and minimize parasites and bacterial infections in pig and dairy production.

<http://organic.com.au/news/2004.06.19/>