Info Organic HACCP

ORGANIC HACCP

Safety and Contamination

Information to Consumers regarding Control of Quality and Safety in Organic Production Chains

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This leaflet provides a practical overview for consumers of what is done to secure the safety and purity of 7 types of organically produced foods, and what the consumer can do to support those efforts and preserve the food safety after purchase. Other leaflets for consumers cover authenticity and fraud or taste, freshness & nutrients, and separate leaflets aim at retailers or at production of specific commodities.

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The Organic HACCP Project leaflets

This is no. 6 of a series of 14 leaflets comprising information on how control of quality and safety can be further improved in organic supply chains across Europe. The Organic HACCP project has reviewed studies of consumer concerns and preferences in relation to organic production systems and collected information about typical production chains for 7 commodities in regions across Europe. For each of the criteria listed below, the information was analysed to identify Critical Control Points (CCPs), defined as the steps in supply chains where the qualities of the final product can be controlled most efficiently. CCPs were identified using methods developed for Hazard Analysis by Critical Control Points (HACCP), a standard procedure to prevent food safety risks. The new aspect is thus to improve how consumer concerns are addressed, through the use of the CCP concept for a wide range of criteria, not only safety.

Overview of the Criteria Examined

The analysis was done for the following seven criteria:

1. Microbial toxins and abiotic contaminants
2. Potential pathogens
3. Natural plant toxicants
4. Freshness and taste
5. Nutrient content and food additives
6. Fraud
7. Social and ethical aspects.

The project analysed 29 organic supply chains in Europe for tomatoes, eggs, cabbage, wine, milk, apples and wheat bread. On the project's homepage (www.organichaccp.org) each chain and the relevant Critical Control Points are described in detail. The present leaflet gives an overview of the outcome of the analysis for microbial toxins, abiotic contaminants, potential pathogens and natural plant toxicants. Two other leaflets for consumers are "Authenticity & Fraud", and "Taste, Freshness & Nutrients". Other leaflets address producers, retailers, etc.

General issues relating to safety (pathogenic bacteria).

The major safety risk in organic foods is *zoonotic bacteria*. They live in animals, often without causing disease, and can infect humans if the food is contaminated, e.g. from animal droppings. Examples are *Salmonella* from poultry and wild birds or the *E. coli*, strain O157 from cattle, which can cause serious illness or death in humans, even though most *E. coli* strains are harmless. These bacteria can grow both in some foods (if stored incorrectly) and in the human body, so even small numbers of pathogens can multiply to become a serious health risk.

General issues relating to contamination (toxins)

Mycotoxins are toxic secondary metabolites produced by mould fungi, which in high amounts can damage kidneys or immune systems of animals and humans. Mycotoxins can be formed in growing plants and the fungi can continue to develop after harvest. Most of them persist during normal cooking of food. Mycotoxins from contaminated feed can pass through the animals and occur in small amounts in meat, eggs, and milk. Mouldy or rotten materials are avoided for food production, as they would spoil the taste (and other aspects of food quality) of the food if they were used, so the actual risk to human health is minimal.

Natural plant toxicants are toxic secondary metabolites produced by plants as protection against diseases and pests, which can pose a risk to human health if present in very high amounts. However, since many plant toxicants appear to have beneficial effects on human health in the low concentrations normally found in food, the real health risk is probably very small. But high levels indicate substandard food quality and should be avoided.

Finally, contamination from industrial toxins such as *dioxins, PCBs and furans* can accumulate in the food chain.

Other contaminants in organic food such as *pesticide residues* or *food additives* are primarily a problem for authenticity, rather than safety, and are therefore described in the leaflet on Authenticity and Fraud.

Animal Products (eggs and milk)

Safety depends on ensuring that *pathogenic bacteria* from the animal are minimised before the food is consumed.

For eggs, a good health status of the hens and careful hygiene during production keeps transfer to a minimum, and depending on the traditions in the country, an unbroken cool chain can prevent remaining bacteria from proliferating.

For milk, all facilities used for handling it are carefully controlled and it is almost always pasteurised before being sold, so milk is not an important source of pathogens.

Mycotoxins can occur in eggs or milk if the grain used for feed was contaminated. Analysis of mycotoxins can thus reveal if the animals received feed of inferior quality, while the levels in animal products are never so high as to pose a serious safety risk to consumers. Freshly harvested organic grain generally contains similar or lower levels of mycotoxins than the corresponding conventional, and proper handling after harvest (thorough drying and storage under dry, clean and cool conditions) prevents accumulation.

Dioxins, PCBs and furans mostly originate from incinerators or industrial pollution and accumulate in the fat of animals and humans, increasing with age. Due to the requirement for outdoor runs in organic production, they can reach organic hens from a variety of sources including soil, feed or

aerial fallout. If the birds are exposed to these toxins, some of it will show up in the eggs. In a few cases eggs have contained levels that were considered to be unsafe for human consumption. To prevent this from happening, the producers can get the soil analysed before establishing outdoor runs or own feed production in polluted areas. Feed suppliers must analyse the feed material, and farmers should restrict the hens to no more than two years of laying.

Recommendations

- Ensure that all utensils (including hands) that have been in contact with raw eggs are carefully cleaned before use with any other foods.
- If relevant and available, buy pasteurised egg yolks and egg whites for dishes made with raw eggs (e.g. desserts).
- If buying eggs produced near industrial sites, ask for information about how dioxin contamination is prevented.

Plant Products (cabbage, tomatoes and apples)

Pathogenic bacteria do not naturally grow in plants, so safety risks are always due to contamination, during cultivation, harvest, transport etc. Somewhat surprisingly, the proper use of manure (before sowing/planting) has not shown increased risk of pathogens under field conditions, possibly beneficial micro-organisms in the soil control the pathogens. However, all fresh produce should be treated as contaminated, you never know where birds or mice have chosen to place their droppings.

Fungal diseases (mould) or bacteria (rot) can cause *mycotoxin* formation in both tomatoes and apples, and also increases the levels of *natural plant toxicants.* Both mycotoxins and natural toxicants have bitter taste even in very small amounts.

Recommendations

- Fresh produce should be stored under cool conditions and washed thoroughly before use.
- Storage of prepared food (e.g. soups or casseroles) requires that the entire portion has been thoroughly boiled and then refrigerated.
- Discard produce that appears or smells rotten or mouldy.

Processed Products (bread, wine)

The procedures used to make bread and wine kills the majority of dangerous *bacteria*, so there are few safety risks from pathogens. In principle *mycotoxins* in the raw material can contaminate the final product, but the risk is low, since spoiled raw materials cause poor quality of the final product.

Recommendations

- Discard bread or wine with visible mould growth, mouldy taste or other quality defects.

Overall conclusion and recommendations

Generally, organic products are not more or less safe than other foods, in terms of pathogens or contaminants (other than pesticide residues). So as the consumer, if you take the normal precautions: remove dirt and spoiled foods, store not too long at appropriate temperatures and discard food that tastes bad, then the food can be enjoyed without risks.

Continuation in the QLIF project

The work of Organic HACCP identified several areas where more research is needed to understand the quality of organic products and to find better ways to fulfill consumer expectations. In 2004 the project QualityLowInputFood (QLIF, www.qlif.org) was started to broaden and deepen the understanding of quality of organic food. QLIF is an Integrated Project in the European Commission's 6th Framework Programme with 31 participants in 15 countries. QLIF is a 5-year project aiming to provide research and development on quality, safety and efficiency of organic and other low-input farming methods in Europe.

The following topics relevant for safety and contamination will be investigated in QLIF:

- Studies of relations between different aspects of food quality, consumer perceptions and buying behaviour (Consumer expectations and attitudes, 2004-2007).
- Studies of effects of production methods on mycotoxins and natural toxicants in wheat and apples and *Salmonella* in pigs (Effects of production methods, 2004-2008).
- Development of cost-effective methods to improve health of plants and animals, thus removing sources of bacteria and mycotoxins (Crop production systems and Livestock production systems, 2004-2008).
- Development of HACCP procedures for control of quality and safety in organic supply chains and training courses for advisors (Transport, trading and retailing, 2006-2008).

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Editorial Notes

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Bibliographical Information

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A PDF version can be downloaded free of charge from the project internet site at www.organichaccp.org or from www.orgprints.org/view/projects/eu-organic-haccp.html.

Printed versions can be ordered from the FiBL Shop at www.shop.fibl.org.

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About Organic HACCP

The main objectives of this Concerted Action are to assess current procedures for production management and control in organic production chains, with particular reference to the characteristics valued by consumers, and from this to formulate and disseminate recommendations for improvements.

The 2-year project started in February 2003. The results of the project, including a database of Critical Control Points in the analysed chains, are available on the project website www.organichaccp.org.

The Project Partners

- University of Newcastle (UNEW), Newcastle upon Tyne, United Kingdom.
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