FOODMETRES Innovation Brief

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The Spatial Challenges of FOOD SAFETY

To date, food safety problems are often directly related to the fact that many people live in high population density areas, animals are intensively kept, transport networks are complex and pathogenic vectors affecting human health are extremely mobile by air, water and organisms. At the same time, the ongoing 'transition' toward a 'low carbon' society calls for a new 're-localisation' of energy and matter flows, especially between urban and rural domain. In this context, the FOODMETRES project (**www.foodmetres-kp.eu**) seeks to contribute with spatial and functional assessment tools that are based on the principles of coherent 'food sheds' or zones.

Introduction

Conventional food production operates in a global food supply network, which has been increasing exponentially since the 1960s. These global networks have become more and more complex, which may impose risks for microbiological and/or chemical contaminations. There is thus a need to monitor, understand, and control food trade flows as food safety problems no longer affect just single countries, but have consequence at the global level. At the strategic level, the following seven food safety principles (BMELV 2013) are considered as being of fundamental value:

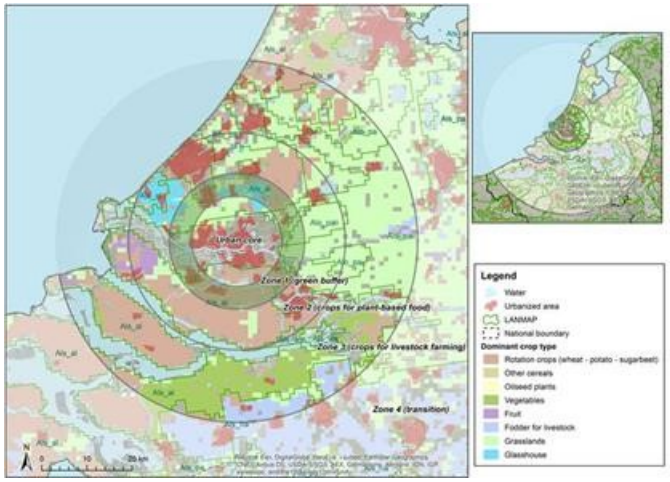
1. The food chain principle
2. The producer's responsibility principle
3. The traceability principle
4. Independent scientific risk assessment
5. Separation of risk assessment and risk management
6. The precautionary principle
7. Transparent risk communication

A closer inspection of these principles in the context of today's global food supply network shows that they are substantially affected by transport, logistics, technology and regulations. For example, according to the 'farm-to-fork' approach, a closed system of regulations and inspections is meant to encompass every phase of production. Therefore, the food chain principle is directly affecting the 'traceability principle' – an operation that requires open communication systems, monitoring procedures, common standards and *functional connectivity* within the food system.

It is not surprising that consumers perceive local and regional food chain products to be environmentally more reliable, operationally more transparent and socially more responsible. In particular, urban agriculture and its many variations such as vertical farming and roof-top-gardening are a social phenomenon that enjoy increasing popularity- not only as a resource for food, but also for their contribution to a new quality of life in cities. However, while urban agriculture does not produce the amount of food that high density urban areas require, most regional food systems are spatially exposed to food safety issues arising from conventional agriculture in their vicinity, connected through air- and water-born infection vectors, as well as (wild) animal movement and human interference. Even at the regional scale, risk assessment and food safety monitoring can hence be considered a challenge. Currently, there is limited information on the food safety issues at this scale. Most research so far focused on food safety at the global level.

Approach and Results

Within the FOODMETRES project, metropolitan footprint tools have been developed that can be used to match food supply and demand at the local and metropolitan scale. These tools can be used to estimate the self-sufficiency levels to be achieved in various urban regions. The tools are also able to derive spatial zoning with an urban core area, followed by a green buffer reserved for nature and recreation, a metropolitan food production zone differentiating a plant-based and a protein-based supply zone, and a transition zone, which is meant to provide food for adjacent urban areas. Within this zoning strategy, food safety aspects are incorporated by placing livestock farming at a remote position following the need to reduce direct expose of core urban population to this sector's impacts (health, odours and food safety issues).



The phenomenon of gardening as one of many forms of urban agriculture, from environmental and socio-economic point of view, was a research objective within the FOODMETRES case studies. Due to rather specific characteristics (e.g. a high self-sufficiency), a bottom up approach in research was followed, supported by extensive interviews. In the Ljubljana metropolitan region, additionally, soil samples were collected from all interviewed gardeners (N=193) to analyse the content of phosphorus, potassium, organic matter and heavy metals.

Output of the metropolitan footprint tool for the Rotterdam City Region.

In order to identify food safety issues to be handled when moving from the global to the local scale, a questionnaire has been developed focusing on possible microbiological and chemical contaminations during food production. A pilot study of urban farmers showed that irrigation, fertilization, (personal) hygiene, the use of a track&trace system and storage are elements that can be improved to ensure a good quality and safe end product.

Output of the gardening research for the Ljubljana Metropolitan Region.

The results for phosphorus, potassium and organic matter show that gardeners often over-fertilise their plots (although with organic fertilisers), which does not have a

large negative impact on the environment, but it is unnecessary and not good for plant resistance. Concentrations of cadmium, lead and zinc were mainly below the limits, although in some cases exceedances were found, which may pose a risk for vegetable consumption from these locations. The gardeners in the area usually do not perform soil tests and less than 1% has knowledge about heavy metals in their gardens soils.

Conclusions

Tools have been developed to assess food security and food safety at local and metropolitan regions. These tools showed that, depending on the region, areas can be self-sufficient. However, more densely populated areas limit the possibilities for metropolitan food supply. Spatial planning of activities should take various aspects, such as food safety, into account. The food safety questionnaire proved to be successful in pinpointing critical areas that need further attention to improve food safety at the local level. Production of healthy food requires avoiding excessive accumulation of undesirable or even harmful substances like heavy metals or nitrate in the products, which can be a problem in urban agriculture. The by far major share of food produced in urban agriculture is consumed directly by the growers themselves, without having passed any health security assurance system.

Recommendations

- Introduce spatial planning modules as a pre-cautionary food safety principle according to which food chain operations are managed within clearly defined zones.
- Increase the resource efficiency of food system operations within dedicated regional zones that separate livestock farming from vegetable production.
- Make use of tools developed within the project (Sustainability Impact Assessment & Metropolitan Footprint Tools) to support policy makers in establishing optimal spatial planning of metropolitan food production.
- Make use of the food safety questionnaire that is derived in the project, in which actors within the food supply can assess possible critical points for producing safe and good quality end products.
- Enable more research into the food safety consequences of a transition from global to metropolitan or local food production.
- Perform more analyses and give targeted professional advice on food safety issues to practitioners who are laypersons.

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