THESIS RESEARCH TOPICS

MSc FOOD QUALITY MANAGEMENT 2022 – 2023
RESEARCH THEMES

I. FOOD QUALITY AND SAFETY MANAGEMENT

II. GOVERNING FOOD SAFETY AND SUSTAINABILITY IN FOOD SUPPLY CHAINS

III. FOOD AUTHENTICITY AND INTEGRITY

IV. CONSUMER PERCEPTIONS AND PRODUCT INTERACTIONS

V. PRODUCTION AND CONSUMPTION OF NOVEL PROTEIN FOODS

VI. FOOD QUALITY AND LAW
I. FOOD QUALITY AND SAFETY MANAGEMENT
1. How food companies change their organisations due to updates of the food safety/quality standards

**Supervisors:** Ebru Cengiz and Geoffrey Hagelaar  
**Building on the research of MFQ students:** Yes  
**Possibility to combine with internship:** Yes  
**MFQ specialisations:** Quality management and entrepreneurship, quality assurance and control  
**Open to 1-2 students**

**Problem description**

In the food industry, the certification has come to the fore as one of the quality management approaches and many companies in the food business choose to gain accreditation of a recognised quality standard (e.g., IFS, BRC, ISO9001, FSSC). Demonstrating compliance with standards has great importance to consumer confidence as products and services become increasingly technically complex and require strict compliance with prescribed organizational behaviour including e.g., guidelines for incoming material and processing activities. Food companies are also entitled to use the certificate awarded to them in their marketing strategy.

However, food companies need to regularly update/fully revise their food safety/quality management systems as scheme owners of the private standards launch new versions. This update can require small up to substantial organisational changes for the food companies in updating their FSMS/QMS: from a change in a guideline for a processing activity, to introduce new technology or a change in ingredients which could imply a change of supplier. Organizational changes raise questions concerning why is that specific change relevant, what is the specific change, who is involved and how is this change implemented. Within this research topic, the focus will be on the latter, the ‘how’ question. Especially the frequency of changes, the strict audit on the changes made, the importance to comply with the updated standard and the possible resistance to change, give the topic of change strategy relevance for food companies.

The MSc project aims at understanding which organisational change strategies food companies use in case of demanded update of the standards and why these change strategies are adopted. The study includes a semi-structured literature analysis and expert interviews. The idea is to search for food companies that are willing to be involved.
2. How can food companies assess the actual effectiveness of their food safety communications and where are the bottlenecks?

Supervisors: Ebru Cengiz and Pieternel Luning
Building on the research of MFQ students: Yes
Possibility to combine with internship: Is possible but needs to be decided
MFQ specialisations: Quality management and entrepreneurship, quality assurance and control
Open to 1 student

Problem description
In the food industry, every company from small vendors to large multinational ones knows the importance of maintaining their food safety management system. In the complex and demanding food supply chain, food safety should be an integral part of the culture of a company. In fact, the recent Global Food Safety Initiative (GFSI) Benchmarking Requirements (2020) incorporated FS culture, driving its development in the international food safety standards internationally such as IFS, BRC, FSSC 22000, and SQF.

Sharman et al. (2020), in their review of FS-culture terminology, suggested culture relates to deeply rooted organisational beliefs, behaviours, and assumptions learned and shared by employees. Determinants for conducting FS-culture encompass the technological and managerial/organisational conditions, human factors, the FSMS, and the external business environment like national culture and food safety governance (Nyarugwe et al., 2016).

FS-culture elements encompass, according to various researchers, employees’ perceptions towards the management system, style and process, communication, sharing of knowledge and information, leadership, accountability, risk perception, and work environment (Zanin et al, 2021a).

Poor FS communication has been assigned as one of the issues in organisations with a poor FS culture. Moreover, poor FS communication has been associated with multiple foodborne outbreaks and issues. Therefore, food companies try to understand how to achieve effective FS communication to create and maintain the desired behaviour toward food safety throughout their organisation, which is challenging.

The MSc project aims at developing a framework, which defines effective food safety communication and the conditions that influence it. The framework must support the systematic assessment of a food business’ actual effectiveness of its FS communication and identify where the bottlenecks are. The research builds further on earlier frameworks and there is a possibility that the student can do participatory research in a company including observations, interviews, document analysis, etc. as described by (Zanin et al, 2021b).

https://doi.org/10.1016/j.tifs.2021.08.013
3. Investigating barriers in the risk assessment of recyclable food packaging

**Supervisors:** Niels van der Linden (PhD at FQD/LAW); Pieterm Luning (FQD)

**Building on the research of MFQ students:** Yes

**Possibility to combine with internship:** No

**MFQ specialisation:** Quality control and assurance, quality management & entrepreneurship

**Open to** 1-2 students

**Problem description**

The food system is in a big transition; consumers are becoming more aware of the environmental impact of their food and are demanding higher quality foods with a lower carbon footprint. In Europe, the farm-to-fork strategy has several goals that impact the entire chain, while also increasing the level of circularity of the sector. This need for more sustainable circularity also applies to food packaging and food contact materials in general.

Food contact materials made from renewable sources, higher recycling rates, and the banning of harmful substances are all being investigated. While generally applauded, there are multiple barriers to achieving this in the short term.

For example, Food Safety Authorities, the packaging industry, and the recycling industry face challenges in risk assessments of the resulting mixtures that are generated by recycling processes. Moreover, innovations in food packaging are often halted by legal barriers by either using not-allowed materials (such renewable bioplastics) or by being prevented from performing their designed function (active materials).

The Ph.D. project aims to investigate the different barriers that actors in the food safety system experience in the transformation toward a more circular economy and is part of the European project “FoodSafety4EU ([https://foodsafety4.eu/project/](https://foodsafety4.eu/project/))” that aims to design, develop and release a multi-stakeholder platform and innovative digital tools to help citizens, scientists, companies, EC, EFSA, and Food Safety Authorities co-design and shape the future Food Safety System in Europe.

An explorative MSc study was done to analyse and categorise possible barriers in the risk assessment of recyclable food packaging as considered from the perspective of the packaging/recycling industry. The new MSc project aims to further understand the root causes of the barriers by improving and validating the initial framework with new literature and expert interviews in recycling as well as FSAs. The students are invited to support the organisation of a round-table discussion with multiple stakeholders on challenges in risk analysis of recycled food contact materials as part of the FS4EU project. The topic will be further discussed at the start of the thesis.
4. Understanding underlying causes of differences in safety and authenticity risks in heritage food production for different foodservice establishments

**Supervisors:** Mohammad Almansouri (PhD), Pieterm Luning (FQD)

**Building on the research of MFQ students:** Yes

**Possibility to combine with internship:** No

**MFQ specialisations:** Quality control and assurance, user-oriented food quality

**Open to 1 student**

**Problem description**

There is increasing consumer interest in food concepts like traditional, ethnic, and heritage food. Heritage food is a quite new concept. Such food inherits from community ancestors, it usually has a long history of consumption, and is commonly part of the cultural history of any population. As part of a Ph.D., a previous study conceptualised heritage food into three dimensions including ‘association with a particular group’, ‘association with a geographic area/place’, and ‘legacy’. Furthermore, risk factors were identified and validated that could compromise and authenticity of heritage food in the hospitality industry.

In the Ph.D. project, several empirical studies were done in different countries and in different kinds of food service establishments (FSEs) such as hotels, specialised heritage food restaurants, and home-based catering. Data indicated obvious differences in safety risks, but the patterns were less clear for authenticity risks.

To get a deeper understanding of the differences between FSEs, previous MSc thesis research projects developed first a general diagnostic tool for the authenticity risks, which was then adjusted, tested, and applied to a specific heritage food made in different types of restaurants. The new MSc thesis aims at investigating underlying causes of differences in safety and authenticity risks in heritage food production for different foodservice establishments by further developing the diagnostic tool and testing and applying it for a specific heritage food dish in a particular country/region.

The type of heritage food, country of origin, and the focus on the types of FSE will be further defined upon the start of the thesis project.
5. Towards a user-friendly biosecurity (hygiene) self-evaluation tool for farmers to prevent pathogens

**Supervisors:** Pieternel Luning (FQD), Ewa Pacholewicz, Miriam Koene (Wageningen Bioveterinary Research)

**Building on the research of MFQ students:** Yes

**Possibility to combine with internship:** Yes, preference for Dutch speaking skills as empirical work will be done with Dutch farmers

**MFQ specialisation:** Quality control and assurance, user-oriented food quality

**Open to 1 student**

**Problem description**
Animals are the source of several important foodborne pathogens, such as *Salmonella*, *Campylobacter*, and *E. coli* O157:H7 *Cryptosporidium parvum*. Campylobacteriosis is one of the most commonly reported zoonoses worldwide. Much research focused on slaughtering houses, as contamination with intestinal pathogens commonly occurs at various slaughtering steps. As the slaughtering process has only a few options to prevent cross-contamination and has no inactivation steps, there is a shift towards preventing high initial contaminations of incoming animals through preventive measures at the farm. These are the so-called biosecurity measures, which cover a broad range of hygiene measures to reduce the chance of infection with pathogens during breeding of animals. There is not just one crucial biosecurity measure, but it is the whole set of measures that needs to be followed consistently to be effective.

Various studies indicated that compliance with these measures is quite challenging for farmers as the measures take time, effort, and investments. Moreover, the incentives are not always obvious to the farmers. In previous research, a biosecurity self-evaluation tool has been developed, validated, and tested in practice, specifically for poultry farms. It can assess the status of the biosecurity measures and context characteristics, such as farmer, farm, and farm management characteristics, that can affect the execution of these measures. The tool was also evaluated on its usefulness, as perceived by farmers, showing that there is a need to improve the user-friendliness, provide suggestions to advance towards higher biosecurity levels, and design dedicated training for farmers on biosecurity measures. Furthermore, other research identified possibilities of nudges as way to improve compliance behaviour, which also need to be further elaborated.

A follow-up study aims at improving the user-friendliness of the tool and co-create with farmers possible improvement strategies to better comply with the biosecurity measures. Another aim is to design interventions to improve compliance e.g., through using nudges. Also contributing to designing a dedicated training program on biosecurity measures for farmers could be a possibility. The project is a collaboration with Wageningen Bioveterinary Research. The thesis topic will be finetuned at the start of the research.

6. Towards a food system dashboard that can monitor the transition to a plant-based diet

**Supervisors:** Pieterm Luning (FQD), Elsbeth Spelt (FQD)

**Building on the research of MFQ students:** Yes

**Possibility to combine with internship:** No

**MFQ specialisations:** All

**Open to 1 student**

**Problem description**

Today’s global food system is complex and dynamic. Climate change, worldwide population growth, and the need for a circular economy challenge the production of palatable, nutritious, affordable, and safe food. Our food system (in the broadest sense) is subject to multiple triggers and trends like climate change, growth of the world population, and economic, political, and technological developments. These trends can influence food production from farm to fork and impact human health and well-being, and the safety and environmental impact of food. According to Kampers and Fresco ([https://edepot.wur.nl/423601](https://edepot.wur.nl/423601)) “Food is vulnerable to degradation in terms of quantity, quality and safety. Identifying, controlling and mitigating these risks is a challenge for all actors operating in the food supply.”. They advocate that there is a need for proactive early warning systems based on a systems approach that acknowledges the complexity of production systems and their environment.

In the Food Cluster group at WUR, a combined initiative (FQD, FHM, FPH) has been started to develop a dashboard to forecast the effects of the trends on the food systems and their impact on human health and well-being, food safety, and environmental impact. The dashboard could consist of a multitude of qualitative and quantitative indicators to monitor the trends and their effects. Another objective is to understand the mechanisms of technological, legal, and human interventions that can interfere in the food system to maintain health, well-being, and food safety and minimise environmental impact. One of the strategies to reduce the burden of food production on the environment is the transition toward a plant-based diet. As a food system is per definition complex, this transition needs changes at different parts of the food system. To monitor this transition a previous MSc thesis investigated how to adjust a recently developed food system dashboard to make it applicable for monitoring the transition to a plant-based diet.

The student conducted a comprehensive literature review and identified comment elements in a food system dashboard, assessed compliance to dashboard criteria of an existing food system dashboard, and identified indicators to monitor the transition to the consumption of plant-based products. Different kinds of expert interviews were conducted to validate the food system elements and identified indicators. Further research is needed to validate the new indicators in the adjusted food system dashboard and to further operationalise the dashboard, which will be, among others, possible objectives of the new MSc thesis. The topic will be further specified at the start of the project based on the student’ recommendations for further research.
Towards a self-evaluation tool to assess vulnerabilities in hygienic design and cleaning and disinfection affecting Listeria control

Supervisors: Pieternel Luning (FQD), Mark Swainson (Lincoln University, the UK)
Building on the research of MFQ students: New topic
Possibility to combine with internship: Yes
MFQ specialisation: Quality control and assurance
Open to 1 student

Problem description

The cause of Listeriosis, *Listeria monocytogenes* is the deadliest foodborne pathogen in the UK and EU with a particularly high mortality rate (30%) associated with this pathogen (Public Health England 2018, 2020). Also, the capacity grows at low temperatures and its ability to form biofilms enables *Listeria monocytogenes* to persist in food manufacturing facilities (Ferreira et al 2014). It is particularly a threat to Ready-To-Eat (RTE) food manufacturers because in case of contamination there will be no further opportunity to remove the pathogen from the product before consumption.

These facts about Listeria pose high requirements for cleaning and disinfection and hygienic design of equipment and facilities.

However, in food manufacturing, misunderstandings of the contamination routes of Listeria and inadequate cleaning practices combined with poorly designed facilities and/or equipment still commonly occur. Often there is confusion about how to clean and disinfect high care and high-risk environments and human mistakes are easily made (e.g. inadequate dosing of chemicals, using wrong chemicals, not adhering to correct cleaning procedure, etc.).

Previous MSc thesis research investigated the product, cleaning and disinfection, and hygienic design-related factors that can influence biofilm formation increasing the likelihood of Listeria growth through a semi-structured literature review and interviews with experts from cleaning and disinfection and hygienic design.

The follow-up thesis aims at developing a self-assessment tool for food companies to assess their vulnerability to biofilm formation inherent to inadequacies in cleaning and disinfection and hygienic design and how they mitigate these vulnerabilities with their current Listeria control measures. The research will be done in collaboration with Lincoln University and depending on the situation it might be combined with an internship. The ambition is to publish the data gained in the thesis work combined with the findings from the previous study.
8. How to integrally monitor food safety management, business, and sustainability performance of a private-based FSMS- the case of FSSC 22000

Supervisors: Pieterm Luning (FQD), Aldin Hilbrands/Elsabe Matthee (FSSC 22000)
Building on the research of MFQ students: Yes
Possibility to combine with internship: No
MFQ specialisations: Quality control and assurance, quality management and entrepreneurship
Open to 1 student

Problem description
Today’s food companies should have an effective quality and safety management system in place to cope with the dynamic business environment and the customer requirements for food safety, integrity, quality, and sustainability. Besides compliance with legal requirements, food companies increasingly use private standards to set up/improve their FSMS and/or QMS. Various private standards are widely acknowledged, such as the retailer-driven standards (such as BRC or IFS) but also management system standards like ISO22000 and Food Safety System Certification (FSSC 22000).

The scheme owners of these private standards regularly update and expand the standards to anticipate food safety trends and other development in society and technology to improve their standards. For scheme owners, it is not only crucial to get feedback from representatives from the food supply chain, certification bodies, and other stakeholders but also to gain a deeper science-based understanding of the applicability and potential effectiveness of the implementation of their standard and how they can anticipate upcoming changes in society. Current trends in society include the shift toward more sustainable and resilient production systems that are able to ensure safe food, combat fraud, and manage the impacts of climate change. In a recent communication, the Global Food Safety Initiative launched a call “to foster greater action and impact to embed the food safety industry into the sustainability agenda and to engage its community in taking a bigger role in the Sustainable Development Goals (SDGs).”

The Food Safety System Certification (FSSC 22000) provides a comprehensive certification scheme for the auditing and certification of an FSMS, is GFSI recognized, and continuously anticipates new developments such as the GFSI’s vision to contribute to the SDGs. The overall question is how to monitor performance in terms of FSMS, business, and, in the near future, the contribution to SDGs. In two previous MSc thesis projects, indicators were identified to monitor FSMS and business performance of private-standard based FSMS based on literature reviewing and expert interviews. The follow-up MSc thesis aims to investigate to what extent the validated indicators are used by (FSSC222000) certified companies and how the contribution to SDGs could be monitored. The research may consist of developing a survey as well as conducting in-depth interviews and literature analysis. The research will contribute to the development of a metrics system to monitor the safety, business, and sustainability performance of private-standard-based system.
9. How to cope with the issue of ethylene oxide - analysis of the industry and governmental perspective

Supervisors: Pieternel Luning, Wilma Taverne, Klementina Kirezieva (Cargill)
Building on the research of MFQ students: Yes
Possibility to combine with internship: Yes, in principle combined with an internship at Cargill Rotterdam
MFQ specialisation: Quality control and assurance
Open to 2 students

Problem description
In September 2020, the first alarm related to ethylene oxide was raised by Belgium food safety authorities with foods containing sesame seeds contaminated with ethylene oxide from India. Nowadays, European countries are increasingly facing ethylene oxide related recalls after the substance was detected in more food additives used in a large range of food products.

Ethylene oxide is a product, which is used in several applications. In Europe, ethylene oxide is not authorized as a pesticide in food and feed. It is specifically prohibited to be used as a sterilization agent in food additives (Regulation (EC) 231/2012). In the rest of the world, ethylene oxide is or may be authorized as a pesticide or sterilization agent (not in all countries. However, in Europe Ethylene oxide is authorized as an intermediate or starting chemical to produce certain food and feed additives, such as mono, di, tri & poly ethyl glycols, polysorbates, surfactants, polysaccharides, choline chloride.

When ethylene oxide is used as a starting chemical to produce additives such as choline chloride, 2-chloroethanol (2-CE) is created during the manufacturing. Choline chloride is produced by the reaction of equal amounts of ethylene oxide with hydrogen chloride and trimethylamine (or from the pre-formed salt). But 2-CE is also a breakdown product of ethylene oxide, which is used as a pesticide or disinfectant. Another known source is, that 2-CE is created when an authorized processing aid is used, and this 2-CE is not related to the use of ethylene oxide.

There is one clear regulation in Europe, and that is the pesticide regulation being Regulation (EC) 396/2005, whereby the sum of ethylene oxide and 2-CE have to be considered. However, the differences in the application of ethylene oxide, and the different (un)known 2-CE sources are putting the Food and feed industry, the regulators, etc for major challenges concerning understanding the source, and the control of the maximum levels, the communication and enforcement.

The research consists of two projects. One project will focus on the food chain, in specific on the differences in regulatory requirements between the EU and Non-EU and the implications for control. The other project will focus on the feed chain, in specific the differences in the enforcement of the EU legislation related to the different sources of 2-CE.

The thesis topic will be further defined upon the start of the project in collaboration with the Cargill supervisors. The research includes, among others, a literature search, legal document analysis, and interviews with stakeholders in the food and feed industry.
10. Using quality label information to build a traceability model for food products

**Supervisors:** Ayalew Kassahun, Yamine Bouzembrak, Hans Marvin.

**Building on the research (of MFQ students):** Local food quality labels in the Netherlands (2021), and Tracking-and-tracing potential sources and paths of contamination in meat supply chains using trade data (2018, 2019)

**Possibility to combine with internship:** No

**MFQ specialisations:** Quality control and assurance

**Open to 1-2 students**

**Problem description**

Globalization, liberalization, efficient logistics (due partially to digitalization) have made food supply chains complex and difficult to gain insight into the quality and safety of food products. For instance, the Dutch food supply chains are relatively transparent and well-monitored, but since the EU is a single market (and integrated into the global food supply chain through free trade agreements with Japan, Canada, Singapore, etc.) and as a result tracking and tracing of food items and ingredients is difficult. However, traceability systems are essential for consumers, food operators and authorities. Consumers increasingly demand high quality products and ethical processing (such as organic products and processes that guarantee animal welfare); businesses want to avoid disruptions; and the authorities want to prevent the spread of contamination. This is because all of them will suffer the consequences when a food crises or scandal breaks out.

In three consecutive studies with former MFQ students, we investigated traceability models for food supply chains. We first used graph theory to predict the potential sources of contamination and vulnerabilities of the Dutch poultry chain using publicly available trade data (see Hao et al. 2020). We then improved the model using addition public data and optimization approaches. Finally, we studied the various quality labels used in the Netherlands with the intention of using quality labels to build event better traceability models. The aim of this assignment is to build on these previous research outputs to build better traceability models, particularly using quality labels and their certification schemes as inputs. This is because different quality labels (obviously the organic food supply chain is different from the regular food supply chain) use partially the same and partially different supply chains and incorporating these facts will improve traceability systems.

In this research project, the student synthesizes the previous studies and recent literature, examine the extent and the significance of food quality labels (e.g., organic, beter-leven and halal) on traceability, and finally design a traceability system that takes food quality labels into consideration. The design of the traceability model can have either a conceptual or a technical character, depending on the skill sets the student has.

**References & further reading**


https://doi.org/10.1371/journal.pone.0233376


https://www.gs1.org/standards/traceability
11. Digital-twin modelling tools to optimize fresh fruit cold chains from tree to table

Supervisors: Vincenzo Fogliano, Matthijs Dekker and Thijs Defraeye

Building on the research of MFQ students: No
Possibility to combine with internship: Yes

MFQ specialisations: Quality control and assurance, quality and food logistics

Open to 1 student

Problem description
Optimizing cold chains of fruits across all unit operations is crucial to maintaining fresh food quality and reducing food losses. Temperature and the gas composition in the air affect decay and fruit quality, so they need to be controlled during precooling, refrigerated transport, and cold storage. By optimizing these environmental parameters, shelf life can be maximized. Currently, extensive monitoring is performed of the environmental conditions in food supply chains (air temperature and humidity). However, this information is not yet optimally used to quantify how the fruit feels and how its quality evolves throughout the cold chain. Linking the measured sensor data with the fruit quality decay is the key objective of this project. With our approach, we want to answer the question when and where in the refrigerated supply chain we lose fresh food quality.

Aim
We look to use such sensor data to better predict the life of each fruit and vegetable in a refrigerated container, truck, or cold storage room. We develop digital twins of the cargo based on commercial sensors’ measured air temperature and humidity data in fruit cold chains. These data are fed into a physics-based model to provide theoretical estimates of key performance indicators such as average cargo temperature, mass loss, and remaining fruit quality at the end of the chain. We upcycle the temperature-time data to obtain quality decay data as a function of temperature. Various stakeholders in the supply chain can use such information for decision-making. This physics-based model entails computational fluid dynamics (CFD) simulations of airflow and heat transport in these cooling units.

Approach
This thesis will include following steps: (1) condensed literature review, (2) collect sensor data on commercial shipments from the sensor platform, (3) build digital twins of the cargo, (4) run digital twins to analyse supply chains. After the literature review, we process measured sensor data of commercial cold chains and analyse data for variability. Then you would build a physics-based, empirically calibrated digital twin for the fruit in a refrigerated container, truck, or cold storage room. Afterward, you use the digital twin to optimize fresh fruit supply chains. With this thesis, you will learn various modelling tools largely used in the digital twin domain, starting from hygrothermal measurements in fresh food supply chains. Apart from at the Wageningen Campus, the work can also be partially or entirely performed at the Swiss Federal Labs (Empa, St. Gallen, Switzerland), where accommodation will be provided by Empa for the 6 months if required. Further background information on the research at this institute (Empa) can be found on our website (https://www.empa.ch/web/simbiosys).
12. Extending the scope of auditing with sustainability: What does this entail for auditors and food companies?

**Supervisors**: Elsbeth Spelt and Geoffrey Hagelaar  
**Building on the research of MFQ students**: No  
**Possibility to combine with internship**: No  
**MFQ specialisations**: Quality control and assurance, quality management and entrepreneurship  
**Open to 1 student**

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**Problem description**

Auditing is an essential quality assurance activity for companies in the food industry. In daily operation, auditing focuses on the technological and managerial activities being conducted in food companies in order to determine the extent of compliance in assuring food safety and quality. The last years the scope on food safety and quality has been broadened for food auditors to food fraud and food defence and recently the scope has been broadened to food safety culture.

Currently, the scope is extended with sustainability. This extension on sustainability in auditing is the central focus of this master thesis research. Research questions that could be addressed, are:

1. What are requirements on sustainability food companies must comply with?  
2. What includes auditing on sustainability?  
3. Which competencies do auditors need to gain to audit for sustainability?  
4. Which kinds of training are necessary to develop these competencies?  
5. Which kinds of training has been designed to develop these competencies?  
6. How do internal and external auditors deal with the several scopes of auditing in daily operation?  
7. What does the current extend of compliance of food companies on sustainability requirements?  
8. What do companies do when they are confronted with their extend of sustainability compliance?

An approach in this thesis research could be reviewing literature, standards and popular journals to develop a framework representing auditing aspects on sustainability in food industry and auditing competencies respectively. Subsequently, the framework can then be validated by conducting interviews among food auditors and food companies. Based upon this research, an advice can be given to food companies and auditors who would like to embrace sustainability more in their vision, mission and daily practice. Other approaches that suit the student interest and learning needs are also possible to take.
13. Managing and assessing food safety culture to increase food companies’ safety performance

Supervisors: Elsbeth Spelt and Geoffrey Hagelaar
Building on the research of MFQ students: Not yet
Possibility to combine with internship: Not yet
MFQ specialisations: Quality control and assurance, quality management and entrepreneurship
Open to 1 student

Problem description
Producing safe food requires a well-established food safety management system together with a well-established food safety culture in companies. Griffith et al., (2010) identified six categories that may influence food safety culture which in turn could influence the food safety performance of companies. However, this initial model originates from 2011, in the meantime many more research has been done on the relevancy and measuring of food safety culture in the food industry, but not yet on assessing food safety culture to provide companies a blueprint on its performance in order to start up improvement cycles.

Therefore, this master thesis research aims at operationalizing the initial model of Griffith et al., (2010) by means of collecting all research and other sources on managing and assessing food safety culture. The operationalized model will be validated with food safety experts and subsequently the operationalized model could be used to assess food safety culture in food companies and provide this companies a blueprint on ‘how they are doing’.

The goal of this research is that by assessing food companies on its food safety culture recommendations can be provided to improve the culture and in turn, contributing to food companies’ safety performance. This can probably not be done by one master thesis research, next academic year a new thesis student will then continue with your recommendations in this field.

Starting literature in this research is:
14. Quality and sustainability standards in the food industry

**Supervisors:** Elsbeth Spelt and Geoffrey Hagelaar  
**Building on the research of MFQ students:** No  
**Possibility to combine with internship:** No  
**MFQ specialisations:** Quality control and assurance, quality management and entrepreneurship  
**Open to 1 student**

**Problem description**

Quality and sustainability standards such as BRC, ISO, UTZ, Lean&Green are implemented in the food industry to assure food quality and to increase sustainable food production. The aim of this master research is to analyse the implementation of quality and sustainability standards in food supply chains. This analysis might be done for one company or across companies, for one supply chain or across supply chains, for one country of across EU and non-EU countries depending on the overall research question that suit your interest and learning needs. Additionally, the implementation itself needs to be demarcated; the research may focus on the preparatory decisions and activities necessary for implementation, the research may focus on the decisions and activities during the implementation, or the research may focus on the effects of implementation. In this respect, overall research questions to consider are:

- What are (dis)advantages for companies to implement quality and sustainability standards?
- Which quality and sustainability standards have the highest benefits for food companies and why?
- What is crucial in implementing these standards to reach the highest effect?
- What kind of quality improvements are realized by food companies?
- What kind of sustainability improvements are achieved by food supply chains?
- What are differences and similarities in implementing a quality or sustainability standard?
- What would be an adequate way of international food companies to deal with all these standards?
- How do food handlers, quality assurance managers, food plant managers value these standards?
- How is a food quality management system being elaborated for compliance to these standards?

This analysis will contribute to the scientific understanding of what food supply chains and companies do in order to comply with the consumer demands and legislation on food quality and sustainability by means of systematically analysing the current body of knowledge available in literature and by means of systematically analysing the current implementation of standards in supply chains and companies. It is up to you to choose the research focus based upon your interest on gaining a better understanding in standards and food quality management systems by doing your thesis research.

Starting literature in this research is:

15. Incentives and barriers of blockchain use in the Dutch meat supply chain

Supervisors: Sara Erasmus and Lars Esbjerg (lae@mgmt.au.dk) (examiner: Saskia van Ruth)
Building on the research of MFQ students: No
Possibility to combine with internship: No
MFQ specialisations: Quality control and assurance, quality and food logistics
Open to 1 student

Problem description
Blockchain Technology (BCT) is a decentralized, distributed ledger that records the provenance of a digital asset, and through its inherent design, the data on a blockchain cannot be modified. The use of BCT has gained increasing attention in recent years and it has been used in various industries. There have been numerous efforts to use and integrate BCT in supply chain management, such as the food supply chain. For example, Walmart and IBM has been using a BCT system from 2018 for the supply chain monitoring of lettuce and spinach with all blockchain nodes controlled by Walmart and placed on the IBM cloud. In this way, traceability of the product is assured. Another example is FoodSQRBlock, a BCT-based approach developed in 2021 that uses QR code and cloud computing to digitize food supply chain data to improve traceability from farm to fork. Similarly, the Food Trust blockchain of IBM was created to trace foods along the entire chain. Hence, BCT allows brands to track a food product’s entire journey. In the case of product contamination, BCT allows the tracing back through each stop to its origin. Provided that the data is recorded at the blockchain node, it also allows companies to visualise everything else that the product may have encountered, allowing the early identification of a risk. However, BCT is not adopted widely in food supply chains and there are still many challenges when it comes to its integration with other data sources.

To address the challenges for the integration of BCT in meat supply chains, it is first required to determine the acceptance of blockchain by studying the incentives and barriers of blockchain use by industry decision-makers/stakeholders in the chain. The acceptance of BCT in the meat supply chain will be investigated through interviews with key decision-makers/stakeholders along the value chain (i.e., farmers, transporters, slaughterhouses, meat processors, retailers). The thesis will view BCT and other means of documenting and tracking credence characteristics as ‘market devices’. Market devices are material and discursive assemblages that play a role in the construction of markets, facilitating the economic exchange of meat products between economic actors. A questionnaire will be designed to interview key stakeholders along the entire value chain for selected meat products. All interviews will have two main parts. Part one will focus on current collaboration practices along the supply chain, with particular emphasis on the devices used to ensure traceability of meat products, and the credibility of these devices. Part two will explore what incentives and barriers decision-makers see for introducing BCT in the Dutch meat chains. This will enable the identification of barriers to the adoption of BCT and to assess how the use of BCT is likely to influence market practices.
II. GOVERNING FOOD SAFETY AND SUSTAINABILITY IN FOOD SUPPLY CHAINS
16. Auditing food quality & safety systems

Supervisors: Geoffrey Hagelaar and Elsbeth Spelt
Building on the research of MFQ students: Yes
Possibility to combine with internship: Yes
MFQ specialisation: Quality control and assurance
Open to 1-2 students

Problem description
Certification of food quality & safety management systems reflects a shift of public governance to private governance. Private governance means that organizations like retailers develop their own standard and relate the standard to a certificate which can be adopted by their suppliers. For supermarkets, standard setting is not only targeted at governing the stakeholders in the supply chain to ultimately selling the product with the intended food safety and quality attributes. The standard is developing into a strategic issue as well with which new markets can be developed and penetrated. Because of the commercial benefits the number of certifications rises (aimed at developing specific markets) but as well the number of companies that implement certificates increases (aimed at reaping the benefits). At the same time certificates are interpreted as signals of trustworthiness of the products towards the customers/consumers.

However, auditing of certificates is a complex matter. Auditing requires from the auditor competencies on the standards but as well on the processes of the audited company and the competency to position the general standard requirement in the specific company processes. The auditor needs to have the social skills to gather the necessary information and to cope with possible resistance from the company to the auditing process. Besides, there is time pressure on the auditor to finalize the audit within a certain agreed upon timeslot. These possible factors raise the question of how certificates are audited in reality in such a manner that the outcome of the audit is objective and reliable.
17. Maintenance of food quality management systems and the quality outcome

Supervisors: Geoffrey Hagelaar and Catriona Lakemond
Building on the research of MFQ students: Yes
Possibility to combine with internship: No
MFQ specialization: Quality control and assurance, quality management and entrepreneurship
Open to 2 students

Problem description
Maintenance of food quality/safety management system (FQ/SMS), after its implementation, is crucial for companies. The FQ/SMS needs to function at such a level that it the company can deliver to the consumer the intended quality/safety of the product. Maintenance is a matter of constant monitoring of the FQ/SMS in relation to the Q/S output. Company internal technological and administrative operations are checked on their effectiveness for delivering the intended Q/S output. At the same time, the efficiency of the FQ/SMS is at stake. The investment in the system and specifically in the maintenance of the system needs to be in balance with the benefits such a system has for the company. In literature the topic of maintenance seems to be underestimated looking at the attention given to this theme. More specific fields of research within this theme are factors that influence the maintenance process, the company internal collaboration to successfully maintain the FQ/SMS, the complexity of the technology and its operation.
18. Introduction of new technologies in food processing companies

**Supervisor:** Geoffrey Hagelaar  
**Building on the research of MFQ students:** No  
**Possibility to combine with internship:** Yes  
**MFQ specialisation:** Quality management and entrepreneurship  
**Open to 1-2 students**

**Problem description**

In a company new processing technology is introduced to become more efficient, to reach a higher quality (e.g. higher nutritional value, longer shelf life, more environmentally friendly) or to reach a higher market share and/or to access a new market (in which higher and/or other quality attributes are valued). These are all good reasons to implement new processing technology. However, by introducing new technology a company doesn’t necessarily achieve the intended goals. From research we know that regularly the intended company goals of implementing a new technology are not met. The company has to cope with two main challenges which are; (1) integrating the new technology in the already existing (technological) processing activities including as well existing administrative procedures for operators to work with the technology (technology assimilation) and (2) to align the quality improvements to the consumer target group (business model innovation). In handling the assimilation and business model innovation companies are able to reap the benefits from the introduction of the new technology. To optimize these two processes and their interdependence, research into factors which influence the successful introduction of new technology is then called for.
19. Entrepreneurship and quality
Supervisor: Geoffrey Hagelaar
Building on the research of MFQ students: No
Possibility to combine with internship: No
MFQ specialization: Quality control and assurance, quality management and entrepreneurship
Open to 2 students

Problem description
Entrepreneurs can be characterized by their entrepreneurial orientation. This orientation encompasses three dimensions being innovativeness, pro-activeness and risk taking. These three dimensions of entrepreneurial orientation shape the way in which entrepreneurs exploit business opportunities and by that drive the business performance.

Following and better yet anticipating on consumer preferences seem to be key for entrepreneurs to develop their company’s business. However, the food sector’s reputation seems to be conservative in bringing innovations to the market. At the same time companies in the food sector are pressured by the globalisation of the food market which urges companies to deal with global competitors. Moreover, consolidation in the domain of retail forces processing companies to deal with upscaling and increasing (standard) requirements. Hence, whilst on the one hand there is conservatism in the food industry to innovate, on the other hand there is pressure induced by (global) competition to be more competitive. This leads to the question what role entrepreneurial orientation plays in food companies and why food business entrepreneurs have such an entrepreneurial orientation. Possibly entrepreneurial orientation is constraint by the context in which food companies operate. This context can be described by the complexity of food processing, strict public regulation on quality and safety of food stuffs and the standards/certificates which also put requirements on the operations of the food processing companies.

This research topic is introduced to better understand the food entrepreneur and his/her entrepreneurial decisions to develop their business.
III. FOOD AUTHENTICITY AND INTEGRITY
20. Food fraud drivers

**Supervisors:** Saskia van Ruth (Examiner: Sara Erasmus)

**Building on the research of MFQ students:** Yes, various MFQ students

**Possibility to combine with internship:** No

**MFQ specialisations:** All

**Open to 1 student**

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**Problem description**

Nowadays, food ingredients are sourced globally with price being the main governing feature. The food supply chain network has become very extensive, which increased its susceptibility to fraud. Food fraud covers issues with composition, processing, shelf-life, geographical origin as well as production practice (e.g. organic). Rather than looking at specific incidents, a system analysis approach is preferred in order to prevent fraud in the future. In the past years, the food factors contributing to the vulnerability to fraud of companies in various supply chains have been studied using the SSAFE tool (http://www.ssafe-food.org/).

These studies revealed the importance of motivational drivers along with perceived opportunities and counteracting control measures. About the mechanisms of food fraud, the modus operandi and the social networks involved is little known. A rare example of such a study is the study of Lord and co-workers (2017), which examined how the central actors of the counterfeit alcohol supply chain carried out the key processes and what the interaction of these actors were within the criminal enterprise. In this research, crime script analysis. This method makes it possible to establish the complete sequence of actions and decisions before, during, and after a crime. Furthermore, social network analysis provides insights into the central actors and their relationships. Distinct structural patterns of social relationships can reveal the resources through which individuals receive information.

In spring 2022 a new organic egg fraud scandal surfaced in the Netherlands (https://www.transport-online.nl/site/138605/nvwa-neemt-750000-euro-in-beslag-bij-eierhandelaar/). This case will be central to the thesis project.

The aim of the thesis project is to elucidate the mechanisms of food fraud in the Dutch organic egg sector. As an initial step, the organic egg supply chain network in the Netherlands will be mapped and nodes identified. Opportunities will be assessed with a crime-script analysis of the 2022 organic egg fraud case (see above). Further, a social network analysis will supplement and elaborate the supply chain mapping and analysis to identify critical points and link them to nodes in licit and illicit networks in the selected food supply chains and industries. Together, this will provide insights into the opportunities as well as economic and social drivers of food fraud in the organic egg supply chain network. From the analysis a wider range of possible interventions, with clear opportunities for law enforcement and regulatory agencies to reduce and disrupt crime, will be identified and recommendations drawn.
IV. CONSUMER PERCEPTIONS AND PRODUCT INTERACTIONS
21. Consumers’ knowledge and attitude to industrial food processing in relation to health
Supervisors: Dieuwerke Bolhuis, Pieter Groen
Building on the research of: Students of HAS university of applied science. (Part of larger project https://restructureproject.org)
Possibility to combine with internship: No
MFQ specialisations: User-oriented food quality
Open to 1 student

Problem description
Consumers receive conflicting and dynamic information about what is healthy from various sources, such as official nutritional recommendations, health professionals, friends and family, social media and press. A good understanding of how people conceptualise healthy foods and how they make their judgements about food healthiness is still lacking. These judgements are expected to be made without much deliberation and based on heuristic strategies. Nowadays, industrial processing of foods and its possible adverse effects on health is widely debated in media and in scientific literature1. In theory, food processing includes any transformation from agricultural products to foods, this includes simple techniques like cutting or heating at a household level to highly advanced techniques at an industrial level. Industrial food processing has historically been done to produce safe and palatable foods with extended shelf lives. However, consumption of so called “ultra-processed foods” has been linked to weight gain, obesity, and related chronic diseases2. Ultra-processed foods are easy to eat at a fast consumption rate (kJ/min), due to their high energy densities and relatively softer textures. Human trials have repeatedly shown that a fast-eating rate (kJ/min) leads to higher energy intakes, which may lead to weight gain over time. Food properties like energy density and texture are considered to be responsible for the risk of overconsumption, which could be influenced by industrial processing but is not necessarily the cause of industrial processing3. It is unclear how consumers think about industrial food processing in relation to health and caloric intake. More insights in consumers attitudes and beliefs may lead to better guidance towards healthy food choices. This project aims to investigate consumers knowledge and attitude about industrial food processing, eating rate, food textures in relation to health and caloric intake. Focus groups/interview and/or a survey will be used to address the project aim.

22. Topics on Consumer Studies

**Supervisors:** Bea Steenbekkers / Pieter Groen  
**Building on the research of MFQ students:** The course YSS-33306  
**Possibility to combine with internship:** No  
**MFQ specialisations:** User-oriented food quality  
**Open to students who passed the course YSS-33306**

**Problem description**

In the course YSS-33306 students work on a research proposal, based on a number of topics that will be presented during the lectures. You can also choose a consumer-food quality related topic of your own choice. General guidelines for the topics are:

- Consumer perceptions and behaviour related to (innovative) food is involved
- Starting point should be the consumer-food product interaction which might influence food quality
- The topic can be studied within different consumer segments and/or different contexts of use.

The final topic will be decided upon in consultation with the supervisors.

All topics have in common that it is aimed to get a deep understanding of consumer perceptions and behaviour, taking place in a certain context. Therefore, in most cases qualitative research will be applied during your thesis.
23. Drivers and obstacles in the substitution of meat and the adoption of meat substitutes

Supervisors: Pieternel Luning (FQD); Hanneke Elzerman (Hogeschool van Hall Larenstein)

Building on the research of MFQ students: Yes

Possibility to combine with internship: No

MFQ specialisations: User-oriented food quality, quality control and assurance

Open to 1 student

Problem description

The substantial environmental impact of our food consumption and food production systems has become clear over the last decades. Especially, the production of meat puts a heavy burden on the environment. Not only researchers but also policymakers now plead for a shift in our dietary behaviour towards a more plant-based diet. In anticipation of this urgent need, numerous meat substitutes have been launched on the market in the last decades. The market for meat substitutes has been growing since the first introduction of soy-based products, and later Quorn, Valess, ‘Vegetarische Slager’, etc. However, the adoption of meat substitutes is slow, and many products are not yet satisfying consumer demands, as texture and taste issues still occur.

Many studies on meat substitutes focused mainly on the product characteristics using sensory tests and consumer studies. However, previous research indicated that the context in which meat substitutes are eaten can influence the acceptance of these products (Elzerman et al, 2013). Context includes the social or situational context (where, when, how, with whom the food is eaten, etc.) or the meal context (i.e. which other foods accompany the food product when it is eaten). In the past two years, several MSc students worked on the situational appropriateness of meat substitutes, by conducting an online survey and in-depth interviews (Elzerman et al, 2021, 2022). However, several questions are still unanswered in the field of consumer acceptance of meat substitutes and the role of contextual factors.

The MSc project will focus on: Differences in consumer attitudes and opinions regarding meat substitution between countries, and what is the role of contextual factors (meal context, usage situation) in the consumer acceptance of meat substitutes.

The project starts with the data analysis of a dataset on consumer motives and barriers regarding meat reduction in general and meat substitutes in particular. These data have been collected via an online consumer survey. Subsequently, the survey will be adapted for data collection in several countries, to study the differences in consumer attitudes and opinions regarding meat substitution, the role of contextual factors (meal context, usage situation), and reasons for making such dietary changes. In-depth interviews might also be part of this project. There will be another MSc student working on this topic and some collaboration might be possible.


24. Understanding consumer preferences for alternative protein products  
An open thesis topic at Isi Sensory Marketing Research in the field of protein shift

**Supervisors**: Pieternel Lunin/Bea Steenbekkers, Femke Brouwer (isi)  
**Building on the research of MFQ students**: New topic  
**Possibility to combine with internship**: No  
**MFQ specialisation**: User-oriented food quality  
**Open to 1 student**

**Problem description**

More and more products including alternative proteins are entering the market, examples are meat replacers, oat drinks, and pasta enriched with algae. Consumers are using these products, but there are huge differences between them. For producers of these products, it is important to know about consumers’ preferences (overall taste, appearance, texture) as well as consumers’ perceptions of these products.

Isi, a global acting sensory market research agency, based in Germany conducts many studies in the field of protein shift. One example is a study on plant-based chicken nuggets done in a central location test among 80 German consumers. Our goal was to find out preference (overall, taste, appearance, consistency), non-meat recognition among children, and the final preference of consumers. Substantial differences were observed between the products tested; some brands stood out and were liked by most people, while some, unfortunately, could do better to be liked by the public. For most people taste and consistency are the most important drivers of liking while appearance is less important. This finding is relevant when setting a focus on further product developments.

Another study was about the perception of hybrid meat, using qualitative research. Isi did a sensory napping study on oat drinks and performed an online survey to get to know more about plant-based schnitzels. These studies are all examples of possible topics and/or methods that could be used during the thesis project.

We are looking for a master thesis student who would like to work and co-create with us on a topic in the field of protein shift from an academic view. As the market develops quickly, and clients’ wishes change fast, we could not offer a specific topic at this moment already. When a student applies to this assignment, we would like to have a kick-off meeting (online, as we are based in Germany) in the first week of the thesis with the student and all supervisors to discuss and define the topic. There is a possibility that this assignment will be in cooperation with one of our clients. The input of the student is appreciated in defining the topic. For more information on our company, our clients and our way of working, see our website: [www.isi-insights.com](http://www.isi-insights.com)
VI. PRODUCTION AND CONSUMPTION OF NOVEL PROTEIN FOODS e.g. INSECTS
25. Embedding of novel protein sources in food supply chains under extraordinary circumstances

Supervisors: Catriona Lakemond and Geoffrey Hagelaar
Building on research of MFQ students: Yes
Possibility to combine with internship: No
MFQ specialisation: Quality control and assurance, quality management and entrepreneurship
Open to 1 student

Problem description
In 2020 the Corona crisis developed itself as a global health crisis leading to closure of borders with an immediate, temporarily effect on the access to certain food products in Dutch supermarkets. Next to a pandemic situation one could also think of other potential situations with an effect on food supply, as a long drought, flooding’s, nuclear disasters, epidemics in the animal sector, political conflicts and war. These can have a direct effect on food security. Now in 2022, the effects of the Ukraine conflict on food supply, i.e. grains, in other parts of the world become evident. Also, indirect effects can be expected as a result of significant economic stresses, e.g. linked to the COVID-19 related lockdown measures. Food chains are often internationally organized, with many import and export practises, that can be disrupted in crisis situations.

The LEI performed in 2013 a theoretical exercise to see whether the Dutch agricultural sector would be able to produce enough food for Dutch population under exceptional crisis conditions. The study was based on a worst-case scenario, namely an autarky situation, in which import, and export were no longer possible. Although the study showed that the Dutch agricultural sector in such a situation is still capable of feeding the Dutch, the transition from the current situation to one of autarky would require very substantial changes to both agricultural production and the national diet.

The most striking differences compared with the current situation are the limited consumption of grain products (including bread), the complete absence of pork and the relative prominence of potatoes, chicken, and eggs in the diet. The absence of pork is a result of maximizing meat production using the minimum amount of land (chickens use less land). Although the domestic grain production is in principle enough to meet the demand for bread, it will not cover what is used as animal feed as well. Alternative upcoming novel protein sources have not been taken into account in this research. Some examples are algae, quorn (mycoproteins), and insects. Insects for example have potential because they are nutritious, easily reared requiring minimum space, and can help limitation of the environmental footprint.

In this research the potential contribution of novel protein sources to food security in an autarky situation will be studied along with the role of policy makers with relation to the resilience and capabilities of a countries food system. The study will be performed with a focus on small and medium sized enterprises, short local food chains and appropriate processing to reach the desired shelf life while upkeeping the nutritional properties. Food security will be studied in terms of food availability and food access.
26. Assessing the potential for upscaling production of emerging novel protein sources: a chain perspective

Supervisors: Geoffrey Hagelaar and Catriona Lakemond  
Building on research of MFQ students: Yes  
Possibility to combine with internship: No  
MFQ specialisation: Quality control and assurance, quality management and entrepreneurship  
Open to 1 student

Problem description

The increasingly growing population puts great pressure for sustainable food production. Environmental and ethical concerns of the intensive traditional livestock production to feed the world population have been pointing out for the need to develop production for alternative supply of animal protein. Therefore, a range of alternative protein sources are upcoming. They range from more traditional ones like pulses (e.g. beans), to novel ones like algae, quorn, cultured meat, and insects. Insects are for example a potential alternative because they are nutritious, easily reared requiring minimum space, and can help limitation of the environmental footprint. However, to have a significant impact on the environment, the production of insects needs to be on a large scale and barriers such as consumer acceptance and requirements for the production and commercialization of these products need to be addressed. In previous MSc work the developing insect chain was extensively studied. The main bottlenecks for the expansion of large-scale production of insects as human food were found to be lack of close collaboration between partners, the relationship with customers/consumers, and the lack of appropriate technical knowledge in insect rearing and processing. In general, increasing the production and how to use novel proteins for food applications is part of building new protein value chains. The impact of these value chains depends entirely on the ability to develop successful food products/protein rich ingredients and to organize the necessary production chain in such a way that good quality products and ingredients are available and finally can reach the consumer. The current research will therefore investigate the similarities and differences of potential successful strategies with respect to the developing chains of various novel proteins. The research will include small and medium sized enterprises.
27. Design of insect supply chains in developing countries

Supervisors: Geoffrey Hagelaar and Catriona Lakemond
Building on research of MFQ students: Yes
Possibility to combine with internship: No
MFQ specialisation: Quality control and assurance, quality management and entrepreneurship
Open to 1 student

Problem description
The world’s growing population and food securities challenges have necessitated the need for using sustainable natural resources. Consumption of insects is a traditional practice since time immemorial in most African, Asian and South American countries. However, the potential contribution of edible insects to food security in these countries is under threat. Adoption of western food habits, especially in urban areas, has caused a decline in the consumption of edible insects as was clear from a case study done in Zimbabwe. The low insect consumption level in urban areas due to restricted availability limits the actual contribution to food security. Further insect consumption is limited due to seasonal availability, since the insects are often harvested from the wild in developing countries. This justifies the need to improve edible insects’ availability in all seasons, especially in urban areas through developing reliable value chains, insect farming and processing. The research will focus on potential successful strategies to design such insect supply chains. Aspects that will be taken along in the research are consumer orientation, (technical) knowledge with respect to insect harvesting and processing, insect farming and collaboration between potential partners in such a chain. We will make use of the PPPlab scaling tool, with technological and managerial ingredients for scaling.
VII. FOOD QUALITY AND LAW
28. Topics on Law and food quality

**Supervisors:** Food law supervision team, contact person: Francesco Cazzini

**Building on the research of MFQ students:** No

**Possibility to combine with internship:** No

**MFQ specialisations:** All

**Open to multiple students**

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**Problem description**

The Law chair group offers multiple topics regarding law that can be sorted out in a thesis research from the perspective of regulating the production of high quality and safe food products. For instance:

**LAW701B/M  Public and Private Food Regulation**

Public food regulation occurs at global, EU, regional and national level and covers a vast number of specific legal areas, such as consumer and marketing, food information, competition, public procurement or trade law. Next to traditional governmental regulation, private food standards (such as UTZ, MSC, GlobalGAP) have emerged as an important mode of governance in food supply chains, addressing environmental, social, ethical, quality and/or safety characteristics of foodstuffs. Thereby, private standard setters are emerging as de-factor regulators, requiring a fresh view on issues such as legitimacy, accountability and enforcement.

Private food standards raise new issues with respect to public regulation applicable to food. Private food standards may mislead the consumer if companies use standards for greenwashing (consumer and marketing law). Standards may not always provide useful, intelligible or verifiable information to the consumer (food information law). Further, agreements between companies, even if made for good purposes, may distort the market conditions (competition law). In the definition of green public procurement criteria, reference to specific private schemes is highly contested (public procurement law). Further, private food standards interact with global (WTO and regional) trade law and EU internal market law. A looming question is how public regulation interacts with and ought to govern private initiatives.

Students writing in this theme may choose to write on specific public and/or private food regulation. In these areas, the LAW group currently conducts projects on the possibilities of using the Unfair Commercial Practices Directive as a tool for combating misleading private certification practices; an assessment of consumer behaviour on fishery and aquaculture voluntary claims (labels and textual information); the relevance of international standards in WTO trade law; the possibility of using private standards to make public spending more sustainable under public procurement law.

Once you are interested in doing a thesis in the field of law, then you can choose this topic as your first preference and together with Francesco Cazzini, you will find the topic among the multiple opportunities that hopefully suits your interest and learning needs.