The Master’s Degree Programme at Department of Food Science
### Table of contents

1. Impact of incubation temperature on muscle metabolism in broilers  
2. Can the liver taste bitter compounds?  
3. Blood metabolites after ingestion of protein sources  
4. Alternative feed formulation to prevent boar taint  
5. Intramuscular fat in Danish beef  
6. Molecular changes in muscle structures with consequences for meat quality  
7. How to keep honey flowing  
8. Plant coagulants  
9. Characterizations of variations in Danish dairy milk  
10. Milk foam - Barista  
11. Developing a quantitative prediction model for water binding and gel strength for various hydrocolloids, proteins + other common additives used in meat/meat free applications  
12. Use of natural compounds for washing of carrots to prolong shelf-life  
13. Hot water treatment to prolong shelf-life of fresh carrots  
14. Effect of HFD on hepatic metabolite profile  
15. Food compounds and intestinal integrity - a cell model for the small intestine  
16. High fat diet induced regulation of hepatic detoxification  
17. Investigating the structuring of food in the gut  
18. New protein solutions as functional ingredients  
19. Designing future protein dense foods  
20. Improving freezing and thawing effects of fresh milk during shelf-life  
21. The effect of contextual factors on food intake and liking among elderly
Impact of incubation temperature on muscle metabolism in broilers

22. Sweet product development - sensory perception and acceptance of beverages sweetened with alternative sweeteners
23. Sweet product development - taste-taste and crossmodal modulation of the sensory perception of beverages
24. How can food products be tested from a sensory science perspective?
25. Eating is pleasure. Development of a scale to measure food related pleasure
26. Optimizing the method for measuring the satiating capacity of foods
27. How does a product make you feel? - Sensations experienced after eating
28. Food eating behavior. Homeostatic and hedonic drivers of food intake
29. WasteSense. Consumer visual evaluation of freshness in stored fresh meat and fish products in retail and home context
30. Play and Eat
31. Sonic seasoning: Behavioral measurements of crossmodal interactions on sweetness perception
32. What does this wine taste like? Measuring the temporal evolution of complex flavors
33. Changing tastes: How does sound change taste perception in real time?
34. NMR studies of hydrocolloids

**SHORT PROJECT DESCRIPTION**

Meat from broilers is highly appreciated by the consumers, and specifically the demand for the breast fillet is increasing. The demand has been met by genetic selection of lines characterized by fast post-hatch growth and greater yield of the breast fillet but not leg muscles. This focus in the selection has caused an imbalance in the body of the chickens, leading to very large pectoralis muscles but decreased leg strength. This causes impaired animal welfare because of the chickens’ decreased ability to walk.

In this project, we study fetal programming by manipulation of temperature during incubation of chicks. The early incubation temperature has been shown to affect the number of muscle fibers in the leg muscle of chick embryos, and this may support a more balanced development post-hatch between the breast and leg muscles, supporting the chickens’ ability to walk. An increased incubation temperature from 37.5 to 38.5°C from day 4 to 7 increases the embryonic movements, and this may explain the increased number of muscle fibers and ratio of nuclei per fiber at day 18 of the incubation period (Hammond et al. 2007). Also, the muscle metabolism might be affected, which could have an impact on the meat quality. Thus, this project aims at describing the glycogen content and activity of metabolic enzymes (e.g. citrate synthase, lactate dehydrogenase, and beta-hydroxy CoA dehydrogenase) in broilers, which have been exposed to fetal programming.
Can the liver taste bitter compounds?

**SHORT PROJECT DESCRIPTION**

Hepatic detoxification is conducted by a series of enzymatic reaction and results in the elimination of drugs and toxic compounds from the body. The rate limiting step in this process is the reaction carried out by the cytochrome p450 enzymes (CYP). The expression of the CYPs is highly adaptive and controlled by a network of transcription factors. Central in this network is the aryl hydrocarbon receptor (AhR) controlling the expression of the major CYP sub-family CYP1A.

Taste is divided into five basic categories and sensed by taste-specific receptors. Bitter taste is perceived by the TAS2 receptor family and is considered a warning signal of toxic compounds. Interestingly, TAS2 receptors are expressed in extra oral tissue, including the liver and intestine. The function here is only vaguely elucidated, and it could be speculated that the perception of bitter tastes here is linked to the detoxification process.

Preliminary data from our lab shows that activation of the AhR by TCDD up-regulates the mRNA expression of TAS2R in porcine primary hepatocytes.

This project will investigate the tissue distribution of TAS2R in pigs and the impact of AhR activation on TAS2R regulation in hepatocytes at molecular level. The project includes culturing of primary liver cells, analysis of gene (qPCR) and protein expression (e.g. western blotting).

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Blood metabolites after ingestion of protein sources

**SHORT PROJECT DESCRIPTION**

When proteins are ingested, digestive enzymes will attack these and degrade them into an array of amino acids and smaller peptides and thereafter, these are absorbed into the blood stream. Optimaly, all these amino acids and peptides present in the blood stream should be quantitated to depict the complete postprandial state.

The aim of the present study is to develop a liquid chromatography mass spectrometry (LC-MS) method to examine the postprandial absorption of proteins. The impact of an exogenous enzymatic hydrolysis on the absorption rate and bioavailability will also be investigated based on inclusion of samples from a human intervention study conducted with two different protein sources that differ in degree of exogenous hydrolysis.

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Alternative feed formulation to prevent boar taint

**SHORT PROJECT DESCRIPTION**

Boar taint is described as an offensive odor and taste which is present in meat from boars. This has a great impact on the consumer acceptance of the meat. Boar taint is caused by the presence of two compounds, skatole and adrostenone, which are metabolized in the liver. Today’s strategy to prevent boar taint is surgical castration of all male piglets.

In this project, we will explore an alternative strategy to prevent boar taint by investigating whether specific food compounds can be used to enhance the hepatic metabolism of boar taint compounds.

The project includes cell culturing and analysis of gene and protein expression as well as HPLC for measuring the metabolism of boar taint compounds.

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**PROJECT START**
2019

**EX Tenn AND TYPE OF PROJECT**
45 or 60 ECTS - MSc project, including practical laboratory work

**MAIN SUBJECT AREA**
Molecular nutrition and cell biology

**Intramuscular fat in Danish beef**

**SHORT PROJECT DESCRIPTION**

Eating satisfaction of beef is the one quality trait identified by both the meat packing industry, food service buyers, and retailers which can stimulate to an increased payment (Igo et al. 2013). Beef tenderness, juiciness, and flavor are characteristics that affect satisif (Frank et al. 2017; Møller, 2015) and this can have an overall impact on consumption, but also less food waste because of fulfillment of expectations, and possibly a better economy in the sector. The amount of intramuscular fat is the one factor contributing mostly to the flavor of beef (Therkildsen et al. 2017), and flavor is highly linked to the overall liking of beef (Corbin et al. 2015). Thus, in order to optimize eating satisfaction of beef, focus should be on increased amount of intramuscular fat and decreased shear force.

In this project, we have the opportunity to screen 1,000 Danish beef carcasses for the content of intramuscular fat and texture, and possibly also evaluate the fatty acid composition depending on breed and crossbreed. This information will be matched with the results from images captured of the meat at the slaughterhouse in order to predict the overall eating quality. The final frame of the project is open for your own interest within this field.

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**PROJECT START**
August/September 2019

**EX Tenn AND TYPE OF PROJECT**
45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**
Meat science, animal science and meat quality

**ADDITIONAL INFORMATION**
The project is part of a large GDP project, “High Quality Beef from Sustainable Crossbred Calves [FutureBeef-Cross]”, which is a collaboration project with SEGES, Danish Crown, Viking Genetics and Department of Molecular Biology and Genetics among others.
Molecular changes in muscle structures with consequences for meat quality

**SHORT PROJECT DESCRIPTION**

The wooden breast phenomenon is an abnormality of the large breast muscle affecting meat quality. The development of wooden breast has been registered already two weeks prior to slaughter.

The aim of this project is to follow the development of wooden breast from when the chickens are small until the time of slaughter and try to identify biomarkers that can indicate if wooden breast is developing at an early stage. Chickens are reared in buildings where the CO2 level is monitored in order to investigate a possible impact of the environment on the development of wooden breast.

The project includes gene and protein regulation analysis (real time PCR and western blotting, respectively).

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How to keep honey flowing

**SHORT PROJECT DESCRIPTION**

The market for thin honey, that easily flows and is sold in squeezable bottles, is growing. During storage, crystals may form in the honey and this affects both flow properties and visual appearance leading to customer rejection and food waste.

In this project, the student will conduct analysis in the lab and help to identify critical process parameters affecting crystal formation in honey. Techniques like spectroscopy, polarized light microscopy, and differential scanning calorimetry will be applied to samples that have been subjected to different types of pre-treatment and storage.

The final goal of the project is to produce honey with minimal crystal formation during storage, thus enabling lower food waste and higher customer liking, and providing a more sustainable product.
Characterizations of variations in Danish dairy milk

**SHORT PROJECT DESCRIPTION**

Traditionally, plant coagulants extracted from the flowers of the Mediterranean thistle Cynara cardunculus have been used for cheese making. Also today, such extracts are used for small-scale production of highly appreciated cheeses based on Ewe’s milk in both Portugal and Italy.

Based on harvested flowers from Italy, enzymes will be extracted from different flower types, harvested at different time points, and the stability of the proteolytic enzymes (cynarases and cardosins) will be tested and characterized by rheological analyses. The molecular identity of extracted enzymes will be analyzed by one- and two-dimensional gel electrophoresis, coupled with mass spectrometry for identification (MALDI ToF MS/MS). Depending on the stability tests of the extracted enzymes, pilot cheeses may be prepared in collaboration with Naturmælk. Furthermore, extracts of Danish thistle types may be included in the studies.

The project is a collaborative project between industry and university. The project will be carried out at Department of Food Science, Aarhus University, in collaboration with Naturmælk. Therefore, visits to Naturmælk and interaction with Naturmælk will be planned as a part of the project. There may be some test trials at Naturmælk to be carried out, but this will be planned in more detail after project start.

**SHORT PROJECT DESCRIPTION**

The inherent variation of milk represents both opportunities and challenges. Opportunities for differentiation, but also challenges in relation to processing variations in relation to milk as a raw material. An increasing part of the milk produced is furthermore used in processes involving up-concentration by filtration with subsequent increase of the variation experienced.

The overall aim of the ‘Danmilk’ project is therefore to clarify the significance of seasonal and geographical conditions on Danish dairy milk. In the project, milk samples will be collected from silo milk from a range of Danish dairies, representing both organic and conventional production. A large range of milk components will be analyzed, including proteins, fatty acids, vitamins, minerals, metabolites, and technological properties. The student will in part participate in this work. The methods involved will depend on choice of parameters to be part of the master’s study, but are expected to involve HPLC, LC-MS, selective ion electrodes, and tests for milk functionality. The project will imply measurements on both fresh and frozen milk samples, and some involvement in sample collection and handling are also included.

The project is a collaborative project between industry and university (Department of Food Science AU, Arla Foods Ingredients, and other small and medium-sized organic and conventional Danish dairies). The project is part of a bigger project, DanMilk, and will imply collaboration with other participants in the project.
**SHORT PROJECT DESCRIPTION**

The milk fat quality is already affected through the feeding and the management of dairy cows. Feeding dairy cows with only grass-based feedstuff provides economic and environmental benefits, and additionally creates a “healthier” milk composition.

The research project ‘Grass milk’ receives milk from herds using such a grass concept. An MSc project can be associated with this project and deal with quality and functionality of milk, which could include foaming properties (e.g. for café latte), fat crystallization, and free fatty acid.

It is possible to discuss MSc project ideas in relation to the research project Grass milk based on interest.

**SHORT PROJECT DESCRIPTION**

In the application group: “Culinary and Meat Alternatives” at DuPont, an MSc project is available working on “developing a quantitative prediction model for water binding and gel strength for various hydrocolloids, proteins + other common additives used in meat/meat free applications.”

The model would make use of texture analysis / rheology / and NMR to look at the textural outcome of the use of the given hydrocolloid within the system as well as document the amount of water that is held within the ‘bound’ state as opposed to the ‘free’ state.

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Use of natural compounds for washing of carrots to prolong shelf-life

**SHORT PROJECT DESCRIPTION**

High consumer awareness has led to search for technologies that do not involve chemicals and that can be considered natural. Use of natural, active compounds from plants and herbs recently gained a lot of attention due to their antimicrobial, antifungal and antioxidant properties. The aim of the study is to test natural, active compounds (e.g. essential oil from thyme or oregano) as sanitizers during washing process and their impact on produce quality and sensory. The quality of carrots is mainly determined by the presence of the fungus Thievialopsis basicola and the bacteria Erwinia carotovora.

The research project involves development of the washing protocol and evaluation of the impact of different treatments on product quality determined by physical, chemical, and microbiological analyses, and sensory panel. The project involves in vitro lab tests and in vivo experiments on fresh produce to study treatment efficiency.

The MSc project is part of the research project ‘KvaliRod’ funded by the Green Development and Demonstration Program. KvaliRod is carried out in collaboration with several Danish companies. You will be part of our project group and will interact with our partners.

The MSc project can be developed in different directions depending on the interest and background of the student.

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Hot water treatment (HWT) to prolong shelf-life of fresh carrots

**SHORT PROJECT DESCRIPTION**

Hot water treatment (HWT) has recently gained attention as an eco-friendly technology to reduce food waste. However, there are few studies on the technology.

The objective of the research project is to develop a method for HWT of carrots to reduce spoilage of packaged fresh produce in the supply chain caused by the fungus Thievialopsis basicola and the bacteria Erwinia carotovora.

The research project involves development of the HWT technology (temperature and time) and studies of the impact of different treatments on product quality determined by physical analyses (microscopy, electrolyte leakage), chemical analyses (volatile, polyacetylenes, sugars), and sensory analysis by expert evaluation. The project also involves artificial inoculation of carrots before HWT to study treatment efficiency.

The MSc project is part of the research project ‘KvaliRod’ funded by the Green Development and Demonstration Program. KvaliRod is carried out in collaboration with several Danish companies. You will be part of our project group and will interact with our partners.

The MSc project can be developed in different directions depending on the interest and background of the student.

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Short Project Description

Effect of HFD on hepatic metabolite profile

High fat diet induces several changes to the body, including disturbances in the energy homeostasis. Moreover, high fat diet is known to have profound effects on hepatic detoxification processes. However, the exact mechanism behind this is unknown.

In this project, we will determine the HFD induced metabolite profile in liver tissue using NMR and correlate it to changes in gene and protein expression of selected enzymes (using RT-PCR and western blotting). Furthermore, we will use already obtained samples from both wild-type and knockout mice to investigate the significance of a specific protein in the regulation.

Food compounds and intestinal integrity - a cell model for the small intestine

Caco-2 is a human colon epithelial cancer cell line. By growing a monolayer of Caco-2 cells on permeable membranes, the model can be used to mimic the epithelial cell-layer lining the wall of the small intestine.

Intervention studies can be made by adding a component of interest on the apical side of the Caco-2 cell monolayer. This could be done in relation to investigating the effect of food compounds on inflammation. An effect of the intervention can be seen by analyzing the Caco-2 monolayer integrity and the cell media on the apical and basolateral sides. At the end of the experiment, the Caco-2 cells can be harvested, and the protein and gene expression can be investigated (using e.g. western blotting and RT-PCR).

Different food compounds will be tested in the Caco-2 cell model to study cell permeability and integrity. To gain further mechanistic insight, OMICS-techniques can be used on the metabolic and proteomic levels.

The aim of the project is to:
- optimize the Caco-2 cell monolayer model in order to obtain samples for metabolomics and proteomics investigations
- study the effect of food compounds on monolayer integrity using transepithelial resistance (TEER), trans-epithelia transport of fluorescence dye and RT-PCR to evaluate gene expression.
High fat diet induced regulation of hepatic detoxification

**SHORT PROJECT DESCRIPTION**

Hepatic detoxification is conducted by the cytochrome p450 enzyme system. The expression of these enzymes is highly adaptive and responds to a high number of events, including specific food compounds and nutritional status.

In this project, we will investigate how the cytochromes respond to specific food compounds during high fat diet conditions. To do this, we will set up a method for culturing hepatocytes in conditions that mimic high fat dieting, and afterwards treat the cells with specific food compounds.

The project includes cell culturing and analysis of gene and protein expression as well as HPLC for measuring cytochrome activity.

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**PHYSICAL LOCATION OF THE PROJECT**

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**PROJECT START**

Anytime

**EXTENT AND TYPE OF PROJECT**

45 or 60 ECTS - MSc project, including practical laboratory work

**MAIN SUBJECT AREA**

Molecular nutrition and cell biology

**ADDITIONAL INFORMATION**

Investigating the structuring of food in the gut

**SHORT PROJECT DESCRIPTION**

The effect of the entire food matrix in the digestibility and the biological functionality of foods are largely unknown, especially in mixed protein systems.

We are proposing to look at complex model foods containing proteins, fat, and structuring polysaccharides, and to characterize the structural changes occurring during a semi-dynamic in vitro digestion. The products will be analyzed for their macro- and microstructure, as well as the breakdown of individual components (proteins, peptides, lipid droplets).

The project involves a literature review, the identification of a complex matrix of interest, and selection and optimization of macroscopic and microscopic structure characterization techniques. This will be accompanied by in vitro digestion experiments, macro and micro-scale structure characterization, and laboratory analytical testing.

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**PHYSICAL LOCATION OF THE PROJECT**

DuPont Nutrition BioSciences ApS, Brabrand Campus

**PROJECT START**

2019

**EXTENT AND TYPE OF PROJECT**

45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**

Food chemistry and structure

**ADDITIONAL INFORMATION**

Co-supervisor:
Finn Madsen, R&D, DuPont Nutrition and Health
New protein solutions as functional ingredients

SHORT PROJECT DESCRIPTION

Today’s consumer is increasingly interested in novel sources of protein in food. However, these proteins are often not fully characterized, especially in complex matrices such as food during processing.

We are proposing to look at mixed matrices containing proteins, fat, and fibers, and to study their interaction from a nano, to a micro, and to a macro-molecular level. This project will explore the potential to create novel protein aggregates with specific functionalities (texture – structure forming) via processing. This will enable better tools towards clean label food products for food product developers.

The project will require a literature review, some product development, as well as advanced molecular and microscopic techniques, together with good data analysis.

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PROJECT START
2019

EXTENT AND TYPE OF PROJECT
45 or 60 ECTS - MSc project

MAIN SUBJECT AREA
Food product development, food processing, food chemistry and structure

ADDITIONAL INFORMATION

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Designing future protein dense foods

SHORT PROJECT DESCRIPTION

Today, we face significant challenges in food science. We have to design the food of the future in a way that it will be sustainable, safe, nutritionally dense, and affordable for everyone.

For this reason, we are focusing on investigating the use of plant-derived proteins in dairy matrices. Dairy is recognized as a highly nutritious matrix for all ages. The milk-derived proteins have many biofunctional and technofunctional properties and are therefore used in a wide array of food products. Plant proteins do not have the same aminoacid composition, taste, or technofunctional properties (foaming, gelling, etc.) that are required to prepare nutritionally dense foods that would be accepted by consumers.

In this project, we will look at plant proteins and understand their properties to create novel foods that capitalize on complementarities or synergies between the dairy and plant components. The project will include review of the literature and processes, use model products, and create food concepts which may then be validated by the industry.

PROJECT LOCATION
Arla Foods Ingredients, Aarhus

PROJECT START
2019

EXTENT AND TYPE OF PROJECT
45 or 60 ECTS - MSc project

MAIN SUBJECT AREA
Food product development, food processing, food chemistry and structure

ADDITIONAL INFORMATION
Co-supervisor: Arla Foods Ingredients

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Improving freezing and thawing effects of fresh milk during the shelf-life

**SHORT PROJECT DESCRIPTION**

Freezing is one of the most common ways to conserve fresh food. However, at low temperatures and low water activity, some chemical reactions may still occur at very low rates.

In this project, we will be looking at the physical and chemical changes occurring to milk during freezing and thawing, and the composition and structure of the aggregates that sometimes form once defrosted.

The project will require a literature review, advanced chemistry, and microstructure techniques. The work will be located at the Research and Innovation facilities of Arla Foods amba.

**PHYSICAL LOCATION OF THE PROJECT**

AU-FOOD and Arla Foods amba, Agro Food Park, 8200 Aarhus N

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**PROJECT START**

2019

**EXTENT AND TYPE OF PROJECT**

45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**

Food chemistry/physics

**ADDITIONAL INFORMATION**

Co-supervisor: Arla Foods amba

The effect of contextual factors on food intake and liking among elderly

**SHORT PROJECT DESCRIPTION**

Low food intake due to loss of appetite among elderly might result in malnutrition and underweight, which is an increasing societal problem. Many factors have an impact on food intake among elderly, such as the context in which the meal is eaten.

In this project, the focus is on how the setting can be optimized to facilitate and support increased enjoyment and intake during eating.

The student will explore factors of importance for facilitating joyful eating and investigate the effect of changing meal settings on elderly's food intake. These factors include portion size, the size and color of plates, as well as the eating situation.

**PHYSICAL LOCATION OF THE PROJECT**

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**PROJECT START**

2019

**EXTENT AND TYPE OF PROJECT**

45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**

Sensory and consumer analysis

**ADDITIONAL INFORMATION**

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Sweet product development – sensory perception and acceptance of beverages sweetened with alternative sweeteners

**SHORT PROJECT DESCRIPTION**

The sugar intake from especially beverages is too high among specific segments, e.g. adolescents. The beverage industry has mainly focused on reducing sugar content per se with limited success due to drastic alteration in the sensory profile that is disliked by many.

One of the goals of the project ‘Innosweet’ is to test the sensory perception and acceptance of beverages where sugar has been replaced by alternative sweeteners.

As a student in the Innosweet project, you will work on product development of beverages with alternative sweeteners that maintain an unaltered sweetness perception from a sensory and consumer science perspective.

The thesis will include sensory descriptive analysis and consumer studies, and you will be part of planning, executing, and analyzing data from the studies.

What is crossmodal perception?
It is how information from the different sensory modalities such as sight, sound, touch, smell, and taste may be integrated by the nervous system and perceived by us. Of importance in this thesis is how different sensory modalities interact with one another and alter each other’s processing.

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Sweet product development – taste-taste and crossmodal modulation of the sensory perception of beverages

**SHORT PROJECT DESCRIPTION**

The sugar intake from especially beverages is too high among specific segments, e.g. adolescents. The beverage industry has mainly focused on reducing sugar content per se with limited success due to drastic alteration in the sensory profile that is disliked by many.

The goal of the project ‘Innosweet’ is to apply an integrated scientific-based sensory perceptional-, psychological-, and physiological (PPP) approach to sugar-reduced or -replaced (SRR) beverages to enable lowering of the sugar content whilst maintaining unaltered sweetness perception.

As a student in the Innosweet project, you will work on product development of beverages with lower sugar content that maintain an unaltered sweetness perception from a sensory and consumer science perspective. This is going to be done and tested using taste-taste interaction and crossmodal interactions such as flavor taste and texture taste interactions. The thesis will include sensory descriptive analysis and consumer studies, and you will be part of planning, executing and analyzing data from the studies.

What is crossmodal perception?
It is how information from the different sensory modalities such as sight, sound, touch, smell, and taste may be integrated by the nervous system and perceived by us. Of importance in this thesis is how different sensory modalities interact with one another and alter each other’s processing.
How can food products be tested from a sensory science perspective?

**SHORT PROJECT DESCRIPTION**

When testing the sensory profiles of food products, several different sensory methods can be used. Which sensory method to choose from depends on the aim, situation, and context.

In this project, you will work with our newly recruited panel and introduce them to different fast sensory methods as well as the classical sensory descriptive method in order to study which method is the most appropriate in relation to the food product and aim.

The sensory descriptive panel is the most vital part of any sensory descriptive analysis. In order to ensure that the panel works optimally, several steps are involved, including recruiting the right people, training and encouraging them on a general level, specific training, and evaluation of samples.

In this project, you will be involved in engaging and recruiting our new sensory descriptive panel, which is going to function from our new facilities in Skejby. Since it will be a new panel, different sensory methods will be introduced when evaluating a specific category of food. The methods will be compared in order to identify the most appropriate sensory analysis for the chosen food category. You will get a good and fundamental understanding of using a trained panel for measuring the sensory quality as well as insights into different methodologies that can be used in sensory science.

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**PROJECT START**

Anytime

**EXTENT AND TYPE OF PROJECT**

45 or 60 ECTS - MSc project or smaller projects

**MAIN SUBJECT AREA**

Sensory descriptive analysis

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**Eating is pleasure. Development of a scale to measure food related pleasure**

**SHORT PROJECT DESCRIPTION**

For the vast majority of human history and prehistory, the primary objective of seeking food was survival through the maintenance of energy homeostasis and the avoidance of starvation. As such, the development of homeostatic hunger is based on the prolonged absence of energy intake. In modern times, among well-nourished populations, most food consumption occurs for reasons other than acute energy deprivation. There is now a strong belief that a major cause of an increase in food intake associated with obesity is related to the hedonic (pleasure related) rather than the homeostatic system.

Taken as a whole, the scientific literature suggests that the hedonic and rewarding effects of foods are multiple and highly involved in human eating behavior, but insights into the individual hedonic process are broadly lacking. A scale measuring (an)hedonia will facilitate researchers to accurately tap into the subjective nature of what individuals find pleasurable in food related contexts, identify subjects with impaired hedonic response(s) and the characteristics of these populations, and clarify the biology of the deficits.

We have a proto-type questionnaire (scale) ready. You will, in this MSc project, contribute to the further development and testing of a scale to measure food related pleasures, and depending on the number of ECTS, contribute in writing a scientific paper about the development of the scale.

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**ADDITIONAL INFORMATION**

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**PROJECT LOCATION**

AU-Aarslev, Kirstinebjergvej 10, 5792 Aarslev / alternatively, Hvidovre Hospital

**PROJECT START**

Anytime

**EXTENT AND TYPE OF PROJECT**

30, 45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**

Sensory and consumer analysis

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Optimizing the method for measuring the satiating capacity of foods

**SHORT PROJECT DESCRIPTION**

Designing food and beverages that make consumers feel full and for longer are one of the top priorities in Danish food industry R&D. Despite the high relevance of optimizing the method to measure the satiating capacity of foods, little work is done in this field.

In this MSc project, you will be connected to the ‘OmniSaM’ project (Omnibus Satiety Metric) which explores satiety from a behavioral, fMRI, and endocrine perspective.

You will work with the method to measure the satiating capacity of foods and its optimization. More specifically, you will test the effectiveness of the method when changing the context of study conductance; natural setting compared to laboratory setting compared to clinical setting.

Ingredients to create beverages with different satiating capacity will be delivered by Arla Foods Ingredients and Arla Foods amba.

How does a product make you feel? – Sensations experienced after eating

**SHORT PROJECT DESCRIPTION**

There is an increased focus on healthy products in the food industry and food cultural trends. Researchers and product developers are used to asking consumers why a product is liked, and how much it can contain regarding nutritional content etc. In recent years, this has been supplemented with questions regarding how a product makes you feel, with a shift from a biological perspective to a more holistic and wellbeing perspective. An area that needs to be addressed more extensively is the sensations experienced as a consequence of eating.

In this MSc project, you will study dynamics in mental (e.g. desires, motivations, and satisfaction) and physical (e.g. stomach rumbling, energy) sensations experienced after intake of meals and products, e.g. with different protein content or other model foods. These sensations are especially relevant for the overall appreciation of the food, for food choice, and for repeated purchase.
Food eating behavior. 
Homeostatic and hedonic drivers of food intake

SHORT PROJECT DESCRIPTION

Human food intake is regulated by two complementary drives: the body’s internal state (homeostasis) and the reward associated with food intake (hedonics). Though an active field of research, the basic interactions between homeostatic and reward systems remain scarcely understood, and at present it is unknown how homeostatic states modulate reward and food seeking behavior.

In this MSc project, you will explore how the reward value of food is modulated by homeostatic states and the relation to food-seeking behavior. We hypothesize that reward signals will positively correlate with homeostatic deficits, systematically shaping human foraging behavior.

We have the methodological setup ready and will begin the study in advance of your connection to the project. Depending on the number of ECTS, you will as a student be involved in executing the study and analyzing data (appetite, reward, and intake data, potentially combined with fMRI data).

SHORT PROJECT DESCRIPTION

When confronted with a packaged fresh/chilled fish or meat product in a retail context, consumers may additionally use the appearance characteristics to assess its freshness state. These appearance changes, however, become more critical in a home context where consumers have to decide whether a product stored in the fridge (packed or unpacked) can be consumed or should be considered waste. However, when do visible changes occur within a fish and meat product’s shelf-life, to which extent they reflect changes in quality, and how sensitive are we, as consumers, to detecting and using visual cues to evaluate the actual freshness and safety of a product?

This MSc project is connected to an existing research project ‘WasteSense’, aimed at getting a more precise assessment of the shelf-life of fish and meat products, with a greater goal to reduce fish and meat waste in the future.

Overall, the student will be challenged to develop a study to examine if the freshness differences, identified by the sensory evaluation with trained panelists, are reflected in the appearance of the product as assessed by consumers. Moreover, the project involves interaction with external academic environments in other scientific disciplines, namely microbiology and instrumental analysis, and is linked to some major Danish food industry and more innovative technology partners.
Play and Eat

30

SHORT PROJECT DESCRIPTION

Food and meals in schools and day cares are not only about securing availability of healthy foods but require that the context in which the food is eaten supports that children can eat and enjoy their food.

At this point, information about the meal setting in schools is limited. In this project, the focus is on how the setting can be optimized to facilitate and support healthy eating.

The student will explore factors of importance for facilitating healthy and joyful eating and investigate the effect of changing meal settings on intake, preferences, and the eating experience.

31

SHORT PROJECT DESCRIPTION

The sugar intake from especially beverages is too high among specific segments, e.g., adolescents. The beverage industry has mainly focused on reducing sugar content per se with limited success due to drastic alteration in the sensory profile that is disliked by many.

As a student, you will be linked to the ‘InnoSweet’ project (www.innosweet.com) working on the development and validation of environmental cues linked to food and eating, particularly background sound/music, that can help reduce people’s sugar intake. This thesis calls for a degree of creativity when it comes to designing new ways to measure empirical influences of background sound on food perception and eating behavior. The thesis will include sensory descriptive analysis and consumer studies, and you will be part of planning, executing, and analyzing data from the studies.

The thesis may include questions like:
- How is information from the different sensory modalities such as sight, sound, touch, smell, and taste integrated in the brain to form a coherent perception of flavor?
- How does environmental factors influence eating behavior?

Of importance to the thesis is how the understanding of multisensory flavor perception can support healthy eating behaviors.
What does this wine taste like?
Measuring the temporal evolution of complex flavors

**SHORT PROJECT DESCRIPTION**

The sensory identity of food and beverages has an important temporal component. In other words, flavors do not stay the same, but change over time in the mouth. This is especially relevant for complex products such as wine. Recently, new temporal sensory methods have been proposed to describe the evolution of in-mouth sensations over time (e.g. Temporal Dominance of Sensations (TDS) and Temporal Choose All That Apply (TCATA)).

The project focuses on linking temporal sensory data to reported wine liking as well as expert evaluations of wine complexity and quality. The thesis will include sensory descriptive analysis, temporal sensory methods, and consumer studies. You will be part of planning, executing, and analyzing data from the studies.

The thesis addresses fundamental questions in flavor perception and cognition such as:
- What makes a wine complex?
- How do people of different expertise levels evaluate wine complexity and quality?

From a practical standpoint, an understanding of wine complexity is of crucial importance to wine producers, marketers, and retailers.

**PHYSICAL LOCATION OF THE PROJECT**
AU-Aarslev, Kirstinebjergvej 10, 5792 Aarslev / Agro Food Park, 8200 Aarhus

**PROJECT START**
Anytime

**EXTENT AND TYPE OF PROJECT**
45 or 60 ECTS - MSc project

**MAIN SUBJECT AREA**
Sensory and consumer analysis

**ADDITIONAL INFORMATION**
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**Changing tastes: How does sound change taste perception in real time?**

**SHORT PROJECT DESCRIPTION**

Crossmodal perception deals with how information from different sensory modalities may be integrated as a whole in the brain. Several recent studies have demonstrated the impact of background music on the taste/flavor evaluation of food and beverages. Since both music and flavor are time-varying in nature, it makes sense to take temporality into account when studying the impact of sound on the eating/drinking experience.

The student will measure the influence of sound on flavor perception over time using especially designed soundtracks. The thesis will include sensory descriptive analysis, temporal sensory methods, and consumer studies. You will be part of planning, executing, and analyzing data from the studies.

The thesis may include questions like:
- How does the brain process temporal information from different sensory modalities?
- What is the role of attention in flavor perception?

Of importance to this thesis is how different sensory modalities interact with one another when it comes to flavor perception, and how this understanding can be utilized to support healthy eating behaviors.

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**ADDITIONAL INFORMATION**
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Hydrocolloids are important ingredients in the food industry where they are used in a broad variety of applications. One of the polysaccharides used in food products is pectin; a complex heterogeneous polysaccharide present in all fruits and vegetables. Industrially, pectin is of interest due to its protein stabilizing and gelling properties. These properties make pectin an interesting polymer in application areas such as food and pharma. Pectin originating from citrus fruit can be divided into different structural domains, of which homogalacturonan dominates functionality in food systems. This element consists of 1-4 linked galacturonic acid units which can be esterified to different extends and in different patterns.

In this project, it is proposed to use NMR spectroscopy to gain a better understanding of the impact of pectin structure on the final functionality in food systems. NMR spectroscopy is a technique that is based on the magnetic moments of certain nuclei in a strong magnetic field. In general, NMR spectroscopy enables structural characterization of hydrocolloids and how hydrocolloids influence the functional properties of food.