

2020

MASTER'S THESIS PROJECTS

FOOD RESEARCH

Master's Degree Program at
Department of Food Science,
Aarhus University

Department of Food Science, Aarhus University

Agro Food Park 48, 8200 Aarhus N and Kirstinebjergvej 10, 5792 Aarslev





“It is all about
food and
food quality”

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Alternative feed formulation to prevent boar taint

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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 androstenone, 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.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

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

MAIN SUPERVISOR

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Is breed of cattle important for In vitro meat production?



SHORT PROJECT DESCRIPTION

CleanMeat or In Vitro meat is a promising way to secure protein in the future in a sustainable way and deliver on the climate targets of Denmark. Growth of muscle tissue in vitro requires stem cells from living animals, which are isolated and in the right environment stimulated to proliferate and differentiate into primitive muscle fibers.

The proliferation and differentiation of the primary satellite cells are critical points in order to get a robust cell-culture, which can be used as meat in the end. There are several growth factors involved in these processes, e.g. myostatin, which is a growth differentiation factor member of the TGF- β family. A group of cattle carries a mutation in the myostatin gene, which leads to excessive muscle mass (double muscling (DM)). This is known from the breed "Belgian Blue" cattle.

In this project, we will test the hypothesis that cell cultures from Belgian Blue has greater potential to proliferate and differentiate. You will work on cell culturing, proliferation assays (e.g. WST1) as well as real time PCR for analysis of specific marker genes for proliferation and differentiation.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Flexible

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Muscle and meat science, molecular biology

ADDITIONAL INFORMATION

Co-supervisors:

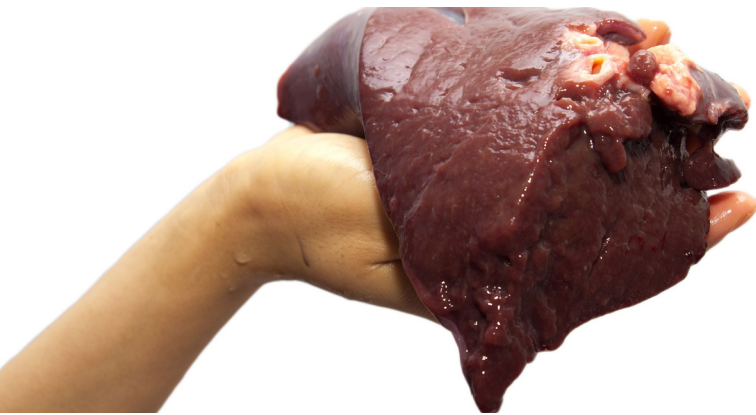
Jette F. Young and Margrethe Therkildsen, Department of Food Science.

The project will be closely connected to the research project [CleanMeat and CleanMilk - future sustainable food production](#)

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Can the liver taste bitter compounds? 3



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project, including practical laboratory work (11 months)

MAIN SUBJECT AREA

Molecular nutrition and cell biology

ADDITIONAL INFORMATION

Co-supervisor:
Associate Professor Jette Feveile Young,
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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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4 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. Optimally, 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.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Molecular nutrition

ADDITIONAL INFORMATION

Co-supervisor:
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The anticancer properties of milk fat globules phospholipids

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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Flexible

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Milk science, molecular and cell biology

ADDITIONAL INFORMATION

Co-supervisor:
Professor Milena Corredig, Department of Food Science.

SHORT PROJECT DESCRIPTION

Milk fat globules have, in cell models, been shown to possess anti-proliferating properties and by that might also anti-cancer effects. This is partly believed to be mediated by phospholipids or the structures that they form with the proteins present at the interface.

Within this framework, projects can be designed to investigate the mechanism behind this and allow for characterization of the responsible phospholipids and the effect of digestion on these phospholipids in the food matrix.

The work includes: work with cell-cultures, real time PCR, cell-proliferation assays, digestion assays (e.g. INFOGEST), and related techniques.

You will to a large extent have the opportunity to be part of designing the master's project, as no pre-set project is given.

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SHORT PROJECT DESCRIPTION

At butter dairies, it is more and more common to distribute yearly production by freezing butter in bulk packs, and later rework the bulks to retail packs during high demand seasons. In particular, direct reworking of frozen bulks is of high demand.

It is commonly known in the industry that butter with added culture is more difficult to rework than without added culture, as the texture of the frozen butter becomes vastly different. This results in increased energy consumption, decreased production capacity and decreased machinery lifetime. The exact reason and extend of the difference is unknown, but it appears to be related to the water phase.

This project seeks to get insight into how the butter water phase composition contributes to the texture of frozen butter, and to study whether the differences are due to chemical/physical properties, microstructure and component interactions. The analytical work will primarily focus on texture, rheology and chemical analysis, microscopy techniques and NMR.

It will be possible to steer the project in different directions, based on either results or new ideas. Both commercial and lab scale butter samples can be included in the study, depending on the agreed experimental setup.

Butter reworking – influence of microstructure on frozen butter texture



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Dairy processing and chemistry

ADDITIONAL INFORMATION

Co-supervisor:
Process Engineer Ida Sørensen, SPX Flow

SPXFLOW

MAIN SUPERVISOR

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Plant coagulants

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PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
August 2020

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

MAIN SUBJECT AREA
Processing and protein chemistry

ADDITIONAL INFORMATION
Co-supervisor:
Associate Professor Nina Aagaard Poulsen, Department of Food Science.

Some visits and collaboration with Naturmælk, Tinglev.

Useful reading: Liburdi et al. (2018). Food Chemistry 239 157–164.

MAIN SUPERVISOR

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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.

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Characterizations of variations in Danish dairy milk



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
August 2020

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

MAIN SUBJECT AREA
Processing and protein chemistry

ADDITIONAL INFORMATION
Co-supervisor:
Professor Lotte Bach Larsen, Department of Food Science.

Useful reading: Poulsen et al. (2015), Seasonal variation in content of riboflavin and major minerals in bulk milk from three Danish dairies, International Dairy Journal 42:6-11

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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.

Milk foam - Barista



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
2020

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

MAIN SUBJECT AREA
Dairy chemistry

ADDITIONAL INFORMATION

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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 crystallisation, and free fatty acid.

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

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SHORT PROJECT DESCRIPTION

The master project will investigate how different sustainable alternatives to peat based growing media can affect strawberry fruit quality and its shelf life. The student will be responsible for conducting post-harvest experiments. Fruits will be evaluated by their visual appearance (size/colour/glossiness), physical quality (firmness, water content), chemical quality (sugar/acid content, volatile aroma compounds or other relevant constituents), physiological quality (respiration rate) and shelf life performance (water loss/physical and chemical quality/decay/sensory quality).

The master student will be associated with the BioSubstrate project from GUDP. The project aims to evaluate different growing media to replace peat (sphagnum). Selected substrates originating from biomasses (miscanthus, willow, meadow grass, straw, fodder grasses, wood chips) or residual products from bio-based productions (fiber fractions from biogasification and protein juice production) will be tested in the strawberry production together with Hunsballe nursery.

The master student will be part of an international working group of scientists, technical staff and PhDs. The experimental work is linked to an ongoing research project using state of art equipment and new facilities at Agro Food Park. This increases the possibilities of making a scientific paper in connection with the MSc-thesis.

Bio-berry



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
Anytime

EXTENT AND TYPE OF PROJECT
45 or 60 ECTS: Experimental thesis in which the student is responsible for collection and analysis of his/her own original data

MAIN SUBJECT AREA
Post-harvest, shelf life, fruit quality, growing media

ADDITIONAL INFORMATION
Co-supervisors:
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Extraction of seaweed protein

– effect of biorefinery process

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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

August 2020

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc project
(shorter project can be conducted within the area but with fewer tasks)

MAIN SUBJECT AREA

Biorefinery and protein chemistry

ADDITIONAL INFORMATION

Co-supervisor:
PhD Student Louise Juul Pedersen, Department of Food Science
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SHORT PROJECT DESCRIPTION

There is a strong and growing need for proteins for feed and food, which we can culture with low impact on climate - and seaweed may be a future alternative source of protein to fulfill this need. Recently, there has been an increased focus on seaweed, e.g. due to its high content of bioactive components and its climate friendly farming. In April 2020, we start a new project focusing on biorefinery of seaweed and the characterization of protein from different seaweed species farmed in Denmark after a traditional extraction procedure with isoelectric focusing and fermentation.

The aim of the project is to characterize the protein from different species of seaweed according to the way they are processed (isoelectric precipitation or fermenting) with respect to digestibility and solubility. The protein digest can also be characterized according to size and bioactivity.

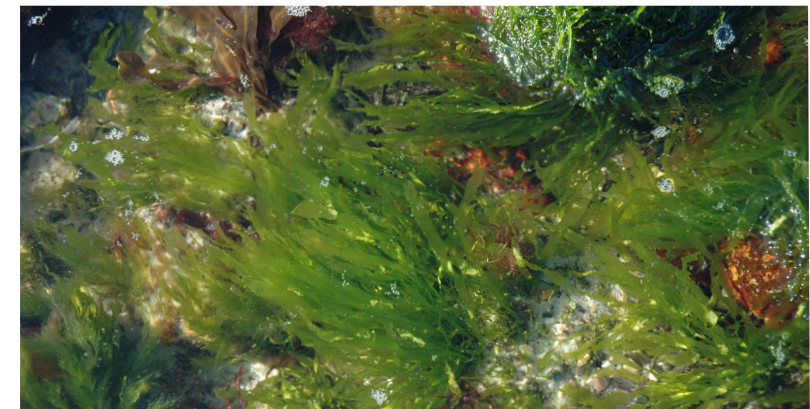
You will learn how to extract proteins and to characterize the extracted protein by separation techniques e.g. SDS-PAGE, reverse phase separation, and mass spectrometry.

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Vitamins and bioactivity in seaweed products



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

August 2020

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc project
(shorter project can be conducted within the area but with fewer tasks)

MAIN SUBJECT AREA

Vitamins and bioactive compounds

ADDITIONAL INFORMATION

Co-supervisor:
Marianne Danielsen, Department of Food Science
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SHORT PROJECT DESCRIPTION

There is a strong and growing need for proteins for feed and food, which we can culture with low impact on climate - and seaweed may be a future alternative source of protein to fulfill this need. Recently, there has been an increased focus on seaweed, e.g. due to its high content of bioactive components and its climate friendly farming. In April 2020, we start a new project focusing on biorefinery of seaweed and the characterization of protein from different seaweed species farmed in Denmark after a traditional extraction procedure with isoelectric focusing and fermentation. One of the drivers for buying seaweed protein products may also be its high content of vitamins, e.g. vitamin B, D, C, and E.

The aim of the project is to characterize the vitamin content in different seaweed species and investigate the effect of type of biorefinery process.

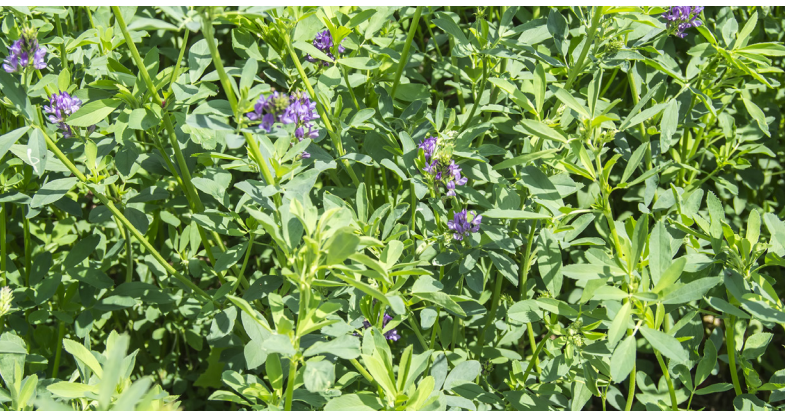
You will learn how to extract proteins and to characterize the extracted protein with respect to vitamins and bioactive compounds.

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High quality protein from lucerne (alfalfa) - biorefinary project

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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

August 2020

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc project

MAIN SUBJECT AREA

Biorefinary of protein from alternative sources

ADDITIONAL INFORMATION

The project will be aligned with an on-going project

SHORT PROJECT DESCRIPTION

The project will focus on extraction of protein from lucerne. Different gentle high-end biorefinary processes will be tested for the production of high quality protein isolate for nutritional purposes. The protein product will be studied with respect to protein yield and quality. Protein digestibility and solubility will be tested and, subsequently, the protein digest will be characterized according to size and bioactivity.

You will be aligned with an on-going PhD project and will learn chromatography, different filtration and drying technologies as well as the INFOGEST technique for in vitro protein digestibility and HPLC or LC-MS.

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Enzymatic activity and its relation to stability of anthocyanins in black carrots



SHORT PROJECT DESCRIPTION

Anthocyanins (ACN) are colored glycosides appearing in color shades between orange, red and blue, depending on raw material, extraction and pH. Black carrots (BC) contain three main types of ACNs with cyanidin 3-xylosyl, pelargonidin 3-xylosyl and peonidin 3-xylosyl as main units, and galactose and glucoside forming tri-glycosides, normally dominated by 1-3 major compounds. ACN can be acylated with organic acids, and aromatic acyl groups normally result in higher stability than aliphatic groups. Over 80% of BC ACNs are acylated with either hydroxycinnamic acid, hydroxybenzoic acid, sinapic acid, ferulic acid or coumaric acid. Generally, a high number of acylations increases the stability towards heat or light. However, stability and degradation kinetics is pH dependent. Detailed knowledge on how specific positions of acylation, number, size and type of acylation and degree of co-pigmentation and metal complexation affects the overall color shade and stability is developing. Different positions, number and size of glycosylation structures of cyanidin affect the color shade significantly. Cy-3 glucosides for example showed maroon-purple shades, 5' glucosides were green while 3,5-glucosides were blue. The stereo chemistry of acylating groups also affects shade and stability of ACN. Acyl transferases from carrots needs to be studied as they most likely will affect ACN acylation and hence the stability of anthocyanin from black carrots. Acyl-transferases present in carrot cell suspension protein extracts has been reported to have a higher affinity for 1-O-feruloylglucose than for 1-Osinapoylglucose as acyl donor.

The aim set up an assay to analyze acyl-transferase activity in black carrots to identify black carrots with high levels of enzymatic activity and correlate it with the degree of acylation of anthocyanins.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

August 2020

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc project
(shorter project can be conducted within the area but with fewer tasks)

MAIN SUBJECT AREA

Enzymatic catalysis in black carrot and stability of anthocyanins

ADDITIONAL INFORMATION

Co-supervisor:
Martin Jensen, Department of Food Science
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Effect of HFD on hepatic metabolite profile

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SHORT PROJECT DESCRIPTION

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.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Molecular nutrition

ADDITIONAL INFORMATION

Co-supervisor:

Professor Hanne Christine Bertram,
Department of Food Science

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SHORT PROJECT DESCRIPTION

Women in rural Africa traditionally extract oil from seeds of numerous native trees, but the potentials are far from fully realized. Only shea butter have received industrial- and research interest, although many other oils have potentials for food and cosmetic industries. Detailed information about the composition and properties of oils could enhance their application and may potential in the long run create income generation in rural Africa. As oil production is a female activity in Africa, improvement will have particular importance for women and their capacity to keep their children healthy and earn an income. Native trees are also of great importance for the biodiversity and conservation of natural habitats. Thus, a rational of sustainable exploitation of seeds for oil production by traditional or improved processes could be a credible alternative to systematic felling of trees.

The aim of this project will be a characterization of selected traditional African oil, thereby forming a basis for identifying potential uses in the food and cosmetic industry. This can involve studies on composition, crystallization behavior, oxidation stability and functionality depending on interests. The oils are obtained from local women groups in West Africa.

New African oils for food and cosmetics



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

30, 45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Lipid chemistry, structure and functionality

ADDITIONAL INFORMATION

Co-supervisor:

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Connected to activity in the synergy project "From research to marketing of new African oils for food and cosmetics" involving Bioscience at AU and the company B4tress.

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Determining glycoalkaloids in potato protein isolates using mass spectrometry

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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Mass spectrometry and new protein sources

ADDITIONAL INFORMATION

Co-supervisor:
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SHORT PROJECT DESCRIPTION

New resources of proteins deriving from plants or vegetables are of current major interest for use in protein-rich food products. Using the side-product from potato starch production is a sustainable use of a side-stream from another food production and is of interest to the potato starch industry as an additional value creation. When purifying the protein from potato fruit juice, the concentration of natural potato defense substances called glycoalkaloids increases, as these glycoalkaloids to a large extent purifies together with the proteins and thereby being up-concentrated. However, before potato protein can be used as ingredient in food industry, it is needed that the levels of these toxic and bitter-tasting glycoalkaloids are within food limits (below 150 µg/g). Furthermore, the glycoalkaloid content is dependent on potato strain and how it is stored before being processed.

In this project, we will be quantify potato glycoalkaloids (α -solanine, α -chaconine and their degradation products) using mass spectrometry based on liquid chromatography-electrospray ionization mass spectrometry (LC-ESI/MS) in single ion monitoring (SIM) mode. This analysis will be applied to determine the concentration of these compounds in potato protein isolates, as well as investigate the impact of harvest time and storage on the development of these compounds by analysis of different sorts of potato stored at different storage conditions.

MAIN SUPERVISOR

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The barley grain proteome



SHORT PROJECT DESCRIPTION

Barley is one of the earliest domesticated cereals and one of the most produced cereals in the world. Most of the produced barley are used in the brewing industry, but it is also used for animal feed and in human nutrition. Barley seed germination is therefore the foundation of the malting and brewing industry. The profile and concentration of barley proteins influence the quality and suitability of the grain for its end uses, and approximately a third of the proteins are present in the final beer. Despite this, the protein profiling of barley grain has not been fully explored.

In this project, we will work on developing a method based on liquid chromatography-electrospray ionization mass spectrometry for protein profiling of barley grains coupled with functional analysis using bioinformatics. The method will be applied to investigate different varieties of barley and potentially investigate the proteome at single grain level. In this project, you might also use two-dimensional gel-electrophoreses and shotgun proteomics as well as other protein chemistry analysis.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Mass spectrometry and protein chemistry

ADDITIONAL INFORMATION

Co-supervisor:
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MAIN SUPERVISOR

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High fat diet induced regulation of hepatic detoxification

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PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

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

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.

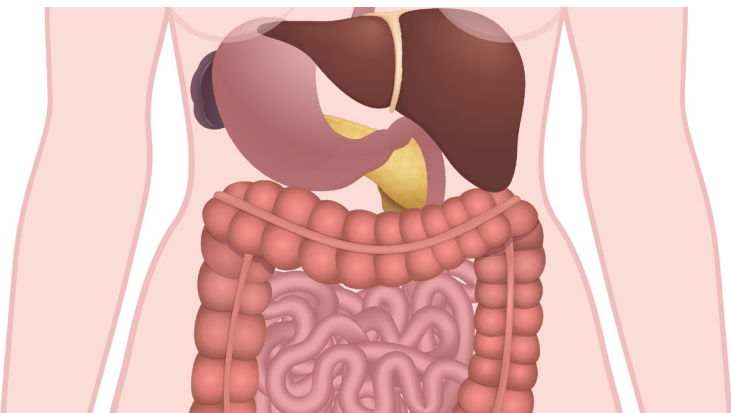
The project includes cell culturing and analysis of gene and protein expression as well as HPLC for measuring cytochrome activity.

MAIN SUPERVISOR

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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.

PHYSICAL LOCATION OF THE PROJECT
DuPont Nutrition BioSciences ApS, Brand Campus

PROJECT START
2020

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

MAIN SUPERVISOR

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New protein solutions as functional ingredients

21

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Designing future protein dense foods



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.

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.



PHYSICAL LOCATION OF THE PROJECT

Arla Foods Ingredients, Aarhus

PROJECT START

2020

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

MAIN SUPERVISOR

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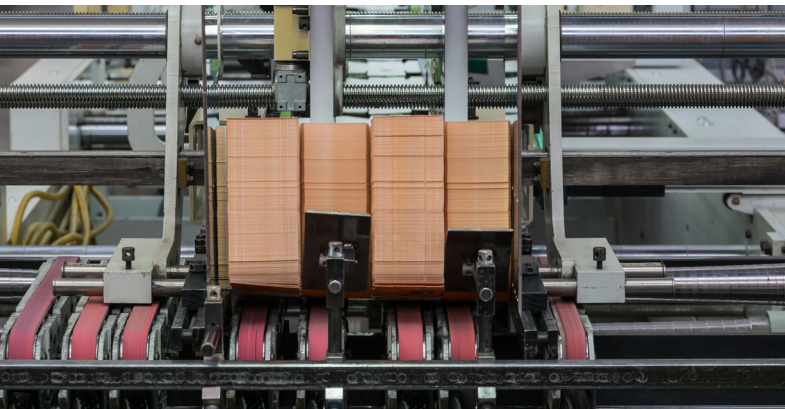
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Sustainable food packaging

– biomaterials interactions and food quality

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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Food chemistry, physics, and material science

ADDITIONAL INFORMATION

SHORT PROJECT DESCRIPTION

This project will evaluate the use of novel materials and thermoforming technologies in challenging food model systems, and the consequences of moving away from conventional packaging. The project will have a whole systems approach, from materials, to recyclability, to food quality and consumer experience.

The project will require a literature review, pilot scale testing, advanced chemistry (chromatography and electrophoresis) rheology and microstructure techniques. The work will be located at AU FOOD, but some visits to companies will be necessary.

MAIN SUPERVISOR

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Cellulose based food packaging

– biomaterials properties and food quality



PHYSICAL LOCATION OF THE PROJECT

Plastics and Packaging Technology Center, DTI, Taastrup

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Food chemistry, physics, and material science

ADDITIONAL INFORMATION

Co-supervisor:
Alexander Bardenstein, Plastics and Packaging Technology Center, DTI, Taastrup.

SHORT PROJECT DESCRIPTION

Multibarrier plastic packaging is a challenge for recyclability. Bio-based plastics also has major challenges, as it requires industrial biodegradation. Littered plastic turns into microplastic, and this is an environmental and health issue. We propose in this project to test novel sustainable packaging solutions based on nanocellulose, modified starch with various advanced coatings on the quality of the food, the material transfer and the properties of the package in specific model systems.

The project will require a literature review, pilot scale testing, advanced analytical techniques. The work will be located in Taastrup at DTI.

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Effect of milk quality on processing technologies

25



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Food chemistry and physics

ADDITIONAL INFORMATION

Co-supervisors:

- Professor Lotte Bach Larsen, Department of Food Science
- Ole Lillevang, GEA Processing Technology

SHORT PROJECT DESCRIPTION

This project will evaluate the mechanisms behind milk quality and fouling of milk during membrane filtration. Time of storage, potential plasmin hydrolysis, or minor components in milk will be used to evaluate fouling behavior. If possible, we will use industrial samples to create relevant conditions.

The project will require a literature review, advanced chemistry (OMICS, HPLC, 2D electrophoresis, LC-MS), rheology and microstructure techniques. The work will be located at AU FOOD in collaboration with GEA filtration (Skanderborg).

MAIN SUPERVISOR

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NMR studies of hydrocolloids



SHORT PROJECT DESCRIPTION

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 extents 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.

PHYSICAL LOCATION OF THE PROJECT

DuPont Nutrition & Health, Brabrand

PROJECT START

August 2020

EXTENT AND TYPE OF PROJECT

MSc project

MAIN SUBJECT AREA

Hydrocolloids in food and NMR spectroscopy

ADDITIONAL INFORMATION

Co-supervisor:

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

27



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory analysis in product development of foods

ADDITIONAL INFORMATION

Co-supervisor:
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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.

MAIN SUPERVISOR

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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 perceptual-, 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.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory analysis in product development of foods

ADDITIONAL INFORMATION

Co-supervisor:
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Are crossmodal interaction effects
stable over time?

29



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
Anytime

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

MAIN SUBJECT AREA
Sensory and consumer analysis

ADDITIONAL INFORMATION
Co-supervisor:
Assistant Professor Qian Janice Wang,
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SHORT PROJECT DESCRIPTION

Excessive sugar intake has contributed to the prevalence of obesity and associated life style diseases. As eating and drinking are multisensory experiences, cross-modal interactions have been suggested as an alternative strategy in the reformulation of products with the aim of reducing the sugar content. However, even though cross-modal interactions have been found to modulate the perception of sweetness, there has been no studies investigating whether these effects are stable over time. The student will be linked to the InnoSweet project (www.innosweet.com) working on the development and validation of sugar reduced/placed beverages. The project focuses on measuring basic taste perception (especially sweetness perception) over time in an exposure study. The student will be part of planning, executing, and analyzing data from the studies.

The thesis addresses fundamental questions in human responses over time, in order to better understand food evaluation and preference. A central focus in this thesis is how different food-intrinsic and extrinsic factors influence sweetness perception, and how this understanding can be utilized to support healthy eating behaviors.

MAIN SUPERVISOR

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Eating is pleasure.
Food related pleasure
among different consumer groups

30



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 believe 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 insight into the individual hedonic process is broadly lacking. By using a scale measuring pleasurable aspects of consumption, we can 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 scale ready, and in this MSc project you will apply the scale to measure food related pleasures among different populations and depending on the number of ECTS, contribute in writing a scientific paper about the findings.

PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N
Alternatively Copenhagen.

PROJECT START
Anytime

EXTENT AND TYPE OF PROJECT
30, 45 or 60 ECTS - MSc project

MAIN SUBJECT AREA
Sensory and consumer analysis

ADDITIONAL INFORMATION
Co-supervisor:
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MAIN SUPERVISOR

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Optimizing the method for measuring the satiating capacity of foods

31



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N
Alternatively Copenhagen.

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

30, 45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory and consumer analysis

ADDITIONAL INFORMATION

Co-supervisor:
Assistant Professor Barbara Vad Andersen, Department of Food Science
E-mail: barbarav.andersen@food.au.dk

SHORT PROJECT DESCRIPTION

Designing food and beverages that make consumers feel full faster and for longer are one of the top priorities in Danish food industry R&D.

In this MSc project, you will be connected to a research project that aims to develop highly accepted carbohydrate-reduced high-protein diets for type 2 diabetics. You will work with measuring the satiating capacity of foods and its optimization. More specifically, you will test the satiating capacity of different carbohydrate-reduced high-protein diets and desires and well-being as a consequence of intake and consumer acceptability among different populations.

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32 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, and 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.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N
Alternatively Copenhagen.

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

30, 45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory and consumer analysis

ADDITIONAL INFORMATION

Co-supervisor:
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Food Eating Behavior.

Homeostatic and hedonic drivers of food intake

33



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 master student be involved in executing the study and analyzing data (appetite, reward and intake data potentially combined with fMRI data).

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N
Alternatively Copenhagen.

PROJECT START

Anytime (preferably summer 2020)

EXTENT AND TYPE OF PROJECT

30, 45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory and consumer analysis

ADDITIONAL INFORMATION

Co-supervisor:
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WasteSense.

Reducing the environmental footprint of fresh fish and meat throughout the food value chain



SHORT PROJECT DESCRIPTION

Green sustainability awareness has led to a growing concern related to the consumption of meat and fish products, since amongst all food categories these are by far the most resource demanding, having therefore the largest impact on climate change. In detail, each ton of meat produced corresponds to an emission of 14 tons of CO₂ equivalents. This number is 7 times higher, when compared to the average of 2 tons of CO₂ emissions for other foods. The question is, could we optimize meat and fish production and consumption so that CO₂ emission is reduced? The answer is yes, if we reduce the corresponding waste throughout the food value chain.

This MSc thesis is connected to an existing research project entitled '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. Within the frames of this MSc project, the student will have the opportunity to be involved in an associated larger project effort, as well as be central to the team conducting the sensory evaluation of freshness using meat and fish products that are undergoing storage.

Overall, the student will be challenged to develop a sensory study to examine freshness and overall quality changes of fresh fish and/or meat throughout storage. The project involves interaction with external academic environments of other scientific disciplines, namely microbiology and instrumental analysis and is linked to some major Danish food industry partners and innovative technology start-up companies.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

May 1, 2020 and onwards

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory quality evaluation and sustainable food

ADDITIONAL INFORMATION

Co-supervisor:
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V-Place:

Consumer perceptions, attitudes and behaviors towards vegan products

35



SHORT PROJECT DESCRIPTION

The demand for vegan and vegetarian food products including alternatives to meat, milk, or eggs, has expanded considerably during recent years in Europe, reflecting the growing consumer awareness towards sustainability in food consumption and ethical concerns towards animal handling for food production. However, for many consumers that want to replace products of animal origin partly or completely, the search for the right information including the avoidance of nutritional deficits is a challenge.

The MSc thesis is connected to an existing research project entitled 'V-place'. V-place aims at exploring consumer perceptions, attitudes, and behaviors towards vegan/ vegetarian products at a cross-cultural level, with a greater aim to reflect the needs and wants of the contemporary EU consumer vs. the existing market choices for vegan and vegetarian food. Within the frames of this MSc project, the student will have the opportunity to be involved in an associated larger cross-cultural consumer research, as well as be central to the team designing the consumer questionnaires.

Overall, the student will be challenged to design questionnaires that will explore consumer perceptions, attitudes and behaviors, examining the needs and wants versus the actual consumption of meat and dairy free products, to demonstrate appropriate food product alternatives. The project involves interaction with external academic environments across Europe and is linked to a [European Union research project funded from EIT food](#)

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Masking flavors of whey proteins



SHORT PROJECT DESCRIPTION

Whey, a side-stream of cheese production, is an excellent source of high quality proteins. Due to the sustainable nature and health-related benefits, whey proteins are considered as one of the most prominent alternative proteins sources and therefore are used as a common ingredient in different drink and food products. However, many of these whey proteins come with a more or less bitter taste or are perceived as having other unpleasant off-flavors that are disliked by the consumers.

This MSc project will concentrate on examining different sensory strategies to mask the off-flavors associated to whey proteins that can be used in product development later on to create products with high consumer liking. Within this context, the student will be challenged to develop flavorful high protein drinks with whey proteins and test the acceptability of those through consumer studies.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

September 1, 2020 and onwards

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Cross cultural consumer science and vegan food

ADDITIONAL INFORMATION

Co-supervisor:
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PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N

PROJECT START

September 1, 2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project

MAIN SUBJECT AREA

Sensory evaluation and product development

ADDITIONAL INFORMATION

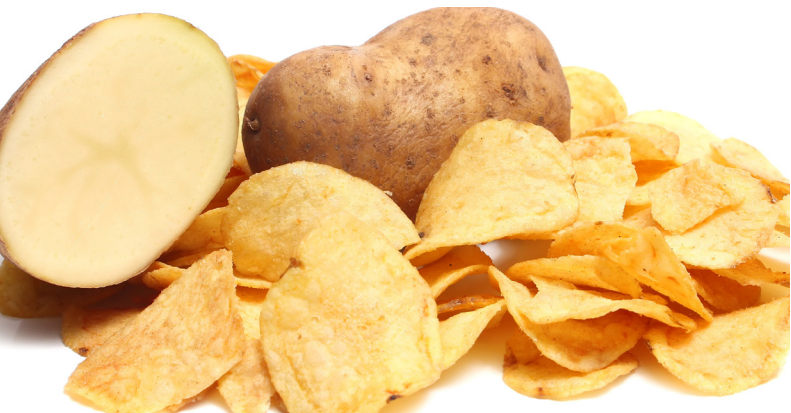
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It's all about the Crunch

37



SHORT PROJECT DESCRIPTION

For snacks such as potato chips, the “crunch” and the texture of the product is of utmost importance to people’s perception and not least preference for the product.

Depending on the products, there are different types of “crunch” and textures, but how are these actually related to the final product acceptance and is there a common “signature success crunch” which would be fitting for all snacks and chips? Moreover, is it possible to evaluate this “signature success crunch” by other measures rather than sensory evaluation, such as the measurement of the sound of the crunch?

In order to answer these questions, you will be working with sensory descriptive analysis and instrumental measurements such as sound measurements to evaluate and describe sensory attributes. Additionally, you will perform consumer studies on the products in order to collect acceptance data which you will be able to correlate with the sensory descriptive and the instrumental data.

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N / KiMs, Orkla Confectionery & Snacks Danmark A/S, Sømarksvej 31-35, 5471 Søndersø, Denmark

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project (or smaller projects)

MAIN SUBJECT AREA

Sensory and Consumer Science

ADDITIONAL INFORMATION

Co-supervisors:
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- Co-supervisors from KiMs

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How does level of training affect Projective Mapping and TDS results?



SHORT PROJECT DESCRIPTION

Sensory panels in industry require a high level of training and maintenance. They are often the bottleneck in New Product Development (NPD) as they are also responsible for test of sensory quality and shelf-life stability. It is therefore relevant to explore if less trained sensory panels can be used in NPD without compromising the quality of results. This project will focus on the two methods Projective Mapping and Temporal Dominance of Sensations (TDS) and will include the following tasks:

- Recruit naïve/untrained Carlsberg employees for NPD panel
- Conduct first Projective Mapping and TDS with naïve/untrained NPD panel and with existing trained sensory panel
- Divide NPD panelists in two and apply two different training strategies
- Conduct second-fourth Projective Mapping and TDS with NPD panel
- Run univariate and multivariate data analysis to explore difference in results e.g.
 - o Trained vs untrained panel
 - o Untrained panel development in sensory results depending on training strategy
 - o Cost-benefit analysis related to using untrained panel
 - o Risk assessment of using untrained panel

PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N / Carlsberg Breweries A/S, Ny Carlsberg Vej 100, KBH V, Denmark

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc project (or smaller projects)

MAIN SUBJECT AREA

Sensory Science

ADDITIONAL INFORMATION

Co-supervisor:
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What does this wine taste like?
Measuring the temporal evolution
of complex flavors

39



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
Anytime

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

MAIN SUBJECT AREA
Sensory and consumer analysis

ADDITIONAL INFORMATION
Co-supervisor:
Assistant Professor Line Ahm Mielby,
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SHORT PROJECT DESCRIPTION

The sensory identity of food and beverages has an important temporal component. In other words, flavours don't 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), Temporal Choose All That Apply (TCATA)).

The project focuses on linking temporal sensory data with instrumental measurements as well as expert evaluations of wine complexity and quality. The thesis will include sensory descriptive analysis, chemometrics, temporal sensory methods, and consumer studies. The student will be part of planning, executing, and analysing data from the studies.

The thesis addresses fundamental questions in flavour 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.

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SHORT PROJECT DESCRIPTION

Citizen science is increasingly used by scientists to solve hard problems, from discovering new planets to simulating quantum physics. It is time, therefore, to involve the public in solving food related societal challenges. This thesis project aims to drive cutting-edge scientific research on food quality and eating behavior by creating a platform for massive public involvement and knowledge exchange, using museums as a high-impact two-way communication medium.

The student will develop an idea for an interactive museum installation that highlights the importance of all the human senses when it comes to flavor perception, eating behavior, or food acceptance. Moreover, the installation will collect data from the public and contribute the ongoing body of research at AU FOOD. The student will be part of planning, executing, and analyzing data from a test run of the installation prototype.

This ambitious project calls for out-of-the-box thinking and develops competencies in emerging technologies, knowledge dissemination, and entrepreneurship.

Curating future food:
Designing museum installations
for citizen science



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

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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How do environmental temperature and humidity influence taste sensitivity?

41



PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

PROJECT START
Anytime

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

MAIN SUBJECT AREA
Sensory and consumer analysis

ADDITIONAL INFORMATION
Co-supervisor:
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SHORT PROJECT DESCRIPTION

Human taste perception is not a stable measure. Fluctuations in taste sensitivity in the same person can be caused by internal factors such as mood and energy level. Moreover, perceived taste intensity can be influenced by food-extrinsic factors such as lighting color and brightness, background music/noise, and ambient aroma. With the climate chambers at AU Department of Public Health, it is now also possible to control environmental temperature and humidity.

The student will be linked to the InnoSweet project (www.innosweet.com) working on the development and validation of sugar reduced/placed beverages. The project focuses on measuring basic taste perception (especially sweetness perception) under different environmental conditions. The student will be part of planning, executing, and analyzing data from the studies.

The thesis addresses fundamental questions in human physiological responses to different environmental conditions, in order to better understand food evaluation and preference. A central focus in this thesis is how different food-extrinsic factors influence sweetness perception, and how this understanding can be utilized to support healthy eating behaviors.

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Digital food: Understanding consumers' emotional responses to food via biometric feedback



SHORT PROJECT DESCRIPTION

Consumer testing is challenging, especially as standard questionnaires are based on consumer self-report, which may take a long time and be subject to consumer bias and demand effects. As consumer acceptance is especially critical in the context of new healthy sustainable products, this project proposes the inclusion of more nuanced and implicit measurements that include behavioral measurements as well as consumer physiological responses. Biometric feedback, which is just beginning to be utilized in sensory science, can measure such implicit responses by tapping into physiological responses, which reflect people's emotional states.

The student will be linked to the InnoSweet project (www.innosweet.com) working on the development and validation of sugar reduced/placed beverages. The project focuses on measuring consumer responses to these beverages via physiological measurements (e.g. facial expression analysis, skin conductance, heart rate). The student will be part of planning, executing, and analyzing data from the studies.

The thesis addresses fundamental questions in food preference and cognition. From a practical viewpoint, the student will develop a protocol for effectively measuring emotional responses to food. A central focus in this thesis is how different sensory modalities interact with one another when it comes to sweetness perception, and how this understanding can be utilized to support healthy eating behaviors.

PHYSICAL LOCATION OF THE PROJECT
Agro Food Park 48, 8200 Aarhus N

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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Aronia in the type 2 diabetes treatment regimen

43



PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Internal Medicine
Palle Juul-jensens Boulevard 165,
Indgang J, 8200 Aarhus N

PROJECT START

Flexible

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc project

MAIN SUBJECT AREA

Clinical intervention study within diabetes and nutrition

ADDITIONAL INFORMATION

Co-supervisor:
PhD Student Christine Bodelund Christiansen, Department of Clinical medicine, AU
E-mail: c.christiansen@clin.au.dk

SHORT PROJECT DESCRIPTION

This master thesis will be a part of a large human intervention trial that aims to investigate the effect of aronia in type 2 diabetes (T2D) patients.

Aronia has the highest antioxidant capacity among berries and a high content of bioactive polyphenolic compounds. In vitro and in vivo studies have indicated aronia's beneficial effects on oxidative stress-driven diseases such as cardiovascular diseases and T2D. Aronia also has a favorable effect on cholesterol in humans. We developed a novel fermented aronia extract (FAE) in order to enhance the antioxidant capacity of aronia and to compare its effect to that of non-fermented aronia extract (NFAE) on T2D. Method: A double-blind triple cross-over study including 30 TD2. The study will include three intervention periods of eight weeks duration. In the intervention periods, the T2D patients receive placebo, FAE, or NFAE.

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The Innosweet Project: Investigating the physiological effect of sugar reduced or replaced beverages using in obesity and type two diabetes



SHORT PROJECT DESCRIPTION

Sugar intake, especially from beverages, is very high amongst specific consumer segments, e.g., adolescents and adults, who will be the group investigated. Due to increasing obesity and diabetes, there has been a growing focus on reducing the sugar content per se, however often with limited success due to dramatic alteration of the taste of sugar reduced beverage.

The aim of the project is to test the physiological changes in varieties of beverages, which have been sugar reduced or substituted with other sweetener types in overweight and type diabetic subjects. Besides the normal physiological blood parameters, the project will also look into the release of various hormones that contribute to addiction-like effects to sugar. The thesis will include participating in highly competent research environment, interacting with many other students, creating a good social atmosphere. The student will participate in clinical trials, as wells as in the formulation of beverages to be tested. The project will include many molecular-biological analyses of blood samples.

PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Hormone Diseases, Skejby Hospital

PROJECT START

June 2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - Human Intervention Study

MAIN SUBJECT AREA

Human Intervention Study to test various sweetener compounds in different beverages

ADDITIONAL INFORMATION

Co-supervisor: Assistant prof. Ph.D. Max Lambert, Department of Health Science, AU
E-mail: mntl@clin.au.dk
Other partners connected to the project: AU food, Oxford University, DuPont, Carlsberg, Rynkeby

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Website: www.innosweet.com

The anti-inflammatory effect of plant-based nutrition drinks on chronic inflammation

45



SHORT PROJECT DESCRIPTION

Western diet and fast food have proven to be associated with inflammatory bowel diseases (IBD), and more and more people in developed countries are affected by Crohns Disease (CD) and Ulcerative Colitis (UC). The project contains a human intervention study to examine the effects of a plant-based nutrient drink, with high content of natural bioactive anti-inflammatory compounds on patients with CD and UC. The selected fruit and vegetables are presumed to decrease the risk of IBD, and the vitamins, minerals, fibers, and phytochemicals they contain, may have health beneficial effects on inflammation, oxidation, and improve the gastrointestinal microbiological composition in IBD patients.

The thesis will include participating in highly competent research environment, interacting with many other students, creating a good social atmosphere. The student will participant in the clinical trial. The project will include many molecular-biological analyses of blood samples

PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Hormone Diseases, Skejby Hospital

PROJECT START

March 2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - Human Intervention Study

MAIN SUBJECT AREA

A clinical trial to test the efficacy intake of novel juice containing anti-inflammatory compounds from plants on inflammatory bowel disease

ADDITIONAL INFORMATION

Co-supervisors: Assistant Prof. Ph.D. Max Lambert and M.Sc. Molecular Biology, Research Assistant Nikolaj Poulsen, Department of Health Scienc, AU, e-mail: mntl@clin.au.dk

Other partners connected to the project: Functional Juice ApS, High on Life ApS Mads Bo

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Novel organic Kale products for prevention of Obesity/Type 2 Diabetes



SHORT PROJECT DESCRIPTION

The project aims to provide much needed evidence demonstrating the beneficial effects of green kale for the prevention of obesity and type 2 diabetes. The health beneficial effects of the novel Green Kale product are due to its high content of unsaturated fatty acids, extremely high fiber content (41g/100g), as well as high protein content (25g/100g). It contains at least 9 essential amino acids, particularly valine, isoleucine and leucine, which are very important for insulin sensitivity. Moreover, the kale product is rich in bioactive phytochemicals (e.g. glucosinolates, phenolic compounds, and carotenoids). Finally, it has a high content of vitamins and minerals such as calcium, phosphate, magnesium, potassium, vitamin K and C. Other products in the market do not provide such a comprehensive content of nutrients and nutraceuticals. The human intervention study will be performed on type 2 diabetic participants. The thesis will include participating in a highly competent research environment, interacting with many other students, creating a good social atmosphere. The student will participant in the clinical trial, as well as the formulation of food products incorporating kale. The project will include many molecular-biological analyses of blood samples.

PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Hormone Diseases, Skejby Hospital

PROJECT START

June 2020

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - Human Intervention Study

MAIN SUBJECT AREA

A clinical trial to test the efficacy of a novel kale product to treat type 2 diabetes

ADDITIONAL INFORMATION

Co-supervisor: Assistant Prof. Ph.D. Max Lambert, Department of Health Science AU. E-mail: mntl@clin.au.dk

Other partners connected to the project: Future Food Innovation, GreenGourmet ApS, InnovaConsult ApS, HerrensMark ApS, Naturlif Foods A/S, Region Midtjylland

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Bitter tasting plant extract for the treatment of Type 2 Diabetes; A pilot study

47

SHORT PROJECT DESCRIPTION

This thesis project will involve performing a pilot human clinical study to test bitter bioactive compounds derived from the Asteraceae plant family. Previous basic research has demonstrated the beneficial effects of many bioactive compounds found in this particular plant family. The study will be performed on a group of type 2 diabetes patients to determine the long-term effect of the bitter substances from the plant.

The thesis will include participating in highly competent research environment, interacting with many other students, creating a good social atmosphere. The student will participate in clinical trials, as well as in the formulation of beverages to be tested. The project will include many molecular-biological analyses of blood samples.

PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Hormone Diseases, Skejby Hospital

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - Human Intervention Study

MAIN SUBJECT AREA

Human Intervention Study to test the efficacy of a novel bitter plant extract from the Asteraceae family the treatment of type 2 diabetes

ADDITIONAL INFORMATION

Co-supervisor: Assistant Prof. Ph.D. Max Lambert, Department of Health Science, AU.
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Other partners connected to the project:
HerrensMark ApS, Region Midtjylland

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48 The effect of a new slow-release plantbased product on recovery and subsequent athletic performance

SHORT PROJECT DESCRIPTION

Post-exercise carbohydrate and protein (CHO-PRO) supplementation has been proposed to improve a subsequent endurance performance by increasing the rate of muscle glycogen re-synthesis and muscle damage repair. The purpose of the present study is to compare the effect of combined intake of carbohydrate and proteins in the form of a new plant-based product (VEG), and an isocaloric carbohydrate only (CON) on recovery and subsequent athletic performance. The study is an on-going study. It is conducted as a randomized cross-over clinical trial with cycling athletes.

The thesis will include participating in highly competent research environment, interacting with many other students, creating a good social atmosphere. The student will participate in clinical trials, as well as in the formulation of beverages to be tested. The project will include many molecular-biological analyses of blood samples.

PHYSICAL LOCATION OF THE PROJECT

Aarhus University Hospital, Department of Diabetes and Hormone Diseases, Skejby Hospital

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - Human Intervention Study

MAIN SUBJECT AREA

Human Intervention Study to test the effect of slow-release protein and carbohydrate on athletic performance of endurance cyclists

ADDITIONAL INFORMATION

Co-supervisor: Assistant Prof. Ph.D. Max Lambert and M.Sc. Sport Lotte Nielsen, Department of Health Science, AU, e-mail: mntl@clin.au.dk

Other partners connected to the project:
Jens Møller Products ApS (Tanghuset), KMC A/S, InnovaConsult, Future Food Innovation, Region Midtjylland

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New technologies in sensory science

SHORT PROJECT DESCRIPTION

Sensory science is evolving rapidly with the adoption of new technology. Instead of asking participants what they taste and whether they like it, we can now also measure such responses. We measure heart rate, skin conductance, brain response, and facial expressions to understand what happens when customers say they like a product, yet never buy it. For more info on the project, go to go.ted.com/camillaarndal-andersen

And don't worry if you don't know how to measure brain responses or skin conductance. We will teach you. There are absolutely no prerequisites for the applicant, but we hope that you are curious and eager to help us shape the future of sensory science in the food industry.



PHYSICAL LOCATION OF THE PROJECT

DuPont Nutrition and Health ApS, Edwin Rahrs Vej 38, 8220 Brabrand

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc Project (The project will be based on experimental activities)

MAIN SUBJECT AREA

Sensory science

ADDITIONAL INFORMATION

Supervisor at DuPont:
PhD, Scientist, Camilla Arndal Andersen

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Dysphagia and how to measure swallowing

SHORT PROJECT DESCRIPTION

We swallow our food every day without much of an effort, but for some people swallowing is a struggle. Their condition is known as dysphagia which is the medical term for swallowing difficulties that severely affects life quality because patients tend to isolate themselves and are at risk of pneumonia and malnutrition.

At DuPont, we try to help dysphagia patients by creating food ingredients that makes the food easier to swallow. But it is a complex task to assess if products are nice to swallow; people swallow differently, and it can be hard to see and feel exactly how the food is swallowed. Therefore, we want to develop a more objective method to understand and compare how products are swallowed. This is where we need your help. You will drive our dysphagia project with daily support and supervision from our sensory science group at Technology and Innovation in DuPont. We will combine sensory analysis with sensors on face and throat to understand what makes a good and bad swallow.

Expect a steep learning curve and a central position in our dysphagia food projects.



PHYSICAL LOCATION OF THE PROJECT

DuPont Nutrition and Health ApS, Edwin Rahrs Vej 38, 8220 Brabrand

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

60 ECTS - MSc Project (The project will be based on experimental activities)

MAIN SUBJECT AREA

Sensory science

ADDITIONAL INFORMATION

Supervisor at DuPont:
PhD, Scientist, Camilla Arndal Andersen

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51

Effects of composition and processing on the formation of continuous phase in imitation cheese

SHORT PROJECT DESCRIPTION

KMC develops, produces and sells potato-based food ingredients that are used in applications, such as imitation cheese. The goal is to obtain melting and stretching properties that are as much alike the original imitated product. However, when the protein level of the cheese is reduced, some of these properties are compromised. In this context, KMC's modified potato starches are useful substitutes for milk protein in cheese.

The aim of the current study is to investigate the effect of structure dominating component, protein or starch, in imitation cheeses with a composition close to 50/50. The effects are studied in samples produced in a small-scale system, a Farinograph, where the development of cheese matrix can be followed during production. The effect of processing and composition of the final products can be analyzed by a range of analytical methods as e.g. Texture Analysis, Rheological Analysis, Melt Tests and Confocal Laser Scanning Microscopy.

Sample production is performed at KMC and analysis of samples at Aarhus University.



PHYSICAL LOCATION OF THE PROJECT

Agro Food Park 48, 8200 Aarhus N
KMC, Herningvej 20, 7330 Brande

PROJECT START

Anytime

EXTENT AND TYPE OF PROJECT

45 or 60 ECTS - MSc Project

MAIN SUBJECT AREA

Structure and functionality, potato starch and casein

ADDITIONAL INFORMATION

Co-supervisors:

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