

ANIMAL SCIENCE

Theses and Projects

Topics for Theses and Projects Available in 2022 -2023

Department of Animal Science

Aarhus University



Preface

This catalogue of master thesis projects available in the Department of Animal Science, Aarhus University, is considered to inspire and help you select a topic for your master thesis project. The catalogue is intended for students of the Master's Degree Programmes in Agrobiolology, in Organic Agriculture and Food Systems (EUR-Organic), in Biology and for other animal-science-related master degree students who would like to do their master thesis project at Aarhus University. Read more about Agrobiolology and the other animal-science-related Master Degree programmes at <http://kandidat.au.dk/en/agrobiolology/>

A number of project proposals are presented in detail, together with contact addresses and other practical information. However, the catalogue is not exhaustive on the possibilities and should also be read as an inspiration on topic areas and supervisors. Therefore, you should feel free to contact us with your own ideas and to ask for further possibilities. You may also find inspiration and possible supervisors to contact at the Department website: <http://anis.au.dk/en/>

This catalogue also lists a few animal-science-related projects from the sister departments Agroecology (<http://agro.au.dk/en/>) and Food (<http://food.au.dk/en/>). You will find more projects and information on the mentioned sites.

During your thesis work, you will be associated to a research group. Please note that the Department of Animal Science is situated at AU Foulum about one hour's drive from Campus Aarhus. There are student housing possibilities at AU Foulum and in Viborg which is close by and with regular bus connections. You can find maps at <http://www.au.dk/en/about/organisation/find-au/buildingmap/>

If you are an international student, looking for exchange possibilities at Aarhus University, you will find more information at

<http://www.au.dk/en/exchange/welcome/>

and

<http://www.au.dk/en/internationalcentre/>

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Guidelines

Thesis types offered for students at the MSc Agrobiolology programme

Thesis 30 ECTS credits

Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

Thesis 45 ECTS credits

Experimental thesis in which the student is responsible for collection and analysis of original raw data. The quality of the data collection, analysis and editing must be included in the overall assessment.

Thesis 60 ECTS credits

Experimental thesis in which the student is responsible for planning of trial design and methods as well as collection and analysis of original raw data. The quality and independence of own trial design, planning of data mining from original data bases or the development of new theories must be included in the overall assessment. The quality of the data collection, analysis and editing must also be included in the overall assessment.

When you have decided on a master thesis subject, a master thesis contract has to be signed, where the conditions and time schedule are described. Contract forms for students enrolled at Aarhus University and further details on requirements can be found here:

<https://studerende.au.dk/en/studies/subject-portals/agroecology-food-and-environment/bachelors-project-masters-thesis-and-other-projects/project-catalogue/>

Guidelines for the MSc Thesis Research Proposal

The Research Proposal

Broad agreement exists on the basic scientific standards that apply for a scientific study. Above all, the scientific standards that apply (and thus must be met) are the following:

The thesis must be theory-based.

The research must be verifiable.

The research must be in principle replicable.

To make sure that your research is complying with these rules, you should start by making a research proposal attending to these standards. A proposal consists of the following parts:

Problem statement: This gives the motivation for the selection of the topic and a clear description of the problem field, finally resulting in a concise problem statement. This part includes a review of the theoretical and empirical literature, which is most relevant to the topic and ensures that the topic has not already been exhausted by other researchers.

Theoretical framework: This part gives the background of your topic and leads up to your research questions/hypotheses. Which information is already known from the literature? The theory acts as a base for further investigation and comparison with the (future) results. You must indicate which concepts are important to be looked at in answering the research questions.

Research objective(s) and research questions/hypotheses: This clearly states the scientific objectives of the research. It is important that the objectives of the research are strictly related to the research topic. Subsequently, the research objective(s) should be translated into research questions/hypotheses. These are the questions that need to be tested and/or answered in order to fulfil the research objective(s).

Methodology: In this part of the proposal it should be explained how the theory and research questions can be examined and answered empirically. The function of the methodology part within the research proposal (and later in the thesis report) is to specify reliability, validity and replicability of the research.

You need to consider the following points when setting up a sound methodological framework:

Identify **the character of the thesis work**. For instance: is it an explorative, or comparative, or experimental study?

Design **the data collection**. This step requires arguing about, and providing an answer to, the following questions:

What is seen as **data** and from which **sources of information** do you obtain these data?

What are the criteria for determining and **delineating the sources** of information?

What **methods** are employed to derive the data from the sources of information? In the case of experimental work: what is the experimental design, which factors do you explicitly test for, how many replicates do you have, etc.?

Which **instruments** will be used? It is important to think about the instruments you need far in advance, because not all equipment is available, or it can be in use elsewhere.

Design **the data analysis**: It should be pointed out that the description of the methods is necessary for data collection as well as for data analysis. How can the data be processed? Which statistical tests can be applied given the employed data collection methods or experimental design? Note that it is important to think about data analysis before you start to collect data. Certain analyses require certain data formats and experimental set-up.

Working plan and time schedule: The research proposal finally should be completed by a comprehensive working plan, indicating the necessary steps in carrying out the research, as well as their logical order in time, specification of milestones and quarterly status presentations – all to ensure that the workload is realistic and the thesis work is progressing in a sound way.

In some cases, you need a **financial plan**. The general necessity of financial means to carry out the thesis work needs to be discussed and agreed between student and supervisor before the actual thesis work starts.

Guidelines for writing the Thesis Report

The thesis report (max. 100 normal pages), should be written in Danish or English with a summary in English. A normal page for written submissions is 2400 type units (i.e., characters plus spaces). To calculate normal pages, text is included, but not the front page, table of contents, bibliography, appendix, figures, tables and models.

Writing style: The thesis report should be written in an academic writing style. An academic writing style is in its essence short, clear and unambiguous. You use the terminology of the discipline. When you propose a hypothesis or theory, it must be substantiated. You bring documentation for any methods and postulates in terms of reference to scientific, peer reviewed research (scientific journal papers) or in terms of data. You discuss your actual results in relation to the applied methods and relevant peer reviewed research. You conclude on you hypothesis and on your actual results.

Referencing: It is very important that you give proper references when making statements from the literature. References acknowledge the work of others, and provide the reader with information on the sources that you used. Plagiarism is not acceptable and in serious cases students risk to be expelled from the university.

Plagiarism

Plagiarism is using another person's text as your own without making precise source references. Plagiarism is considered a very serious offense because it is a theft of another person's work and because you are assessed on work that in actual fact is not yours. You avoid plagiarism by always making a precise source reference when you use other people's work – this applies to quotations, reproductions, interpretations, translations, figures, illustrations, etc. When you produce a text, it must appear clearly which is the result of your own ideas and which passages are a result of your processing of other people's knowledge.

You must be aware that it is your responsibility: If you plagiarise, the consequences may be quite serious.

Suggested structure of the report

- **Front page:** This is the cover of your thesis. It should mention the title of the research, the name of the author, the name of the master's degree programme, year and date. The front page also needs to carry the logo of the university.

- **Title page:** This page must be in the strict format.

The title page contains the following elements:

Title of the thesis research
Your full name (including all initials)
Student registration number
Name of the master's degree programme
ECTS of the thesis (60, 45 or 30)
Year and date of submission
Title, name and department of the supervisor(s)
A copyright statement – to be discussed
The proper logo of the university

- **Preface:** Less than one page.
- **Table of content:** Gives an overview of the chapter structure of the thesis with their respective page numbers. It should also include the summary and possible annexes.
- **Abstract:** Maximum of 250 words that describes the research for the general public.
- **Summary:** Provides a short (1-2 pages) but comprehensive summary of all chapters, i.e., the research objectives, the methods used, the most important results and conclusions.
- **Introduction:** This part includes the problem statement, the scientific objectives as well as the research questions/hypotheses that you have formulated in your proposal. You can also give a

characterisation of the type of work and a short outline of the structure of the subsequent chapters can complete it.

- **Background/Theoretical Framework:** This section provides a focused review of the theoretical and empirical literature which forms the basis of your work. The section substantiates the research questions/hypotheses of your work. The theoretical framework may be completed by a conceptual model, in which the relations of the relevant concepts of the applied theories are presented. Note that this framework may also be part of the introduction instead of being presented as a separate chapter.
- **Methods:** This part reports on the used information sources, as well as the applied methods and instruments for data collection and statistical data analysis. In contrast to the research proposal - where this section is presenting the ambitions/plan - you must present the situation as it has actually worked (incl. problems that occurred) in the final thesis report. In the case of fieldwork, you should describe the area and sites in which the research was carried out. When you have done experimental work, you should give all relevant details of the followed procedure (protocol). This enables others to evaluate your work, and to reproduce it if needed.
- **Results:** In this section the results should be presented in the most objective and comprehensive manner. Mixing results with subjective interpretation and discussion must be avoided. The challenge is to structure the results in such a way, that the research questions are addressed as best. Where appropriate, the findings should be illustrated or summarised with tables and figures including a statistical data analysis. In any case tables and figures must be drawn in such a way that they can be read on their own, independent from the surrounding text. Do not forget to include measurement units and an explanation of abbreviations. References to tables and figures should be made in the text (e.g., see table 1; cf. figure 2). Note that table captions are given above the table, whereas figure captions are placed below the figure.
- **Discussion:** The discussion section links your own findings, as presented in the result section, with those of others. What do your results mean and imply? The challenge here is to argue for and against the findings and the related theoretical concepts. Literature references are therefore again a requisite in this section. Furthermore, you must discuss your findings in the background of the scientific objective(s) and the research question(s), as well as in the light of the chosen theoretical framework. Last but not least, it should also not be forgotten to discuss to what extent the findings might have been influenced by the chosen methods.
- **Conclusions:** This section brings together the most important findings and consequences of your research. The conclusion must state the answer your work provided to the research questions and/or hypothesis you posed
- **Implications or Perspectives:** These conclusions normally touch on three aspects: a.) The scientific objective and the research questions (results); b.) Hints for future research on this topic (theoretical framework and methods); c.) Practical application of the results (consequences in management and policy), however, this last part might also be a separate section named 'Implications' or 'Perspectives'.

Bibliography: In this section a list of all referred literature should be given, sorted in alphabetical order. The style for the different types of publications (articles in journals, books, chapters in books etc.) should be consistent, e.g., according to the Harvard style, see also the [Harvard online referencing tutorial](#).

When you refer to information on the Internet you should give the complete web-address, as well as the date on which the information has last been accessed, e.g.,:

Ministry of LNV (2002): Forestry on paper. Public brochure, downloadable at

<http://www.minInv.nl/morepaper.pdf>. Information derived on June 15, 2002.

Royall, C.P., B.L.Thiel, and A. Donald. 2001. Radiation damage of water in environmental scanning electron microscopy. *Journal of microscopy* [online]. 204(3), [Accessed 17 March 2009], pp.185-195. Available from:

- Annex/Appendix: This is optional and the content of the annex/appendix is not evaluated, thus all important and relevant information must be given within the frame of the thesis and its main sections. The annex could include supplementary information about protocols, observations, calculations, etc. This could mean for example: the inclusion of the original data, further detailed statistical analysis, etc. Note that also the annex pages should be numbered consistently with the general text.

Topics

Variation in feed intake and feeding behaviour of bull calves and its relation to age, ration composition, health and performance

Main subject area

Animal Science, cattle nutrition, feeding behaviour, beef production.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mogens Vestergaard, Senior Researcher

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Project start

April or August 2022. To be decided in agreement with the supervisor.

Physical location of project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele, with some collaboration with SEGES in relation to data and data analyses.

Short project description

Thesis based on analyses of existing feed intake and feeding behaviour data from 9 experiments conducted at DKC/ANIS/Aarhus University between 2001 and 2016. The main subject area is beef production based on dairy bull calves, feed intake recording, feeding behaviour (feeder visits, meal size etc.), performance, and animal health. The objective is to investigate the influence of animal age, ration composition, e.g., total mixed rations vs. pelleted concentrate feeding, on the feed intake patterns. The specific objectives are to be decided, but could include estimation of the variation in feed intake between days and within days or quantifying meal size, visits to the feeder, eating time etc. These findings could be related to disease recordings/veterinary treatments, performance of animals and health. The long-term perspective is to minimise feeding-related stress on rumen function and animal health. Datasets are available in Excel and SAS-files. Data has been partly analysed in SAS.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

Additional information

The student is invited to co-author a scientific publication.

Optimised feed bunker space for slaughter calves to maximize feed intake and growth and improve feeding behaviour

Main subject area

Animal Science, cattle nutrition and feeding behaviour, beef production.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mogens Vestergaard, Senior Researcher

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Project start

April or August 2022. To be decided in agreement with the supervisor.

Physical location of project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele, but will include cooperation with SEGES.

Short project description

The main subject area is beef production based on dairy bull calves. The dairy bull calves used for beef production, e.g., rosé veal calves or young bulls are raised and fed in various types of production systems. In some fattening units, a total mixed ration is fed. In some cases, the feed bunk space is too short to allow for an optimised feed intake for the group of calves in the pen, e.g., 25-30 calves per pen. This might lead to lower feed intake and growth, especially for some weaker calves in the group, which again might lead to a larger variation in growth rate and thus live weight within a group. The objective is to investigate the influence of feed bunk space on animal performance. An experimental trial has been performed at a private farm. Causes of variation studied were; 1) age of calves, 2) feed bunk area, and 3) feed rations composition. Feed intake was recorded per pen and LW for each calf every 3 weeks. The data recording also included video data and animal sensor data to estimate feed intake and feeding behaviour (feed bunker visits, rumination etc.). The long-term perspective is to minimise feeding-related stress and variation in feed intake on performance as well as on rumen function and animal health. Thus, the included literature review should also cover these aspects.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

Additional information

No additional information.

Healthy and sustainable production of rosé veal calves

Main subject area

Animal Science, cattle nutrition and physiology, beef production.

Department and supervisor

Department of Animal Science, <http://anis.au.dk>

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Project start

April or August 2022. To be decided in agreement with the supervisor.

Physical location of project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele and experiments at DKC.

Short project description

The main subject area is beef production based on dairy and beefxdairy bull calves. The bull calves used for beef production, e.g., rosé veal calves or young bulls are raised and fed in various types of production systems. Some are fed concentrate pellets others are fed total mixed rations. However, feed rations are typically high in starch and low in effective fibre, and the roughage share is often too low to assure a normal and well-functioning rumen. This causes acidotic conditions in the rumen and the outcome can be damaged epithelial tissue in the forestomacs as well as liver abscesses as signs of this type of feeding. The consequences for the behaviour and welfare of calves are not well described. The consequences for a changed feeding on methane production are also warranted.

We want to develop and test the consequences on performance, health, behaviour, economy and carbon footprint (LCA) of using alternative healthy and rumen-friendly feeding based on locally produced feed sources. An experiment will be conducted with calves at DKC in 2021. The student will be involved in practical sampling and recording of data from the experiment and in handling of data etc. The long-term perspective is to develop criteria for a sustainable feeding that has advantages compared with the current practice. Thus, the included literature review should cover the above-mentioned aspects.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

Additional information

No additional information.

Cattle feeding, nutrition and physiology in relation to emissions, efficiency and product quality

Main subject area

Animal Science, cattle nutrition and physiology.

Department and supervisor

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Project start

To be decided in agreement with supervisor.

Physical location of project and students work

Department of Animal Science, Foulum.

Short project description

The aim of cattle research at the section of Animal Nutrition and Physiology is to optimise feeding and nutrition to reduce greenhouse gas emissions, environmental impact and to improve animal production, product quality and health. We have several ongoing projects, which may be of interest for you as a part of your thesis, or there might be planned projects in the near future, where your contribution would be valuable. Don't hesitate to ask if there is a possibility for you to write your thesis at Aarhus University, Foulum, within cattle nutrition and physiology.

Extent and type of project

30-45-60 ECTS as appropriate.

Additional information

No additional information.

Production performance and slaughter- and carcass quality of heavy Holstein Friesian young bulls

Main subject area

Animal Science, cattle nutrition, health and physiology, beef production, product quality.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mogens Vestergaard, Senior Researcher

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Phone: +45 23103774

Project start

To be decided in agreement with the supervisor.

Physical location of project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Thesis based on analyses of existing data from an experiment performed at AU combined with a literature study. Three groups of bull calves were raised on different feeding regimes varying in concentrate/roughage ratio and with or without a compensatory growth period. Even though maize silage (up to 90% of the ration) was used as roughage and animals were housed indoor this dataset represents interesting aspects also in relation to organic farming and animal welfare. Initial slaughter groups allow for quantitative estimation of accretion rates in body and carcass. Experimental data including health recordings, performance, carcass and meat quality and rumen wall conditions are available for further analyses. There is possibility to decide a specific subject for the thesis. Datasets are available in Excel and SAS-files. Data analyses have been performed.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

Additional information

The MSc student is invited to co-author a scientific publication.

Pros and cons of extended lactation as herd management strategy

Main subject area

Animal science, dairy herd management, herd health and economy, production systems.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Main supervisor:

Søren Østergaard, Professor

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Phone: +45 51420215

Co-supervisors:

Dr Vivi M. Thorup, Associate Professor

Dr Mogens A. Krogh, Researcher

Project start

Spring 2022 or to be decided in agreement with the supervisor.

Physical location of the project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Deliberately postponing the time of first insemination of a dairy cow is a herd management strategy, which potentially may benefit cow health, farmer economy and greenhouse gas emission. Many cows are capable of maintaining a high milk yield throughout lactation. Delaying pregnancy improves both persistency and reproductive performance. Cows with a high milk yield throughout an extended lactation are characterised by a high yield in the previous lactation as well as early in the present lactation. As part of a large project, data collection from 48 Danish dairy herds is ongoing and continues into 2023. Conventional and organic herds are both represented. In each herd, a subset of 40 cows were selected for either extended lactation or for control, in total 1920 cows. We are investigating how extended lactation affects production, animal health, and farm economy. Among other things, we seek answers to questions on what extended lactation means for milk production and body condition in late lactation – do cows become too fat, and will they dry themselves off too early? Data already collected are available. The student may decide the specific topic of the thesis and assist collecting data from the herds.

Extent and type of project

30, 45 or 60 ECTS thesis as appropriate. The MSc student may be invited to co-author a scientific publication.

Additional information

Prerequisites: an interest in data analysis is required. The MSc-study will become part of a research team in a collaborative on-going project, which involves Dept. of Agroecology (AU) and SEGES.

Useful reading: Lehmann, J. O., Mogensen, L., & Kristensen, T. (2017). Early lactation production, health, and welfare characteristics of cows selected for extended lactation. *Journal of Dairy Science*, *100*(2), 1487–1501.

<https://doi.org/10.3168/jds.2016-11162>

Management strategies that reduce methane emission from dairy herds

Main subject area

Animal welfare, dairy herd management, methane emission, herd health and economy.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Main supervisors:

Søren Østergaard, Professor

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Phone: +45 51420215

Anne B. Kudahl, Senior Advisor

Vivi M. Thorup, Associate Professor

Project start

Spring 2022 or to be decided in agreement with the supervisor.

Physical location of the project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Almost 35% of the total greenhouse gas emission from Danish agriculture is from dairy cattle, and enteric methane emission makes up about 50% of the climate footprint of milk. Globally, milk and meat consumption are expected to increase. Production and management strategies for improved animal health, longevity and fewer young stock may be important tools to reduce the total climate impact from the production of milk and meat. When reducing methane emission, productivity and animal welfare should not be allowed to deteriorate. Relevant management strategies involving changes in feed, health, reproduction and /or herd dynamics are simulated with a model (SimHerd) using input data from 10 Danish commercial dairy herds. The results are presented to and discussed with the farmer to evaluate feasibility of the strategies. Economic effects can be included as well. Depending on the duration of the thesis project, the student will be expected to participate in data collection.

Extent and type of project

30, 45 or 60 ECTS thesis as appropriate. The MSc student may be invited to co-author a scientific publication.

Additional information

Prerequisites: an interest in data analysis is required. The student will become part of a research team working on the on-going project: "Development of a model of enteric methane emissions from dairy herds under different management strategies".

Analyses of crossbreeding management strategies in dairy herds

Main subject area

Animal science, dairy herd management, herd health and economy, production systems.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Main supervisor:

Søren Østergaard, Professor

Email: soren.ostergaard@anis.au.dk

Phone: +45 51420215

Project start

Spring 2022 or to be decided in agreement with the supervisor.

Physical location of the project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Crossbreeding in Danish dairy herds is increasing slowly and is currently at a level of 15%. Research has shown that crossbreeding can improve health, reproduction and economy and reduce greenhouse gas emission in a dairy herd. To increase the use of crossbreeding there is a need to study these effects at the herd level in more detail and to study management aspects that are affected by crossbreeding. A thesis could analyse alternative strategies to manage the transition period from a purebred herd to a crossbred herd. Another focus could be to analyse how to utilise crossbreeding further by specialisation of breeding, multiplier and production herds. A sub question here could be to study the consequences of production herds purchasing calving heifers versus purchasing primiparous cows. Other focus areas could be defined for a thesis on crossbreeding management. The work will be related to the ongoing DairyCross project and the SimHerd Crossbred model will be available for the project. The project could include literature review, data analyses, herd simulation modelling and analysing of scenarios for technical and economic consequences.

Extent and type of project

The master thesis could be any of 30, 45 or 60 ECTS.

Additional information

Prerequisites: an interest in data analysis is required. The MSc-study will become part of a research team in a collaborative with an on-going project. The MSc student may be invited to co-author a scientific publication.

Improving culling decisions in dairy herds

Main subject area

Animal science, dairy herd management, herd health and economy, production systems.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Main supervisor:

Søren Østergaard, Professor

Email: soren.ostergaard@anis.au.dk

Phone: +45 51420215

Project start

Spring 2022 or to be decided in agreement with the supervisor.

Physical location of the project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Dairy farms grow bigger, more cow- and herd data become available and dairy production is challenged to reduce greenhouse gas emission. This provide new challenges and possibilities to manage the culling decisions. There is a need for new analyses of the effect of culling strategies on each of economy, greenhouse gas emission and animal welfare. The ongoing CFIT project is developing a flexible version of the SimHerd model allowing to analyse culling decisions using new and detailed information about the individual animal. The model will be able to rank cows on their expected future profitability. The thesis could be with focus on a combination of farm interview and herd simulations modelling (SimHerd). The thesis could also be with focus on the interrelated area of culling strategy, herd health, reproduction and breeding management. As new technologies emerge, the area of breeding management and operation/technical herd management become more interrelated. The project can use herd simulation modelling (SimHerd) to analyse how to optimise these decision simultaneously.

Extent and type of project

The master thesis could be any of 30, 45 or 60 ECTS.

Additional information

Prerequisites: an interest in data analysis is required. The MSc-study will become part of a research team in a collaborative with on-going project. The MSc student may be invited to co-author a scientific publication.

Economic effects of cow-calf-systems

Main subject area

Dairy production systems, management, economy, health.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Anne Braad Kudahl, Senior Advisor

Email: AnneB.Kudahl@anis.au.dk

Phone: +45 21794074

Project start

Spring 2022 or to be decided in agreement with the supervisor.

Physical location of the project and students work

Department of Animal Science, Foulum.

Short project description

Consumer groups have put focus on the ethical dilemmas in early separation of newborn calves from their dam. Some farmers and dairies have therefore become interested in developing dairy production systems where calves are given the opportunity to stay with and suckle their own dam or other cows for a longer period – half time or full-time. The system implies markedly increased milk intake by calves and thereby lost income from the dairy in addition to investments in inventory and changed routines. However, long term positive effect on health and production could be expected and some experienced farmers report other savings and increased work-satisfaction. There is a huge variation in the implemented cow-calf systems and the costs and benefits related to different strategies needs further investigation. Different approaches can be applied for a study on this subject like literature studies, farmer interviews (case-studies) and simulations. The project will be linked to the Core Organics RDD-4 project KALVvedKO

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data

The master thesis could be any extent 30-60 ECTS

Additional information

No additional information.

Monitoring health and assessing disease costs in dairy herds

Main subject area

Herd health management, biomarkers for monitoring health, disease and preventive costs.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Søren Østergaard, Professor

Email: soren.ostergaard@anis.au.dk

Phone: +45 51420215

Co-supervisors:

Dr Vivi M. Thorup, Associate Professor

Email: vivim.thorup@anis.au.dk

Dr Mogens A. Krogh, Researcher

Email: mogens.krogh@anis.au.dk

Project start

Spring 2022 or to be decided in agreement with the supervisors.

Physical location of the project and students work

Department of Animal Science, Foulum.

Short project description

A part of the negative climate impact from dairy production can be ascribed to diseases that reduce efficiency and longevity of the cows. Disease complexes like mastitis, metabolic diseases and claw lesions can be prevented using a number of different preventive measures. However, research shows that these preventive measures are used less than optimal by farmers. The possible explanations are that the occurrence of diseases as well as the financial losses associated with them are underestimated, furthermore, the preventive measures are too general and are not adjusted to the individual farmer's situation. To motivate the farmer to improve herd health, a monitoring system based on blood and milk biomarkers will be developed as well as a tool to estimate more precise prevalence of disease and better estimates of both failure and preventive cost associated with diseases.

The project will be linked to the GUDP project "KlimaKS" initiated spring 2022 involving 25 dairy herds and 3,000 cows. There will be several opportunities for MSc thesis projects focusing on different aspects within the KlimaKS project. Activities could include herd visits/interviews, quantifying disease and preventive cost, analytical work on development of a monitoring system for disease detection etc.

Extent and type of project

The master thesis could be any of 30, 45 or 60 ECTS.

Additional information

Prerequisites: an interest in data analysis is required. The MSc-study will become part of a research team in a collaborative with an on-going project. The MSc student may be invited to co-author a scientific publication.

Legislation, strategies and decision making regarding antibiotic use in Danish pig and dairy farms

Main subject area

Dairy and pig farming, veterinary practice, antibiotic and disease treatment strategies.

Department and supervisor

Department of Animal Science, <http://anis.au.dk>

Mette Vaarst, Senior Researcher, email: Mette.Vaarst@anis.au.dk

Hanne Kongsted, Researcher, email: Hanne.Kongsted@anis.au.dk

Physical location of the project and students work

Department of Animal Science, AU Foulum.

Project start

Summer 2022, can be decided individually.

Short project description

The identified current threat of antimicrobial resistance (AMR) continues to urge for rethinking the use of antibiotics in animal farming, also in Denmark. Several structures in the legislation as well as in the current farming structures in pig as well as in dairy farming influence the possibilities and drivers for using or avoiding to use antibiotics, and there is a huge need to look at the consequences of these structures in practical farming and veterinary practices. In the EU project, we work with organic and not-organic dairy farming, calf rearing, intensive pig farming and 'Pure pork' (raised without antibiotics).

The main objective of this MSc project is to investigate and critically analyse the incentives, motivations, drivers and barriers for changing treatment and animal health promotion strategies, on farm level but also on sector level and beyond. The MSc-study will be interdisciplinary and include social scientific methods. It can be shaped to the wishes and number of ECTS, but will be expected to consist of two elements: 1) conduct a document and literature review on antibiotic use in animal farming with emphasis on decisions, strategies and effect of legislation, 2) Conduct interviews (and analysis of them) of relevant vets, authorities, organisations and farmers about their perceptions on opportunities and concerns related to different disease treatment and health promotion strategies in animal farming.

Extent and type of project

Possibilities to conduct 45 ECTS or 30 ECTS projects, through involving different levels of data collection (interviews with farmers, veterinarians, authorities; collection of data on legislation and real life cases of exchange of antimicrobials).

Additional information

The student should be sufficiently fluent in Danish for communicating with farmers, veterinarians and other actors in the environment, and hold a valid driving license. This MSc-study is conducted within the framework of an EU project ROADMAP. This means that the MSc student will be part of a research team at Foulum, with possibilities to have collaboration with international partners.

Useful reading

Skjølstrup NK, Nielsen LR, Jensen CS and Lastein DB (2021) Veterinary Herd Health Consultancy and Antimicrobial Use in Dairy Herds. *Front. Vet. Sci.* 7:547975. doi: 10.3389/fvets.2020.547975

Fortané, N.; Bonnet-Beaugrand, F.; Hémonic, A.; Samedi, C.; Savy, A.; Belloc, C. Learning Processes and Trajectories for the Reduction of Antibiotic Use in Pig Farming: A Qualitative Approach. *Antibiotics* **2015**, *4*, 435-454. <https://doi.org/10.3390/antibiotics4040435>

Exploring and exploiting behavioural patterns to improve dairy cow management

Main subject area

Animal welfare, data-driven management, behaviour, precision livestock farming, sensor technology.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Main supervisor: Leslie Foldager, Senior Researcher

Co-supervisor: Vivi Thorup, Associate Professor

Email: vivim.thorup@anis.au.dk

Phone: +45 20637229

Project start

Summer or autumn 2022.

Physical location of the project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele.

Short project description

Modern, intensive dairy farming implies caring for many animals with a small number of staff, which limits time spent per individual animal. This poses a risk for animal welfare, as farm staff might miss animal cues for deteriorating health. Animal behaviour such as features related to resting (lying), standing, walking, ruminating, eating, drinking, being milked, etc. are increasingly often measured using sensors on commercial dairy farms. The main purposes of such sensors have been to detect time of heat and other fertility features. So far, linking lying behaviour and activity to other cow and herd aspects, such as health status, has had limited success, because of large variations between cows and herds and the use of daily sums of behavioural features. For example, lying behaviour generally follows a 24-h pattern that predominantly is shaped by milking and feeding times. Summarising data in 24-h periods is likely to ignore useful individual variation. Exploring individual variation will enable us to capture behavioural changes and to exploit this knowledge to detect disease or suboptimal management.

This thesis project will identify cow behavioural features that capture individual 24-h patterns, study their variation in relation to cow and management factors, and possibly quantify the relation between a selection of cow features and onset of disease. Alterations in management based on identified features in this project provides a data driven approach to improve cow health, milk yield as well as societal acceptance of intensive farming. Data already collected are available to work on for 30 ECTS projects. Involvement in collection of new data is expected for longer projects.

Extent and type of project

30, 45 or 60 ECTS thesis as appropriate.

Additional information

Prerequisites: an interest in data handling and analysis is required.

Nutritional value of grass-based feeding of organic slaughter pigs

Main subject area

Organic pig production, sustainable feedstuffs

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Lene Stødkilde-Jørgensen, Assistant Professor

Email: lsj@anis.au.dk

Maria Eskildsen, Postdoc

Email: Maria.Eskildsen@anis.au.dk

Project start

August 2022.

Physical location of the project and students work

AU Foulum.

Short project description

The Danish organic pork production is facing numerous challenges in relation to negative environmental impact on local and global scales. Organic production is particularly challenging because of lower feed utilisation and thus higher nutrient losses. As the feed is a major contributor to the greenhouse gas emissions from the production, and the reliance on imported soy-based compound feed and thereby non-local protein sources negatively affects the climate footprint of Danish organic pork, there is a need to rethink feed strategies for the Danish organic pig production.

A feeding strategy with great potential is one based on locally grown grass and clover. Grass-clover has traditionally been used for ruminants; however, green biorefining allows for an efficient and sustainable use of the grass-clover via separation into multipurpose fractions. The extracted protein "Green protein" has great potential as protein source for monogastrics providing a sustainable alternative to imported soy and the residual pulp may be both a roughage source and a source of additional protein. Using pulp as roughage would improve the nutrient utilisation and circularity of the production.

By law, organic pigs must have access to roughage, and it is suggested that organic pigs can have their nutritional needs for amino acids covered partly or completely through grazing during the summer period or through intake of pulp or clover-grass silage during winter. This is not exploited in feed allocations potentially leading to feeding of surplus protein.

The distancing from traditional feeding strategies necessitates scientific knowledge, where the effects of the grass-based feeding are elucidated in a controllable environment.

The project focuses on determining the nutritional value of green protein, fresh clover grass pulp silage and clover grass silage for organic slaughter pigs. Growth, intake and feed utilisation are determined as are body composition and protein / energy metabolism. This is done both in the summer and winter trial.

The project is part of the project ENTRANCE funded by GUDP through organic RDD7.

Extent and type of project

45-60 ECTS thesis as appropriate.

Additional information

Hands-on work in Foulum is a prerequisite and is expected to be performed by the student.

Nutrient losses and GHG emissions from grass-based feeding of organic slaughter pigs

Main subject area

Organic pig production, sustainable feedstuffs.

Department and supervisor

Department of Animal Science/ <http://anis.au.dk>

Lene Stødkilde-Jørgensen, Assistant Professor

Email: lsj@anis.au.dk

Maria Eskildsen, Postdoc

Email: Maria.Eskildsen@anis.au.dk

Project start

August 2022.

Physical location of the project and students work

AU Foulum.

Short project description

The Danish organic pork production is facing numerous challenges in relation to negative environmental impact on local and global scales. Organic production is particularly challenging because of lower feed utilisation and thus higher nutrient losses. As the feed is a major contributor to the greenhouse gas emissions from the production, and the reliance on imported soy-based compound feed and thereby non-local protein sources negatively affects the climate footprint of Danish organic pork, there is a need to rethink feed strategies for the Danish organic pig production.

A feeding strategy with great potential is one based on locally grown grass and clover. Grass-clover has traditionally been used for ruminants; however, green biorefining allows for an efficient and sustainable use of the grass-clover via separation into multipurpose fractions. The extracted protein "Green protein" has great potential as protein source for monogastrics providing a sustainable alternative to imported soy and the residual pulp may be both a roughage source and a source of additional protein. Using pulp as roughage would improve the nutrient utilisation and circularity of the production.

By law, organic pigs must have access to roughage, and it is suggested that organic pigs can have their nutritional needs for amino acids covered partly or completely through grazing during the summer period or through intake of pulp or clover-grass silage during winter. This is not exploited in feed allocations potentially leading to feeding of surplus protein.

The distancing from traditional feeding strategies necessitates scientific knowledge, where the effects of the grass-based feeding are elucidated in a controllable environment.

The project focuses on determining emissions of greenhouse gases and leaching of nutrients from organic slaughterpigs. Eight pigs from 30-85 kilo will be housed in metabolic cages and climate gas chambers for several periods of five days. This is done both in the summer and winter trial. Project 2 will calculate phosphorus and nitrogen balances and the emissions of methane, carbon dioxide, ammonia and dinitrogen oxide. The project is part of the project ENTRANCE funded by GUDP through organic RDD7.

Extent and type of project

45-60 ECTS thesis as appropriate.

Additional information

Hands-on work in Foulum is a prerequisite and is expected to be performed by the student.

Consumption quality and shelf life of pork from grass-fed organic pigs

Main subject area

Organic pig production, sustainable feedstuffs.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Lene Stødkilde-Jørgensen, Assistant Professor

Email: lsj@anis.au.dk

Maria Eskildsen, Postdoc

Email: Maria.Eskildsen@anis.au.dk

Project start

August 2022.

Physical location of the project and students work

AU Foulum.

Short project description

Previous experiments at AU Foulum indicate that there may be an increased risk of impaired lard quality when feeding slaughter pigs bio-refined grass protein. The purpose of the project is to investigate the effect of feeding Green protein on the long-term shelf life and consumption quality of pork immediately after slaughter and after six months on frost.

The project provides facts about the long-term shelf life of pork after feeding with Green protein and both positive and negative consequences of replacing soy protein with Green protein will be identified. The results may potentially be included in the work of improving bio-refining methods and the development of feeding strategies with grass protein for both organic and conventional slaughter pigs in Denmark.

At the organic Platform in Foulum, a total of 150 (in August 2022) and 120 (in January 2023) organic pigs will be fed a ration based on either locally produced green protein or imported organic soybean meal from 30 kilo to slaughter at approximately 110 kilo.

The animals will be slaughtered at Danish Crown's slaughterhouse in Herning and 24 hours post slaughter, belly fat and two fatty muscles are removed. One is analysed immediately after slaughter. The other is stored at -20 C for half a year (the recommended maximum shelf life for pork according to the Danish Institute of Technology). This is to emulate the conditions of consumers all over the world. The pork is used for meat- and eating quality analyses. At the Danish Meat Research Institute, a sensory analysis of aroma, taste and tenderness is performed. Colour, pH, texture, fatty acid composition, antioxidant level, protein degradation and degree of rancidity will be determined at AU Foulum.

The project is part of the project GRATIS funded by The Pig Levy Found.

Extent and type of project

45-60 ECTS thesis as appropriate.

Additional information

Hands-on work in Foulum is a prerequisite and is expected to be performed by the student.

Improving welfare of broiler breeders by changes in feed management

Main subject area

Animal behaviour and welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Anja Brinch Riber, Senior Researcher

Email: anja.riber@anis.au.dk

Phone: +45 22353374

Project start

August/September 2022

Physical location of the project and students work

AU Foulum, Blichers Allé 20, Tjele (possible to do some office work in Aarhus)

Short project description

Genetic selection for growth parameters in broiler breeders, i.e., the parents of broilers, has caused an increased appetite due to modulation of mechanisms of hunger regulation. As a result, *ad libitum* access to feed will result in obesity and consequently in serious health and reproduction problems during the breeding period. To prevent health and reproductive problems, broiler breeders are feed restricted. However, the severe feed restriction introduces welfare problems in terms of frustration and hunger as basic behavioural and physiological needs are commonly not fulfilled. Different feeding strategies have been used to alleviate the hunger felt by broiler breeders and to fulfil their behavioural need for feeding behaviour with varying success. Among these are qualitative feed restriction, where the quality of the feed in terms of nutrient content is reduced by adding non-nutritious or poor-nutritious diluents to the standard feed. A previous study at ANIS showed that combining daily allocation of roughage with standard feed diluted with insoluble fibres in terms of oat hulls may have the potential of increasing the welfare of broiler breeders.

The thesis project will investigate the effect of combining daily allocation of roughage with standard feed diluted with oat hulls on the welfare of broiler breeders. A range of welfare indicators to be collected is predetermined, but the student also has the possibility to focus on different welfare indicators of own choice, targeting biological functioning, affective states and/or natural behaviour.

Extent and type of project

45-60 ECTS depending on the student's choice.

Additional information

The student is expected to participate in the experimental work taking place at Foulum and will be part of a group consisting of a senior researcher, two postdocs, a PhD student, technicians and interns.

The MSc student is invited to co-author a scientific publication.

How does wooden breast syndrome in broilers affect behaviour?

Main subject area

Animal behaviour and welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Anja Brinch Riber, Senior Researcher

Email: anja.riber@anis.au.dk

Phone: +45 22353374

Project start

Autumn 2022

Physical location of the project and students work

AU Foulum, Blichers Allé 20, Tjele (the extent of physical presence can be agreed with the supervisor).

Short project description

The selection for high productivity by rapid growth, high feed efficiency and increased terminal body weight has led to a range of welfare issues in broilers, including wooden breast syndrome (WBS). WBS is defined as abnormal microscopic appearance in tissue samples and it is accompanied by hard consistency of the pectoralis major muscle post-mortem. WBS possibly exhibits metabolic signs of oxidative stress and it often appears with white striping, suggesting that fibres in the breast muscles of broilers are damaged. The incidence of WBS in commercial broiler flocks is unclear, yet white striping is estimated to affect one-tenth of broilers and has been detected in 38% of the broilers in a recent study.

WBS is only observed post-mortem and so far, there has been no detectable symptoms on live birds useful for singling out the affected individuals. It has been suggested that WBS has the potential to cause or contribute to significant walking difficulties. Furthermore, WBS may negatively affect other normal activities requiring a certain level of physical strength, e.g., perching that requires use of the breast muscles.

The thesis project will investigate the effect of WBS on a range of behaviours expressed by fast-growing broilers. The student will collect data on the behaviour of 32-34 day-old individuals with known WBS status (obtained post-mortem on day 38) from existing video recordings.

Extent and type of project

45 ECTS (not possible to do 60 ECTS as the experiment has been completed, and not possible to do 30 ECTS as behavioural data need to be collected from the recorded videos).

Additional information

Flair for data handling and statistical analyses will be a benefit, as this type of data collection creates large data sets.

Investigation of the metabolite signature in urine of suckling and weaned piglets

Main subject area

Animal Nutrition/Animal Science.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mette Skou Hedemann, Senior Researcher

Email: Mette.Hedemann@anis.au.dk

Phone: +45 51 44 8783

Project start

September/November 2022.

Physical location of the project and students work

Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Short project description

Background: Weaning is a major challenge to the digestive system of the young pig, where the diet changes from highly digestible sow's milk rich in protein and fat before weaning to a more complex mainly plant based dry feed with a lower nutrient digestibility after weaning. This transition and change of nutrient flow in the gut leads to profound changes in the microflora, and an increased risk of developing PWD.

The metabolome is a collection of endogenous metabolites, products of the metabolism, metabolites originating from microbial fermentation as well as exogenous metabolites originating from the feed (xenobiotics). Metabolomics is the measurement of the metabolome in biological samples like urine. Changes in the metabolome can reflect altered metabolic pathways or changes in the microflora or its activity. Investigating the urinary metabolome during the period around weaning may provide information on the changes in metabolism imposed by the dietary change at weaning. Furthermore, excretion of xenobiotics that originate from the diet may be a sign that the piglet has consumed dry feed prior to weaning. Finally, microbial metabolites in urine may indicate microbial changes.

The overall aim of the present project is to investigate how the urinary metabolome changes at weaning. Additional research questions are 1) can feed intake prior to weaning be assessed and 2) does the urinary metabolome differ between dietary treatments after weaning.

Activities: An experiment has been performed with 40 litters during the period from birth to two weeks post-weaning. The piglets were provided dry feed, however, as a negative control, a group of piglets were not provided feed prior to weaning. After weaning, one of the four experimental diets were fed. Piglets were euthanised 7 days prior to weaning, at the day of weaning, 5 days post-weaning, and 14 days post-weaning. Urine samples were collected from the bladder. The urine samples will be analysed in this thesis project using a non-targeted liquid chromatography-mass spectrometry (LC-MS) approach. Following, data has to be pre-processed prior to multivariate analysis and important metabolite will be identified using online databases.

Extent and type of project

45-60 ECTS.

Additional information

The student should be interested in laboratory work as well as extensive data processing using various software tools as well as internet-based databases.

Behaviour and welfare in various cow-calf-contact systems

Main subject area

Animal Behaviour and Welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Margit Bak Jensen, Professor

Email: margitbak.jensen@anis.au.dk

Project start

Autumn 2022/spring 2023.

Physical location of the project and students work

AU Foulum

Short project description

Cow-calf contact is practiced in various ways in dairy farming varying in terms of duration (from few days to the whole milk-feeding period), degree of contact (full-time and part time contact) and type (dam rearing vs. foster cow rearing). The scientific literature on the various cow-calf-contact management in dairy production has so far focused on dam-rearing (Sirovnik et al., 2020 J. Dairy Res. 87: 108–114; Meagher, et al 2019 J. Dairy Sci. 102, 5765–5783; Johnsen et al., 2016 Appl. Ani. Behav. Sci. 181, 1–11), while the merging cow-calf-systems in Danish organic dairy production often involves rearing the calves with a cow other than the mother. These systems are either in foster cow systems, or systems where the calves are with the dam during the first part of the milk-feeding period and then reared by a foster cow for the main part of the milk-feeding period. The thesis will review the existing literature on various cow-calf-systems and discuss the welfare implications of the differences in management.

Extent and type of project

30 ECTS.

Additional information

The project involves data collection from video-recording. Please contact for more information.

The effect of feed-additives to reduce methane production on feeding behaviour of dairy cows

Main subject area

The Thesis project integrates behaviour and nutrition.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Margit Bak Jensen, Professor

Email: margitbak.jensen@anis.au.dk

Co-supervisor: Professors Peter Lund or Martin R. Weisbjerg

Project start

Autumn 2022/spring 2023.

Physical location of the project and students work

AU, Foulum

Short project description

Development of feeding strategies to reduce methane emissions from ruminants is important to meet sustainability goals. Novel feed rations and feed additives show promise to reduce methane, but may have undesired side effects. The thesis project aims to investigate the effect of feed rations and feed additives to reduce methane production on dairy cows feeding behaviour and welfare. Data on feeding behaviour will be collected using automatic feed bins (Insentec bins), which records data on feeder visits and feed intake continuously. Based on these data, daily feeding duration, number of meals, feeding rate, as well as feed intake may be calculated. Data originates from three experiments running in 2021 to investigate the effect of various feed-additives and feed-rations on methane production. PhD-students supervised by Peter Lund and Martin R. Weisbjerg will be running these experiments. If feasible, the student will take part in data collection during an animal trial.

Extent and type of project

60 ECTS.

Additional information

The automatic feed bins generate a considerable amount of data that the student will be editing and analysing. Interest in statistic is an advantage.

Play behaviour in dam-reared calves – effect of gradual weaning on play behaviour

Main subject area

Animal behaviour and welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Margit Bak Jensen, Professor

Email: margitbak.jensen@anis.au.dk

Project start

Autumn 2022/spring 2023.

Physical location of the project and students work

AU Foulum.

Short project description

Prolonged cow and calf contact has been shown to promote normal social behaviour, reduce abnormal behaviour and reduce stress and fear responses. On the other hand, this practice increased the calves' response to separation from the cow (see Meagher et al., 2019; J. Dairy Sci. 102:5765–5783 for review). One possible solution to the problem is to develop ways to gradually separate the calf from the cow and wean it off milk. Dam rearing with only part-time contact is suggested to be feasible for dairy production. Part-time cow-calf contact may also ease the stress of separation in combination with gradual weaning methods.

Good animal welfare is about the absence of negative experiences and the presence of positive experiences. Play behaviour is suggested to a good indicator of animal welfare (Boissy et al. 2007, Physiol Behav. 92:375-397). Young animals are motivated to play when their primary needs are met and there is no danger, while the occurrence of play is reduced when there are threats to welfare. The occurrence of play is reduced by weaning in calves (Krachun et al. 2010 Appl. Anim. Behav. Sci. 122:71-76). However, whether gradual weaning methods impact play behaviour less than abrupt weaning has not been investigated.

The thesis project will investigate the effect of daily duration of contact with the cow, as well as gradually restricting the suckling, on calves' play behaviour. The Thesis project will be part of a larger experimental study conducted at AU Foulum 2021-2023 investigating the effect of various cow-calf-contact management on behaviour and welfare of cow and calf.

Extent and type of project

45 or 60 ECTS.

Additional information

The project involves data collection from video-recording. Please contact for more information.

Methane emission from horses

Main subject area

Nutrition, enteric methane emission.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Anne Louise F. Hellwing, Member og Administrative Staff

Email: annelouise.hellwing@anis.au.dk

Phone +45 87157903

Project start

The project would begin in 2022 and has to be finished by the end of 2023.

Physical location of the project and students work

The in vivo study with horses would be done in Foulum and the in vitro study would be done at Norwegian University of Life Sciences.

Short project description

Horses emit methane due to anaerobic fermentation in the caecum and hindgut. Studies on methane emissions from horses are scarce. Therefore, it is important to get better knowledge about what the total methane emission are from horses in Denmark, and which factors affects the methane emission from horses. It is well known that the fibre composition affects the methane emission in both pigs and cows. It is our hypothesis that the fibre digestibility and composition would affect the methane emission in the horse as well.

The project has two parts. The first part is to test different diets in vitro and this part would be done in collaboration with Rasmus Bovbjerg Jensen at Norwegian University of Life Sciences. The study in Norway would be used to decide which feed composition we are going to use in the in vivo study with horses in Foulum. The aim is to measure the methane emissions from horses fed two different rations in the respiration chambers.

Extent and type of project

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data

Additional information

No additional information.

Natural disease protection in horses

Main subject area

Animal science/horses/immunology/disease control.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Rikke Brødsgaard Kjærup, Postdoc

Email: rikke.kjaerup@anis.au.dk

Phone: +45 87157889

Tina Sørensen Dalgaard, Associate Professor

Email: Tina.dalgaard@anis.au.dk

Phone: +45 87158052

Project start

Any time.

Physical location of project and students work

Lab work at Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Possibility to do office work in Aarhus.

Private horse stables for sample collection.

Short project description

Background: The innate immune response serves as early defence against the invasion of pathogens. Some molecules belonging to the innate immune response serve directly as initiators of destruction of the pathogen while others serve as facilitators of phagocytosis by macrophages or dendritic cells. A third group of molecules serve as receptors triggering the onset of an inflammation. The immune-related genes have extensive polymorphisms creating diversity and influencing the immune response of the organism.

The general aim is to study the innate immune genes in the horse and their polymorphisms. This will be done by a literature review and by sequencing selected genes and identifying polymorphisms that may influence the expression and functionality of the proteins.

Extent and type of project

ECTS content is flexible. The degree of lab work is adjustable according to ECTS and interest.

Additional information

The master student will be linked to a group of researchers, postdocs, and PhD-students and their experimental work in on-going projects. The student will get the possibility to be trained in molecular biology and ELISA.

Welfare in dogs, cats and horses

Main subject area

Welfare in family animals (cats, dogs or horses), e.g., within selective breeding, nutrition and feeding, training and behavioural problems, reproductive control, veterinary treatment, abandoned and stray animals; see further description via the link below (in Danish), or contact us for more information:

<https://dyreetik.ku.dk/center-for-forskning-i-familiedyrs-velfaerd/>

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Janne Winther Christensen, PhD, Associate Professor

Email: jwc@anis.au.dk

Phone: +45 87158075

Department of Veterinary and Animal Sciences, KU

Peter Sandøe, Professor

Email: pes@sund.ku

Phone: +45 35333059 (Centre leader)

Or one of the other senior researchers in the Centre for Companion Animal Welfare, depending on subject, see: <https://dyreetik.ku.dk/center-for-forskning-i-familiedyrs-velfaerd/>

Project start

Any time.

Physical location of project and students work

Anywhere.

Short project description

The Centre Companion Animal Welfare provides good opportunities for students with an interest in welfare of dogs, cats and horses to conduct their MSc project under supervision of the affiliated senior researchers. Their expertise comprises a range of welfare-related subjects, such as animal behaviour and training, stress biology, breeding, nutrition and veterinary treatment.

Extent and type of project

30-45-60 ECTS.

Additional information

Driver's license is necessary.

Animal transport and related management

Main subject area

Animal behaviour and welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mette S. Herskin, Senior Researcher

Email: MetteS.Herskin@anis.au.dk

Phone: +45 50502969

Project start

Anytime – depends on project availability.

Physical location of project and students work

Department of Animal Science, AU-FOULUM, Blichers Allé 20, 8830 Tjele.

Short project description

Within farm animal production, there is a strong international trend towards increased transport of animals – fewer and more specialised slaughter facilities means longer transport distances, and more specialised production means that live animals are often moved between production facilities (even across borders). This trend can be seen across almost all the species relevant in Denmark – pigs, cattle and poultry. However, until recently, the majority of research in farm animal welfare has been focused on 'on-farm' issues. At the Department of Animal Science, animal transport is becoming increasingly important, and new master students are welcomed within this area. If you are interested in a thesis focusing on animal transport and related management – such as fitness for transport, cull animals, live exports, long-distance transport or, pick-up facilities (in Danish: udleveringsforhold), export of breeding animals and wish to be part of a group of researchers committed to animal behaviour and stress biology, you are welcome to contact us.

Extent and type of project

45-60 ECTS.

Additional information

The master project will be connected to an ongoing research project involving animal transport. Depending on the choice of topic, the work will take place at AU-FOULUM, 8830 Tjele or in private herds or slaughterhouses. Driving licence will be an advantage.

3R – Refinement of animal experimentation

Main subject area

Animal welfare.

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Mette S. Herskin, Senior Researcher

Email: MetteS.Herskin@anis.au.dk

Phone: +45 50502969

Project start

Anytime – depends on project availability.

Physical location of project and students work

Department of Animal Science, AU-FOULUM, Blichers Allé 20, 8830 Tjele.

Short project description

At the Department of Animal Science, new master students are welcomed within this area. If you are interested in a thesis focusing on animal experimentation and the concept of 3R, and wish to be part of a group of researchers committed to animal behaviour and stress biology, you are welcome to contact us.

Extent and type of project

45-60 ECTS.

Additional information

The master project will be connected to an ongoing research project involving animal experimentation, such as for example metabolism chambers, blood sampling, tube feeding, single housing, fixation and seek to examine effects of the experimental procedures on the welfare of the animals as well as to refine procedures.

Production diseases and general robustness in poultry

Main subject area

Animal science/poultry/disease resilience/disease control/microbiology/immunology.

Department and supervisors

Department of Animal Science/<http://anis.au.dk>

Ricarda Engberg, Associate Professor

Email: Ricarda.Engberg@anis.au.dk

Phone: + 45 87157904

Tina Sørensen Dalgaard, Associate Professor

Email: Tina.dalgaard@anis.au.dk

Phone: +45 87158052

Project start

Start is flexible.

Physical location of project and students work

Lab work and animal experiments at Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Possibility to do office work in Aarhus.

Short project description

The general aim is to study the composition and activity of the intestinal microbiota in relation to nutrition, health, and importance for immune development and function. Moreover, studies may include prophylactic disease control strategies like vaccination and immunity regulation aiming at disease prevention. Ongoing projects focus on diseases related to different pathogens including virus (infectious bronchitis), bacteria (erysipelas, campylobacteriosis, necrotic enteritis and dysbacteriosis) and parasites (worm infections and coccidiosis).

Potential study areas include

- Emerging diseases in organic poultry (layers and broiler) with focus on Erysipelas and worm infections
- Studies on the composition and activity of the intestinal microbiome in relation to nutrition and intestinal disease (zoonotic bacteria and poultry pathogens)
- Interaction between intestinal microbiota and immune system in relation to disease resilience.
- The cross field of nutrition, microbiology and immunology

Extent and type of project

ECTS content is flexible, but projects of 45 and 60 ECTS are preferred. The degree of lab work is adjustable according to ECTS.

Additional information

The master student will be linked to a group of researchers, postdocs, and PhD-students and the experimental work will be related to on-going projects. The student will get the possibility to be trained in, e.g., animal experimentation, microbiology, molecular biology, cell culture, flow cytometry, and ELISA.

Cellular milk for sustainable milk production

Main subject area

Cell biology and sustainable milk production.

Department and supervisor

Department of Animal Science/<https://anis.au.dk/>

Stig Purup, Senior Researcher, Adj. Professor

Email: stig.purup@anis.au.dk

Phone: +45 29345955

Co-supervisor: Yuan Yue, Postdoc, Department of Animal Science

Project start

Any time.

Physical location of the project and students work

The practical work will take part at the Department of Animal Science, AU-Foulum, Blichers Allé 20, 8830 Tjele.

Short project description

Milk from dairy cows provides essential nutrients as part of the diet, and people have a central need for this food. However, dairy cows account for approximately 75% of Danish agricultures emission of the greenhouse gas, methane. One biological approach for reducing greenhouse gas emission is to produce milk in a sustainable way – by *in vitro* biotechnology instead of dairy cows. The aim of the master project is to establish animal cell models for *in vitro* milk production. Mammary epithelial cells are isolated from either the udder of a slaughtered cow or non-invasive from cows milk. Cells are grown in culture medium, differentiated into mammary secreting cells that produce a milk secretome similar to milk from cells in the mammary gland *in vivo*. We have obtained mammary cells from eight cows and these cells can be growth in cultures. The master project can be focused on different aspects of the cellular milk production, such as cell viability, growth and differentiation factors, or sustainable plant-based culture medium.

Extent and type of project

45 or 60 ECTS projects are possible, but 60 ECTS is preferred. This project will be designed and planned in collaboration with the master student, and the student will analyse his/her own data. The MSc student is invited as a co-author if results are being published. No experience with cell-based assays is required.

Additional information

The master project will be connected to our ongoing research project: "What do we drink in 2030? In vitro milk based on cultured cells." More info can be obtained at

<https://dca.au.dk/aktuelt/nyheder/vis/artikel/kan-vi-producere-naeringsrig-og-baeredygtig-maelk-i-laboratoriet>. A number of people is driving from Aarhus to AU-Foulum every day, so transport should be possible without having a car.

Seaweeds as sustainable feed source for ruminants

Main subject area

Sustainable ruminant production, climate.

Department and supervisor

Department of Animal Science/<https://anis.au.dk/>

Mette Olaf Nielsen, Professor

Email: mon@anis.au.dk

Phone: +45 27265701

Co-supervisor

Natalja P. Nørskov, Researcher

Email: natalja.norskov@anis.au.dk

Phone: +45 87158068

Project start

Any time.

Physical location of the project and students work

Practical work will take part at the Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Possibility do to writing at home.

Short project description

Current climate policies represent a serious threat to the cattle industry, since cattle account for appr. 75% of emission from Danish agriculture of the powerful greenhouse gas, methane. It is formed in the forestomach by a special domain of organisms, archaea. Methods to efficiently reduce methane emission is currently not available. Feed-additives that can block the archaea's methane synthesis appears to be the only viable way to achieve reduction targets in time without compromising the entire cattle industry. It has been discovered that a tropical red macroalgae, *Asparagopsis taxiformis*, when fed in small quantities to cattle, virtually blocks the enteric methane emission. The responsible bioactive compounds are part of the algae's defense system against the surrounding environment, but unfortunately they are carcinogenic to humans as well as ozone degrading. Recent analyses in our lab have shown that Northern hemisphere macroalgae do not contain these compounds, but they must have developed other strategies for their defense, which could potentially target archaea. We did indeed discover that some Northern macroalgae species (eg. *Delesseria sanguinea*, *Dictyota dichotoma*, *Sargassum muticum*) induced a partial suppression of methane formation in an in vitro system simulating rumen fermentation. The bioactive compounds responsible for this are as yet unknown, but their use as anti-methanogenic feed additives for ruminants could have enormous market potential – nationally and globally. In the ongoing project ClimateFeed, large number of Northern brown, red and green macroalgae have been screened in vitro for methane-reduction potential. The master project will complement this work by identifying the bioactive compounds, develop protocols for their fractionation/up-concentration/purification, and provide proof-of-concept for their anti-methanogenic potential.

Extent and type of project

30-45-60 ECTS.

Additional information

The master project will be connected to ongoing research projects SeaBioAct and Climatefeed. The master student should be interested in laboratory work and data processing in collaboration with supervisors and lab technicians.

Validation of a new feed additive to prevent methane emission from cattle

Main subject area

Sustainable ruminant production/Climate.

Department and supervisor

Department of Animal Science/<https://anis.au.dk/>

Mette Olaf Nielsen, Professor

Email: mon@anis.au.dk

Phone: +45 27265701

Co-supervisors: Peter Lund, Martin Weisbjerg, Natalja Nørskov, all at Department of Animal Science

Project start

Any time.

Physical location of the project and students work

Practical work will take part at the Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Possibility do to writing at home.

Short project description

Current climate policies represent a serious threat to the cattle industry, since cattle account for appr. 75% of emission from Danish agriculture of the powerful greenhouse gas, methane. It is formed in the forestomachs of ruminants by a special domain of organisms, archaea. Methods to efficiently reduce methane emission are currently not available. Feed-additives that can block the archaea's methane synthesis appears to be the only viable way to achieve reduction targets in time without compromising the entire cattle industry. The aim of the master project is to validate the efficiency of a new potential feed additive to reduce emission of methane from dairy cows, which includes to determine the most optimal strategy for its addition to diets and the safety of using it in relation to both cow and consumer health (milk quality traits).

Extent and type of project

30, 45 or 60 ECTS projects are possible.

Additional information

The master project will be connected to ongoing research projects: No-Methane and BioMilk. The master student will have the possibility to participate in experimental animal trials, laboratory work to establish how the new additive is metabolised in the cow, and data processing in collaboration with supervisors, PhD students and lab technicians.

Isolation and characterisation of hydrogenotrophic bacteria from the rumen

Main subject area

Microbiology/Ruminant production

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Samantha Joan Noel, Researcher

Email: Samantha.noel@anis.au.dk

Phone: +48 87158068

Co-supervisor: Ole Højberg – Dept. Animal science

Project start

Any time.

Physical location of the project and students work

AU Foulum.

Short project description

Ruminant animals rely on the symbiotic relationship with the microbes in their rumens to use feed that is high in otherwise indigestible fibres (e.g., grasses). Hydrogen is a normal end-product of microbial fermentation of feed within the rumen. This hydrogen is then converted into methane, by the ruminal methanogens resulting in unwanted greenhouse gas production. The removal of hydrogen is beneficial for fermentation in the rumen as high hydrogen concentrations can inhibit some rumen bacteria.

Hydrogenotrophic bacteria are bacteria that consume hydrogen as part of their metabolism. They are phylogenetically diverse but have functional similarities. These bacteria are normally not competitive with methanogens (hydrogenotrophic archaea) in the rumen, but they can take over and serve as alternative hydrogen sinks, if the methanogen population is suppressed or lacking. The overall aim of this project is to use hydrogenotrophic bacteria to redirect hydrogen in the rumen into alternative metabolic pathways and producing biomass, which can be absorbed and utilised by the cow.

In this project, we will isolate and establish procedures for cultivation of hydrogenotrophic bacteria. Strains of hydrogenotrophic bacteria will be isolated from the rumen, a culture collection created, and phylogeny of new isolates determined. Hydrogen uptake capacity will be determined in pure cultures of new isolates and selected cultures test in an *in vitro* system.

Extent and type of project

30, 45 or 60 ECTS projects are possible.

Additional information

The proposed project will be connected to the No-Methane project.

Exploring behavioural and cognitive measures to examine positive and negative affective states in finisher pigs

Main subject area

Pig behaviour and welfare, applied ethology

Department and supervisor

Department of Animal Science/<http://anis.au.dk>

Lene Juul Pedersen, Professor

Email: lene.juulpedersen@anis.au.dk

Co-Supervisor: Dr Guilherme Amorim Franchi

Email: amorimfranchi@anis.au.dk

Project start

2022 - To be decided in agreement with the supervisor.

Physical location of the project and students work

AU Foulum, Tjele. An office space will be available, so the student can become part of an active research environment. Naturally, part of the master's thesis work (e.g., video observation, data analysis, literature review, and writing) can be done remotely.

Short project description

Good animal welfare is about the absence of negative affective states and the presence of positive affective states. Accordingly, there is a need to develop and validate measures that can meaningfully investigate the presence of positive and negative affective states as well as be non-invasive and quick. For instance, the presence of positive and negative affective states in animals may be assessed by use of behavioural measures linked to underlying cognitive mechanisms, based on the empirical and theoretical links between affective states and objectively measurable cognitive processes such as engagement with a stimulus (i.e., lateralised movement) (Franchi et al., 2020; Mendl and Paul, 2019). Hence, this project aims to explore the use of tail posture, tail lateralisation and tail motion, and compare these measures against more established behaviour-based welfare measures, such as agonistic behaviour and play, in finisher pigs subjected to pen enrichment.

Extent and type of project

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

Additional information

Prerequisite is the MSc course Animal Behaviour. Some prior data management and statistical analysis skills (e.g., R software) are advantageous. Please contact for more information.

Marbled, tender and environmentally friendly beef

Main subject area

Meat quality, sustainable meat production.

Department and supervisor

Department of Food Science/<http://food.au.dk>

Margrethe Therkildsen, Associate Professor

Email: margrethe.therkildsen@food.au.dk

Co-Supervisor: Fie Følbæk Drachmann, PhD Student

Physical location of the project and students work

Arhus University, Agro Food Park 48, 8200 Aarhus N.

Project start

September 2022.

Short project description

High quality beef – can it be produced from female cross-breed animals from the dairy-production?

Marbled, tender and environmentally friendly BEEF – in Swedish that is “Marmorerad, Mör och Miljövänlig” thus the project is also called 3M. The project aims at producing high quality beef from the off-spring in the dairy-production based at extensive grazing and cross-breeding with beef cattle because cross-breeds have a lower environmental impact per kg meat than pure-bred dairy calves.

We are evaluating the meat quality of 72 heifers from four different geno-types and two different feeding strategies. We are looking in to the texture, the degree of marbling measured chemically and the fatty acid composition. The fatty acid composition may vary depending on the feed, and we know that more grass or grass-based feed will lead to more unsaturated fat, and specifically an increase in healthy omega-3 fatty acids.

Your project can be adjusted to your main interest within this area.

Extent and type of project

Master or bachelor project of 15-60 ECTS.

Additional information

The project will be part of the research project hosted by the Swedish University of Agricultural Science (SLU) and the final outline of the project can be adjusted according to type of project and interest. Department of Food Science is responsible for the meat quality analyses in the project.

<https://www.slu.se/institutioner/husdjurens-miljo-halsa/forskning/forskningsprojekt/marmorerat-kott/>

Quality of grass-based beef

Main subject area

Meat quality, sustainable meat production.

Department and supervisor

Department of Food Science/<http://food.au.dk>

Margrethe Therkildsen, Associate Professor

Email: margrethe.therkildsen@food.au.dk

Physical location of the project and students work

Aarhus University, Agro Food Park 48, 8200 Aarhus N.

Project start

September 2022.

Short project description

Grass-based beef may be the most sustainable way to produce beef in future. However, how does it affect the meat quality?

Future beef production has to be done in a sustainable way, and grass-based beef may be a way forward because it takes into account the animal welfare and the unique capability of cattle to use fibre rich products as feed. However, the impact on the meat and eating quality has to be explored in order for the concept to be accepted by the future consumer. In the research project GrOBEat we work on developing a production strategy for organic beef production from the dairy production, which can lead to high quality products, that will fulfil the consumers expectations in order to establish a trend towards quality before quantity. This will be of benefit for the climate.

In the project, we analyse the texture, content of fat and composition of fatty acids, the content of volatiles and the eating quality and your project can be adjusted to your main interest within this area.

Extent and type of project

Master or bachelor project of 15-60 ECTS.

Additional information

The project will be part of the research project GrOBEat <https://icrofs.dk/forskning/dansk-forskning/organic-rdd-6/grobeat> and the final outline of the project can be adjusted according to type of project and interest.

Genetics for methane emissions in dairy cattle

Main subject area

Animal Genetics, Dairy cattle, Methane and feed efficiency.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Emre Karaman, Tenure-track Assistant Professor

Email: Emre.karaman@qgg.au.dk

Coralia I. Manzanilla Pech, Assistant Professor

Email: Coralia.manzanilla@qgg.au.dk

Project start

To be decided in agreement to the supervisor

Physical location of the project and students work

QGG Aarhus.

Short project description

The main aim would be to do research about methane emissions in dairy cattle, and its interaction with feed efficiency, in order to be able to select for low methane emitting animals and help to the reduction of greenhouse gas emissions.

Project 1. Breed comparison in terms of methane production and feed efficiency for Jersey and Holstein cows. This could include estimation of genetic parameters and identification of genetic regions (alone and in common) associated with methane production and feed efficiency.

Project 2. Investigate further the phenotype for methane concentration, including homogenisation of raw methane data, and determining which distribution or transformation would fit better for methane gas emissions in dairy cattle.

Extent and type of project

30 ECTS-60 ECTS.

Additional information

Use of any of these software packages would be useful: R, Python, SAS.

The ancient alleles in Nordic Holstein cattle

Main subject area

Animal Genomics, Bioinformatics

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Zexi Cai, Tenure-track Assistant Professor

Email: Zexi.cai@qgg.au.dk

Goutam Sahana, Senior Researcher

Email: goutam.sahana@qgg.au.dk

Project start

To be decided in agreement to the supervisor.

Physical location of the project and students work

QGG Aarhus.

Short project description

The retained or swipe of the ancient alleles in modern herds could give us information about the breeding and evolution. Nowadays, we can retrieve publicly available dataset of whole genome sequencing dataset for several bos species, which give us the opportunity to define the ancient alleles. This result could filling some gaps left by previous reported population genetics study of cattle. The project takes advantage of publicly available genomic data.

- Design the suitable pipeline for variants calling
- Defining the ancient alleles
- Population genetics

Extent and type of project

30-45-60 ECTS.

Additional information

Use of any of these software packages would be useful: R, Python.

Verifying the candidate genes of GWAS with RNA-seq data

Main subject area

Animal Genomics, Bioinformatics.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Zexi Cai, Tenure-track Assistant Professor

Email: Zexi.cai@qgg.au.dk

Goutam Sahana, Senior Researcher

Email: goutam.sahana@qgg.au.dk

Project start

To be decided in agreement to the supervisor.

Physical location of the project and students work

QGG Aarhus.

Short project description

With the advance of next-generation sequencing and variants imputation. We have dozens of traits that have been tested with the whole-genome sequencing level of imputed variants. However, the underlined genetic determinates still reminded being verified. Nowadays, more and more RNA-seq dataset are publicly available, which give us the opportunity to utilize these dataset to exam the significant hits we obtained from genome-wide association study

(GWAS).

- Differential expression genes (DEG) analysis
- Integrate DEG result with GWAS hits.
- The shared genetics determinates between highly correlation traits

Extent and type of project

30-45-60 ECTS.

Additional information

Use of any of these software packages would be useful: R, Phyton.

Predictive ability of host genetics and rumen microbial composition for bovine milk content of vitamin B2 and B12

Main subject area

Animal Genomics, microbiomics.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Grum Gebreyesus, Assistant Professor

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Bart Buitenhuis, Associate Professor

Email: bart.buitenhuis@qgg.au.dk

Nina Aagaard Poulsen, Associate Professor

Email: nina.poulsen@food.au.dk

Project start

To be decided in agreement to the supervisor.

Physical location of the project and students work

QGG Aarhus.

Short project description

Studies have established links between vitamin B12 deficiency and several disorders in humans. Milk and dairy product are some of the best sources for several minerals and vitamins, including riboflavin (vitamin B2) and cobalamin (vitamin B12). The primary origin of these water-soluble vitamins is the biosynthesis by the microorganisms in the rumen. Recently, we have shown that the rumen microbial composition can be more predictive of the milk concentrations of acetate and beta-hydroxybutyric acid; the two major ketone bodies in dairy cow. Building up on these methodologies, this master's project will investigate the proportion of variation in milk vitamin B2 and B12 content that can be explained by the cows' genetics and the composition of the microbiome in its rumen. Furthermore, prediction accuracies using genomic and microbial relationship matrices will be compared through cross validation. Genotype and phenotype data on cows and 16S rRNA sequence data are available for the rumen bacterial and archaeal community.

- Estimate proportion of variation in B2 and B12 content of bovine milk explained by host genetics and rumen microbiome
- Identify bacterial and archaeal OTUs significantly associated with B2 and B12 content of milk
- Assess prediction accuracy for B2 and B12 using genomic and microbial relationship matrices

Extent and type of project

30-45-60 ECTS.

Additional information

Use of any of these software packages would be useful: R.

Topics in cooperation with SEGES, Aarhus

Possible lethal mutation in calves from the jersey breed

Main subject area

Genetic, breeding, gene mapping.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/ <http://qgg.au.dk>

Goutam Sahana, Senior Researcher

Email: goutam.sahana@qgg.au.dk

Phone: +45 30577159

Contact person at SEGES Innovation P/S

Kevin Byskov, Special Consultant, Husdyr, SEGES Innovation P/S

Email: kyb@seges.dk

Phone: +45 26621307

Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

It has been noticed that progeny of a specific jersey sire have higher mortality than average in the rearing period and it is speculated if it is due to a lethal mutation. It is of economical and ethical importance to document new lethal mutations and thereby avoid mating between carriers of the mutation. In this study you will work with genotypes, phenotypes and pedigree information.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Breeding for social interaction in slaughter cattle

Main subject area

Genetic, breeding, social behaviour.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Ole Fredslund Christensen, Senior Researcher

Email: olef.christensen@quu.au.dk

Phone: +45 87158029

Contact person at SEGES Innovation P/S

Trine Andersen, consultant, Husdyr, SEGES Innovation P/S

Email: tria@seges.dk

Phone: +4524468559

Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Slaughter cattle are raised in groups, and it is possible that social interaction has an impact on the overall health status and growth rate for the group. There may be a genetic component of how the individual affects the group dynamic and the overall well-being. This study will aim to develop breeding values for social interaction for several traits of economic interest. This will be based on already existing data, and the challenge is to use these data in new ways. Breeding values for social interaction has been studied in pigs, laying hens, mink and other group-housed species, and a literature review should also be part of the project.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Possible explanations for increasing frequency of straight hock angles in dairy cattle

Main subject area

Feeding, breeding period, management, genetic, bone structure.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Morten Kargo, Senior Researcher

Email: morten.kargo@qgg.au.dk

Contact person at SEGES Innovation P/S

Trine Andersen, consultant, Husdyr, SEGES Innovation P/S

Email: tria@seges.dk

Phone: +45 24468559

Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

In the latest years more Danish dairy cows have extreme straight hock angles (rear leg, side view). Though the frequency is still low this is problematic since these extreme cases often lead to early culling. In this study you can focus on which consequences very straight hock angle can have for dairy cattle and find possible disorders related to straight hock angles. Furthermore, there will be a need for a possible explanation for very straight hock angles and thereby a suggestion how to avoid these in the future. We hypothesise that feeding management in the rearing period may affect the development of the hock joint. There might also be an influence from genetic.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Effect of gene myostatin in growing slaughter calves

Main subject area

Genes, genetic, breeding, statistics.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Albert (Bart) Johannes Buitenhuis, Associate Professor

Email: bart.buitenhuis@qgg.au.dk

Phone: +45 87157947

Contact person at SEGES Innovation P/S

Kevin Byskov, Special consultant, Husdyr, SEGES Innovation P/S

Email: kvb@seges.dk

Phone: +45 26621307

Project start

Any time

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

The aim of the study is to quantify the effect of the gene myostatin on direct calving traits and growth traits for slaughter calves with a dairy dam and a beef sire. Calves from sires being heterozygotic for the myostatin gene (e.g., Dubliner) will be used to quantify the effect.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Possible correlation between fertility and frequency of twin births

Main subject area

Genetic, fertility.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

Morten Kargo, Senior Researcher

Email: morten.kargo@qgg.au.dk

Contact person at SEGES Innovation P/S

Trine Andersen, consultant, Husdyr, SEGES Innovation P/S

Email: tria@seges.dk

Phone: +45 24468559

Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Twin births increase risks of calving related diseases and risks of problematic lactation starts. Furthermore, twin calves are often weaker and smaller than singleton calves. Put together twin births lead to more labour work and therefore they are undesirable both economically and for health issues. Twin births are increasing in frequency and we speculate if they are correlated to favourable fertility traits so that we indirectly breed for more twins. In this study, you can examine the causes of twin births and possible solutions.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Correlation between sensors for rumination and actual feed intake

Main subject area

Feeding, sensor data, breeding.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

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Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Feed efficient cattle is favourable both from an economic perspective and a carbon footprint perspective, and therefore measurements of individual feed intake are rated highly by geneticists. However, individual feed intake is difficult and expensive to measure. This study will be based on data from a conventional farm where sensors register rumination of slaughter calves. The aim of the study is to estimate the correlation between measures of rumination and actual feed intake.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Estimating heritability of immunoglobulin (iGg)

Main subject area

Genetic, breeding.

Department and supervisor

Quantitative Genetics and Genomics (QGG)/<http://qgg.au.dk>

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Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Immunoglobulin G (iGg) is measured in milk samples and it is expected to be correlated with cell numbers and mastitis. The aim of the study is to estimate heritability and genetic correlations for iGg. If iGg content in raw milk has an additive genetic component, then it is possible to breed for it and include it in the breeding value estimation.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Heritability of feed efficiency for Holstein cattle with data from a conventional slaughter herd

Main subject area

Genetic, breeding, feed efficiency.

Department and supervisor

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Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Purebred Holstein bulls that are not selected for breeding are raised to slaughter age at conventional slaughter herds. Feed efficient cattle is favourable both from an economic perspective and a carbon footprint perspective. The aim of this study is to estimate heritability of feed efficiency based on data collected in a conventional slaughter herd where individually feed intakes are measured.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.

Compare temperament scores from milking robots and farmer gradings

Main subject area

Temperament.

Department and supervisor

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Project start

Any time.

Physical location of the project and students work

We provide a study place at a student office in QGG Aarhus main campus or SEGES Innovation P/S, Aarhus N.

Short project description

Milking robots register temperament of the cow based on how much it moves before and during milking. In herds without milking robots, the farmer register temperament manually for the cows. The aim of this study is to examine if the two different measuring types are comparable and discuss if they are good proxies for temperament. Temperament needs to be clearly defined before we can get full profit of breeding for temperament.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analysis of issued and edited data sets.

45 ECTS: Experimental theses in which the student is responsible for collection and analysis of his/her own original data.

60 ECTS: Experimental theses in which the student is responsible for planning, trial design and collection and analysis of his/her own original data.

Additional information

No additional information.