

ANIMAL SCIENCE

Theses and Projects

Topics for Theses and Projects Available in 2021 -2022

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/>

Ricarda Engberg

Associate Professor

Member of the Educational Committee ANIS

Email: Ricarda.engberg@anis.au.dk

Phone: +45 8715 7904

Contents

Guidelines	4
Thesis types offered for students at the MSc Agrobiology programme	4
Guidelines for the MSc Thesis Research Proposal	5
Guidelines for writing the Thesis Report	7
Topics	9
Cattle feeding, nutrition and physiology in relation to emissions, efficiency and product quality	9
Variation in feed intake and feeding behavior of bull calves and its relation to age, ration composition, health and performance	10
Production performance and slaughter- and carcass quality of heavy Holstein Friesian young bulls	11
Optimized feed bunker space for slaughter calves to maximize feed intake and growth and improve feeding behaviour	12
Healthy and sustainable production of rosé veal calves	13
Legislation, strategies and decision making regarding antibiotic use in Danish pig and dairy farms	14
Exploring potentials for and implications of reducing the use of antibiotics in organic dairy and calf farming	15
Strategies for implementing cow calf contact systems on Danish organic dairy farms	16
Feed the pigs and train the enzymes prior to weaning – impact on microbiome and microbial metabolites in the gut	17
Animal transport and related management	18
3R – Refinement of animal experimentation	19
Cow-calf contact – how to reduce weaning stress	20
The effect of feed-additives to reduce methane production on feeding behaviour of dairy cows	21
The effect of eight weeks suckling by calf on dairy cow’s milk yield and milk flow in the milking parlour	22
Natural disease protection in horses	23
Welfare in dogs, cats and horses	24
Behavioural responses of service dogs	25
Welfare in laying hens in relation to dust	26
Production diseases and general robustness in poultry	27
Biological activity of plant-based alternatives to cow’s milk	28
Improving outdoor run for organic pigs – animal welfare and/or environmental focus	29
Seaweeds as sustainable feed source for ruminants	30
Key role of palmitoleic acid (C16:1n-7) on energy expenditure to increase piglet survival	31
Investigation of the metabolite signature in urine of suckling and weaned piglets	32
Reduction of enteric methane from dairy cows by essential oils	33
Topics in cooperation with SEGES, Aarhus	34

Guidelines

Thesis types offered for students at the MSc Agrobiography 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 characterization 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 summarized 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

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

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

Martin Riis Weisbjerg, Professor

E-mail: Martin.Weisbjerg@anis.au.dk,

Tel.: +45 8715 8046

and/or

Peter Lund, Professor

E-mail: Peter.lund@anis.au.dk,

Tel.: +45 40157673

and/or

Mogens Larsen, Senior researcher

E-mail: mogens.larsen@anis.au.dk,

Tel: +4587157983

and/or

Mette Olaf Nielsen, Professor

E-mail: mon@anis.au.dk,

Tel: +45 27265701

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 optimize 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.

Additional information

30-45-60 ECTS as appropriate.

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

Main subject area

Animal Science, cattle nutrition and physiology, beef production.

Department and supervisor

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

Mogens Vestergaard, senior scientist

E-mail: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

Project start

2021 - To be decided in agreement with the supervisor.

Physical location of project and students work

Department of Animal Science, AU Foulum, DK-8830 Tjele. Some collaboration with SEGES included on data and data analyses.

Thesis based on analyses of existing feed intake and feeding behavior data from approximately 10 experiments performed at DKC/ANIS/Aarhus University.

Short project description

The main subject area is beef production based on dairy bull calves, feed intake recording, feeding behavior (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 should be related to disease recordings/veterinary treatments, performance of animals and health. The long-term perspective is to minimize feeding-related stress on rumen function and animal health. Datasets are available in Excel and SAS-files.

Additional information

15-30-45 ECTS thesis as appropriate. The BSc or MSc student is invited to co-author a scientific publication.

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

Main subject area

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

Department and supervisor

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

Mogens Vestergaard, senior scientist

E-mail: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

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.

This is based on analyses of existing data from an experiment performed at AU combined with a literature study.

Short project description

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.

Additional information

30-45-60 ECTS thesis as appropriate. The MSc student is invited to co-author a scientific publication.

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

Main subject area

Animal Science, cattle nutrition and physiology, beef production.

Department and supervisor

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

Mogens Vestergaard, senior scientist

E-mail: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

Project start

February or August 2021. 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 can include experimental work at a private rosé veal/young bull farm and 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, and in some cases the feed bunk space is too short to allow for an optimized 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 minimize 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.

Additional information

45-60 ECTS thesis as appropriate.

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>

Mogens Vestergaard, senior scientist

Email: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

Project start

February or August 2021. 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 experimental work at DKC.

Short project description

The main subject area is beef production based on dairy and beef, e.g., dairy 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.

Additional information

45-60 ECTS thesis as appropriate.

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

Mette Vaarst, Senior Scientist, Department of Animal Science, Mette.Vaarst@anis.au.dk

Hanne Kongsted, Researcher, department of Animal Science, Hanne.Kongsted@anis.au.dk

Physical location of the project and students work

Department of Animal Science, AU Foulum.

Project start

Summer 2021, 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 potentials for and implications of reducing the use of antibiotics in organic dairy and calf farming

Main subject area

Organic dairy farming, antibiotic and disease treatment strategies, animal ethics, health and welfare.

Department and supervisor

Mette Vaarst, Senior Scientist, Department of Animal Science, Mette.Vaarst@anis.au.dk
(depending on choice of the MSc student also other researchers from ROADMAP)

Physical location of the project and students work

Department of Animal Science, AU Foulum.

Project start

Summer 2021, 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. Some private companies take initiatives to push a reduction of the use of antibiotics among their producers, and make this as a part of the company's strategy and communication to and with the surrounding society. This creates debates among as well as opportunities and some risks for the producers, who take the responsibilities to change practices and strategies on their farms, and involve their advisors in developing their strategies. This MSc-study will work with Danish dairy farmers, and aims at investigating in particular cases of antibiotic reduction in organic dairy farming and calf rearing.

The main objective of this MSc study will be to investigate and critically analyse the different motivations, drivers, risks, barriers and potential ethical implications of a significant reduction of antibiotics in Danish dairy farming, in a framework of explicitly aiming at reduced antibiotic use. 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 include interviewing and analyzing interviews of relevant farmers, vets, advisors and actors from dairy companies and possibly calf retailers, and evaluate the consequences for different strategies. Based on the MSc-student's choice and planning of the study, statistical / epidemiological analyses can be included.

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 and analysis of data on use of antibiotics).

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 for collaboration with international partners.

Useful reading

Duval, J E; Bareille, N; Fourichon, C; Madouasse, A; Vaarst, M.2017. How can veterinarians be interesting partners for organic dairy farmers? French farmers' point of views. PVM, 146, 16-26.

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

Strategies for implementing cow calf contact systems on Danish organic dairy farms

Main subject area

Dairy farming, farming strategy.

Department and supervisor

Mette Vaarst, Senior Scientist, Department of Animal Science, Mette.Vaarst@anis.au.dk

Lisbeth Mogensen, Senior Scientist, Department of Agroecology, Lisbeth.Mogensen@agro.au.dk

Physical location of the project and students work

Department of Animal Science / Department of Agroecology, AU Foulum.

Project start

Summer 2021, can be decided individually.

Short project description

Dairy farmers throughout Europe have during the past one-two decades begun trials with letting the newborn calf stay with its dam for longer than the traditional 24-48 hours practiced on the majority of organic farms. Several research projects have investigated or are investigating various consequences and various ways of implementing this change in management, which is termed dam-rearing or mother-bonded calf rearing, and other forms of cow calf contact systems such as suckler aunt/nurse cow systems.

The main objective of this project is to develop potential implementing strategies for approx. 10 different organic dairy farms in Denmark that will serve as cases. The three elements in this project is to 1) conduct a literature review required management changes and consequences, 2) Interview of approx. 10 organic dairy farmers who has just started or would like to start having cow calf contact systems, about their perceptions on opportunities and concerns about implementing a cow calf contact system, and 3) outline potential concrete implementation strategies, improvements and their potential consequences including barn layout on these farms.

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

The student should be sufficiently fluent in Danish for communicating with farmers and hold a valid driving license. The project will be part of ongoing cow-calf-systems projects and the MSc student will be part of a research team in collaboration with two Danish dairy companies and Organic Denmark.

Useful reading

- Johnsen et al., 2016. Applied Animal Behaviour Science 181, 1-11.
- Kälber and Barth, 2014. Applied Agricultural and Forestry Research 64, 45-58.
- Weary and von Keyserlingk, 2017. Animal Production Science 57, 1201-1209.

Feed the pigs and train the enzymes prior to weaning – impact on microbiome and microbial metabolites in the gut

Main subject area

Microbiology and nutrition in piglets.

Department and supervisor

Senior Researcher, Nuria Canibe, Nuria.Canibe@anis.au.dk; Phone: 87158058

Physical location of the project and students work

Dept. of Animal Science, Blichers Allé 20, 8830, Tjele

Project start

September 2021

Short project description

Background: Post-weaning diarrhea (PWD) in piglets occurs during the days after weaning due to the social, environmental and dietary stressors imposed to the newly weaned pig. One of the tools to prevent PWD has for decades been inclusion of high dosages of zinc in feed for piglets. However, due to concerns on increased antimicrobial resistance and environmental impact, the European Union has decided to ban the use of zinc oxide at medical levels by 2022. The ban will undoubtedly lead to an undesirable increase in use of antibiotics, and there is an urgent need for reliable alternatives.

Weaning is a major challenge to the young pig. Starch and protein digestibility is low in newly weaned pigs and a flow of undigested starch and protein into the large intestine may contribute to unbalanced which may stimulate growth of pathogenic bacteria and increase the risk of developing PWD. Furthermore, bacterial proteolytic activity in the large intestine results in the production of detrimental metabolites such as ammonia, amines, and phenols, which are believed to increase the risk of PWD. The flow of undigested nutrients into the large intestine may be avoided either by feeding low-protein diets or by using highly digestible protein sources in weaner diets. Reducing the content of dietary protein in the post-weaning diet lowers diarrhea. However, in order to maintain a high performance, the diets have to be supplemented with crystalline amino acids which significantly increases diet costs.

In the present project, we want to take the second approach and provide the piglets with a feed with highly digestible protein sources to allow the full growth potential with a low flow of undigested protein to the large intestine resulting in a lower proteolytic activity in this site.

Objective: The overall aim of the present project is to develop a feeding concept that ensures weaning without development of diarrhea in a production situation without use of high dosages of zinc.

Activities: An experiment will be performed with a total of 10 sows and their piglets during the period from birth to two weeks post-weaning. Four diets will be optimized for the experiment with high and low protein content and with high and low starch and protein digestibility, respectively. Piglets will be euthanized 7 days before weaning, at weaning, 5 days post-weaning, and 14 days post-weaning. Microbial composition in the gut will be measured (16S rRNA sequencing and qPCR of specific groups of bacteria) and metabolites of microbial fermentation of protein and carbohydrates will be determined (short chain fatty acids, lactic acid, biogenic amines, ammonia, indoles and phenols).

We expect to show that providing creep feed with improved starch and protein quality to the piglets will improve nutrient digestibility post-weaning. This will result in lower amounts of fermentable substrate for the microbiota, which in turn will reduce the risk of developing post-weaning diarrhea.

Extent and type of project

45-60 ECTS

Additional information

By September 2021, the animal studies will be performed. The student will be involved in the laboratory analyzing the samples taken, and calculating and interpreting the results.

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 scientist

E-mail: MetteS.Herskin@anis.au.dk

Phone: +45 50502969

Project start

Anytime – depends on project availability.

Physical location of project and students work

At ANIS, AU-FOULUM, 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.

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 scientist

E-mail: MetteS.Herskin@anis.au.dk

Phone: +45 50502969

Project start

Anytime – depends on project availability.

Physical location of project and students work

At ANIS, AU-FOULUM, 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.

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.

Cow-calf contact – how to reduce weaning stress

Main subject area

Animal Behaviour and Welfare.

Department and supervisor

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

Main supervisor: Professor Margit Bak Jensen (margitbak.jensen@anis.au.dk)

Physical location of the project and students work

AU Foulum

Project start

Autumn 2021/spring 2022

Short project description

Cow and calf are typically separated within 24h of birth in the dairy production. Little stress of separation is seen at this stage, but the practice deprives the calf of maternal care. An increased focus on cow-calf contact for animal welfare has initiated research, which focuses on whether a later separation of cow and calf can be a feasible management option. 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.

The thesis project will investigate the effect of daily duration of contact with the cow, as well as gradually restricting the suckling, on calves' behavioural stress responses to weaning and separation. The Thesis project will be part of a larger experimental study conducted at AU Foulum 2021-2022 investigating the effect of cow-calf-contact on behaviour and welfare of cow and calf. The MSc student will be based on AU Foulum and be part of an inspiring research team including a Post Doc, a PhD student, interns and technicians.

Extent and type of project

60 ECTS

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>

Supervisor Professor Margit Bak Jensen

E-mail: margitbak.jensen@anis.au.dk

Co-supervisor Professors Peter Lund or Martin R. Weisbjerg

Physical location of the project and students work

AU, Foulum

Project start

Autumn 2021/spring 2022

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.

The effect of eight weeks suckling by calf on dairy cow's milk yield and milk flow in the milking parlour

Main subject area

Behaviour, management and production.

Department and supervisor

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

Main supervisor: Professor Margit Bak Jensen (margitbak.jensen@anis.au.dk)

Co-Supervisor: Dr. Kerstin Barth, Thünen Institute, Germany

Co-supervisor Ph.D. Student Maja Bertelsen

Physical location of the project and students work

AU Foulum, Tjele. The student will be offered a desk at AU Foulum.

Project start

Data is collected until May 2021 and will be available from then. Project start can be agreed upon with student.

Short project description

One concern about dam-reared calves are their higher milk intake and the possible impaired milk let down by cows. The aim is to assess how dairy cows rearing their own calves behave in the milking parlour. Further, to assess if nursing own calf affects milk let down, flow to the milking machine and yield. In most studies to date, dam and calf have been together full-time. Dam rearing with only part-time contact is less studied, but suggested to be feasible for dairy production. The present study evaluates the effect of contact duration (full-time contact for 8 weeks, half-time contact for 8 weeks, and control group separated at birth) on behaviour in the milking parlour, milk flow and milk yield.

Automatically collected data will be available from a total of 72 cows, collected by SAC software during two daily milkings at the Foulum Research barn (first parity as well as later parity cows). The student edit and analyse this data, collect data on behaviour in the milking parlour and take part of an ongoing project.

Extent and type of project

45 or 60 ECTS

Additional information

Some prior data management skills could be an advantage, as you will be handling large datasets of automatically generated data. Please contact for more 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, post doc

E-mail: rikke.kjaerup@anis.au.dk

Phone: +45 87157889

Tina Sørensen Dalgaard, associate professor

E-mail: 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 scientists, 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

E-mail: jwc@anis.au.dk

Phone: +45 87158075

Department of Veterinary and Animal Sciences, KU

Peter Sandøe, Professor

E-mail: 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 scientists. Their expertise comprises a range of welfare-related subjects, such as animal behaviour and training, stress biology, breeding, nutrition and veterinary treatment.

Additional information

Driver's license is necessary.

Behavioural responses of service dogs

Main subject area

Human-animal interactions
- the response of and the effects on the animal

Department and supervisor

Department of Animal Science (Husdyrvidenskab)/<http://anis.au.dk>
Senior researcher Karen Thodberg
E-mail: Karen.thodberg@anis.au.dk

Physical location of the project and students work

AU-Foulum and different locations in Denmark

Project start

Fall 2021
The project period will be finally decided in May-June 2021

Short project description

The main project investigates how military veterans with PTSD benefit from having a service dog. The thesis project will be a supplement to the main project and focus on the dogs' behavioural responses to being a support for a veteran – especially in stressful situations.

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

Or

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

It is an advantage if the student speaks Danish.
Driver's license is needed.

Welfare in laying hens in relation to dust

Main subject area

Animal behaviour and welfare.

Department and supervisor

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

Anja Brinch Riber, PhD, Senior Researcher

E-mail: anja.riber@anis.au.dk

Phone: +45 87157949

Project start

1st September 2021 (flexible to some degree)

Physical location of project and students work

AU Foulum, Blichers Allé 20, Tjele, and private farms.

Possible to do office work in Aarhus.

Short project description

According to EU legislation on the welfare of both laying hens and broilers, the “[...] dust levels must be kept within limits which are not harmful to the animals” (Directive 98/58 EC, Annex, Paragraph 10). However, limited knowledge exists on how animal welfare is affected by dust, at what level dust is harmful to the animals and how dust levels can be measured in a reliable, valid and feasible way. The latter is a methodology much needed by the official veterinarians conducting inspections of on-farm welfare in broiler and layer farms in all EU member states.

The aim of the master project is 1) to write a mini-review on the effect of dust on the welfare of domestic fowl and 2) to develop a reliable, valid and feasible method for assessment of dust in poultry barns that is usable during animal welfare inspection by official veterinarians.

Extent and type of project

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

Additional information

Driver's license is necessary.

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

E-mail: Ricarda.Engberg@anis.au.dk

Phone: + 45 87157904

Tina Sørensen Dalgaard, associate professor

E-mail: Tina.dalgaard@anis.au.dk

Phone: +45 87158052

Project start

Start and ECTS content are flexible. Projects of 45 and 60 ECTS are preferred. The degree of lab work is adjustable according to ECTS.

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

Additional information

The master student will be linked to a group of scientists, 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.

Biological activity of plant-based alternatives to cow's milk

Main subject area

Animal Science / Cell biology.

Department and supervisor

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

Stig Purup, senior researcher

E-mail: stig.purup@anis.au.dk

Phone: +45 8715 7808 or +45 29345955

Project start

Any time

Physical location of project and students work

Dept. Animal Science, Blichers Allé 20, Building P25, 8830 Tjele, Denmark

Short project description

Food contains compounds that have positive or negative effects on animal and human health. Milk is a good example and is known as the nature's most complete food. Milk contains protein, fat, carbohydrate, vitamins and minerals, but also many compounds with biological effects – called bioactive compounds. These include more than 60 different hormones and growth factors that can affect digestion and function of the gastrointestinal tract, and that are important for development of the newborn and consumers of milk. In recent years, the alternatives to conventional cows' milk have increased with a number of plant-based options: "milks" made from soy, almonds, oats, rice hemp, coconuts and more. Using cell-based models of human or animal tissues, the project will investigate the biological activity of plant-based alternatives, and will elaborate on the healthy or non-healthy effects of these alternatives.

Extent and type of project

45-60 ECTS. This project will be designed and planned in collaboration with the MSc student, and the student will collect and analyse his/her own data. The MSc student is invited as a co-author on an outcoming scientific paper. No experience with cell-based assays is required.

Additional information

A number of people are driving from Aarhus to AU-Foulum every day, so transport should be possible without having a car.

Improving outdoor run for organic pigs – animal welfare and/or environmental focus

Main subject area

Organic pig, On-farm studies, Animal Welfare, Climate impact.

Department and supervisor

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

Tine Rousing*, PhD, senior researcher/Lene Juul Pedersen, professor

and/or

Department of Agroecology/<http://agro.au.dk>

Heidi Mai-Lis Andersen, academic employee

E-mail: tine.rousing@anis.au.dk

Phone: +45 8715 7915

Project start

The master project is part of a research project running in 2021 and 2022. The start of the master project is to be decided in agreement with supervisor.

Physical location of project and students work

Dept. of Animal Science/Agroecology, AU-Foulum, Blichers Alle 20, DK-8830 Tjele.

Data collection takes part on farm in private organic pig farms.

We make an office space available and can hereby offer the student/students to become part of an active research environment, but of course part of the master's thesis can also be written from home.

Short project description

Organic animals should according to legislation have outdoor access. For organic weaned and slaughter pigs the practice in Denmark is typically that the pigs are housed in stables with access to an outdoor run - an outdoor run, which is often a relatively barren yard with concrete floor with a hay rack where roughage or other rooting material are provided. The pigs use the out door run for urination and defecation, and often this is the main usage of these areas, which becomes all wet and dirty which is undesirable from a welfare and environmental point of view.

During 2021 and 2022, Departments of Animal Science and Agroecology are running an research study on improving outdoor runs for organic slaughter pigs aiming at making them more attractive for the pigs and less dirty - and hereby improving the animal welfare and reducing the ammonia evaporation. The improvement of the outdoor runs includes establishing separate rooting and resting areas. The data collection will include behaviour observations (both live and video based) as well as describing the degree of dirtiness of the outdoor run. The student(s) will be able to shape the/their master project(s) as regards content and focus.

Extent and type of project

1-3 master projects can be carried out. The master project(s) include data collection for which reason 45 or 60 ECTS are preferred.

Additional information

Please contact us for further information.

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

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.

Project start

At any time

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.

Key role of palmitoleic acid (C16:1n-7) on energy expenditure to increase piglet survival

Department and supervisor

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

Søren Krogh Jensen, Professor

Email: skj@anis.au.dk

Phone: +45 87158076

Co-supervisor

Peter Kappel Theil, Professor

Email: peter.theil@anis.au.dk

Phone: +45 87157803

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.

Project start

May 2021.

Short project description

Newborn piglets suffers from high mortality, and especially piglets with low birth weight and low intake of colostrum due to competition for the sow's teats are at high risk to die due to hypothermia. Therefore the use of milk replacer become more and more common. Our projects within nutrition and physiology of pigs have focused on increased newborn piglet survival by improvement in colostrum intake, which is important for the thermoregulatory ability. Palmitoleic acid (C16:1n7) is abundant in sow milk, but absent in milk replacers and content in sow colostrum is currently unknown. It is hypothesized that palmitoleic acid plays a key role in cellular energy homeostasis, by activating fatty acid oxidation when cellular energy is low and maybe also by directing cellular glucose utilization towards oxidation. Thus, palmitoleic acid may be a key thermoregulatory compound of energy deficient newborn piglets. The objective of the current study is in a dose response experiment with newborn piglets to investigate the importance of palmitoleic acid on thermoregulation, energy expenditure and fat metabolism in newborn.

Extent and type of project

45-60 ECTS

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 scientist

E-mail: Mette.Hedemann@anis.au.dk

Phone: +45 5144 8783

Physical location of the project and students work

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

Project start

September/November 2021

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 euthanized 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 analyzed in this thesis project using a non-targeted liquid chromatography-mass spectrometry (LC-MS) approach. Following, data has to be preprocessed 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.

Reduction of enteric methane from dairy cows by essential oils

Main subject area

Reduction of methane and carbon foot print from dairy cows.

Department and supervisor

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

Christian Friis Børsting, Senior advisor

E-mail: cfb@anis.au.dk

Phone: +45 5193 8665

Physical location of the project and students work

Take part in an experiment in Foulum some days during February to April 2021. Depending on the wishes of the student and corona restrictions, a major or a minor part of the project may be performed from home. The student will gain insight in experimental work with dairy cows with emphasis on measuring feed intake, methane emission, milk yield as well as effect of feed additives on rumen microbiome. The student will participate in experimental barn work, lab work and statistical data analysis during this thesis. The student will work with a strong group of scientist with focus on reducing the effect of dairy cows on climate and environment.

Project start

Whenever possible – the experiment starts primo February – but OK first to join later; however, important to start some time during March at the latest.

Short project description

Aarhus University (AU) will perform a study about the effect of a feed additive based on essential oils (EO) extracted from plants, on feed conversion rate, methane emission and rumen microbiome in lactating cows. The effect of EO is tested in a diet containing approximately 60% of DM from forage of which the major part will be grass clover silage as often used for organic cows.

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.

Topics in cooperation with SEGES, Aarhus

Master projects can also be conducted in cooperation with SEGES, Aarhus. In this case, the main supervisor has to be from AU, Department of Animal Science and the co-supervisor from SEGES.

For inspiration and information regarding ongoing projects on pigs, ruminants and poultry at SEGES, the student is referred to:

Regarding pigs:

Thomas Sønderby Bruun
HusdyrInnovation
Phone.: +45 8740 5264/+45 2498 3877
E-mail: ths@seges.dk

Regarding ruminants:

Mogens Vestergaard
Sundhed og produktion, kvæg
Phone: +45 2310 3774
E-mail: move@seges.dk

Regarding poultry:

Jette Søholm Petersen
Økologi Innovation
Phone: +45 8740 5381/ +45 2171 7715
E-mail: jtp@seges.dk