

ANIMAL SCIENCE

Master Thesis Projects

Topics for Master Thesis Projects available in 2018-2019

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 selecting a topic for your master thesis project. The catalogue is intended for students of the Master's Degree Programmes in Agrobiolology, in Sustainable Animal Nutrition and Feeding (EM-SANF), 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 at 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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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	10
Behaviour at calving on dairy cows kept on pasture.....	10
Play behaviour in piglets	11
Hoof health in dairy cows: The effect of a new barn	12
Ruminant nutrition (enteric methane production from ruminants).....	13
New quality perspectives in milk and dairy products: phenolic compounds	14
Metabolomics as a tool in nutrition studies	15
Study of mink Mannose-Binding Lectin (MBL) expression in different mink tissues	16
Greenlandic sheep farming on coastal mountains: Productivity and feeding strategies to promote increased meat production with a higher quality on marginal lands	17
Variation in feed intake and feeding behavior of bull calves and its relation to age, ration composition, health and performance.	18
Production performance and slaughter- and carcass quality of heavy Holstein Friesian young bulls.	19
Pro- and pre-biotics for growing calves – effects on health and performance	20
Effect of seaweed on calf health.....	21
Reduced excretion of phosphorous in dairy cows	22
Cattle feeding, nutrition and physiology in relation to emissions, efficiency and product quality.	23
A new method to study immunological communication in chickens.....	24
The return of an old disease in organic and free-range poultry production	25
Study of mink Mannose-Binding Lectin (MBL) expression in different mink tissues	26
Impact of feeding during transition and/or lactation on performance of sows and piglets during lactation.....	27
Kale – a promising source of health beneficial bioactive compounds.....	28
Horse (mare) milk and human health.....	29
Targeting chicken c-type-lectins for novel and sustainable vaccine development.....	30
Organic pig production and prevention of weaning diarrhea	31
Deposition of intramuscular fat in pigs	32
Evaluation of genetic variation in allicin content and antibacterial activity of garlic and ramsons.....	33
Learning and fearfulness in horses.....	34
Effect of shade and/or insect harassment on welfare of horses during summer	35

Guidelines

Thesis types offered for students at the MSc Agrobiology 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:

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

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 fulfill 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? Is 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.minlnv.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: <http://0-www3.interscience.wiley.com.wam.leeds.ac.uk/>

- **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

Behaviour at calving on dairy cows kept on pasture

Main subject area

Animal health and welfare. Animal science, animal behaviour, animal welfare.

Department and Supervisor

Department of Animal Science

Senior Scientist Margit Bak Jensen, MargitBak.Jensen@anis.au.dk

Tel.: 8715 7941

Project start

1 April 2019.

Physical location of project and students work

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

The idea is investigate the effect of providing dairy cows that calve at pasture with the opportunity to seek isolation. Under natural conditions the cow separate from the herd to calve in a naturally sheltered area, if these are available, where she hides her calf for the first period after calving. Also in indoor housing, cows sought isolation if they had the opportunity (Proudfoot et al., 2014; J. Dairy Sci. 97, 2731–2739). The tendency for cows to seek isolation at pasture depends on the availability of natural hiding places (Lidfors, 1994; Appl. Anim. Behav. Sci. 42, 11-28). Farmers often report that cows often use natural hiding places when they calve at pasture in for instance organic production. Provision of calving hides may therefore fulfil the cows' need to isolate at calving and also ease surveillance at calving of cows on pasture. There the aim here is to investigate the effect of 'hides' in the form of calving hutches placed on pasture on cows isolation seeking, calving behaviour and her maternal behaviour compared to no hides. The project also investigates what a cow perceives as an optimal calving site with a sufficient level of isolation. The project will be carried out on a commercial organic dairy farm.

Additional information

Prerequisite is the course 'Behaviour in Domesticated Animals', or 'Animal Behaviour', and a driving licence.

Play behaviour in piglets

Main subject area

Animal science, animal behaviour, animal welfare.

Department and Supervisor

Department of Animal Science

Senior Scientist Margit Bak Jensen, MargitBak.Jensen@anis.au.dk

Tel.: 8715 7941

Co-supervisor: Senior Scientist Lene Juul Pedersen

Project start

Maj or September 2018.

Physical location of project and students work

AU, Foulum, Blichers Allé 20, Tjele.

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*). Play behaviour in piglets includes locomotor play and social play. Play behaviour includes elements of defence and flight, but during play behaviour these elements are exaggerated, repeated, and more variable than during the corresponding functional behaviour. Young animals are motivated to play when their primary needs are met and there is no danger. Studies of piglets and calves have found that the occurrence of play is reduced by weaning (*Krachun et al. 2010 Appl Anim Behav Sci 122:71-76; Donaldson et al. 2002 Appl Anim Behav Sci 79:221-231*), and feeding calves a low milk allowance reduces play behaviour (*Jensen et al. 2015 J Dairy Sci 98: 2568-2575*). Litter size affects the risk of teat competition with increased risk of piglets missing milk let-down in large litters (*Miligan et al. 2001 App Anim Behav Sci 73: 179-191 Andersen et al. 2011 Behav Ecol Sociobiol 65: 1159*) and thus litter size is important for piglet growth (*Pedersen et al. 2016 ANIMAL 9: 1529-1535*) Offering extra milk to large litters is suggested as a solution to a low gain in large litters, but the effect of milk intake on play behaviour is not known. The space allowance affects animals' opportunity to express their motivation to perform play behaviour. For instance, calves housed under small space allowances play less (*Jensen et al. 1998 Appl. Anim. Behav. Sci. 56: 97-108*) and piglets housed in crates play less (*Martin et al. 2015 Appl Anim Behav Sci 69-79*) than animals housed under more spatial conditions.

The study aims to investigate the effect of litter size and milk supplementation under small and large space allowances from 7 days of age until weaning at 28 days of age. The study is conducted in a 2 x 2 x 2 factor design with 108 litters in total. Information on piglet weight is available, as well as video recordings at 7, 14, 21 and 28 days of age for analysis of piglet play and its relation to weight gain as an indicator of whether piglets' primary needs are met and the presence of positive welfare.

Additional information

Prerequisite is the course Behaviour in Domesticated Animals.

Hoof health in dairy cows: The effect of a new barn

Main subject area

Hoof health and animal welfare in dairy cows.

Department and Supervisor

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

Senior scientist Peter Thomsen

E-mail: ptt@anis.au.dk

Phone: 8715 7834

Project start

As soon as possible.

Physical location of project and students work

Research Centre Foulum, herd visits and working from home.

Short project description

The housing environment may play a major role for the risk of hoof lesions in dairy cows.

We have contact with a dairy herd currently building a completely new barn. This mean that we have a unique possibility to compare hoof health in the old and new barn. Would you like to be the one doing this exiting project?

Ruminant nutrition (enteric methane production from ruminants)

Main subject area

Nutrition, dairy cows, environment, feed efficiency, digestibility

Department and Supervisor

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

Peter Lund, senior scientist

E-mail: Peter.Lund@anis.au.dk

Phone: 87158072

Project start

When relevant.

Physical location of project and students work

AU Foulum.

Short project description

Ruminants are important sources for meat and milk, but the production is challenged with respect to utilization of nutrients (e.g. N and P) and enteric methane production.

Additional information

The student will be responsible for her/his own experiment (primarily 60 ECTS projects) or the project can be theoretical. The portfolio of experiments are within ruminant nutrition and feed evaluation. Some experiments are with rumen and intestinal-fistulated dairy cows. Focus on enteric methane production, digestibility in different parts of the gastrointestinal tract as well as rumen environment (VFA- production, pH etc). The student will be involved in lab-analysis of samples as well as statistical analysis of data. A high level of command within ruminant nutrition and physiology is a prerequisite as well as the interest in taking active part of the experiment. This means that the student will be on Foulum on most days, especially during the experimental period.

New quality perspectives in milk and dairy products: phenolic compounds

Main supervisor

Senior scientist, Professor Hanne C. Bertram
Department of Food Science
Aarhus Faculty of Science and Technology
Aarhus University
E-mail: hanne.bertram@food.au.dk
Homepage: <http://food.au.dk/>

Physical location of the project

AU Årslev
Kirstinebjergvej 10
P.O Box 102
DK-5792 Årslev

Project start

Any time.

Main subject area

Food chemistry.

Additional information

Post doc Virginia Artegoitia will be acting as co-supervisor.

Short project description

Phenolic compounds in milk are associated with both health benefits and quality of dairy products. They perform a wide range of metabolic activities: antimicrobial, antioxidant, anti-inflammatory, inhibition of platelet aggregation, and immunological functions, participate in the direct protection of DNA and in the promotion of apoptosis, among other activities.

However, quantitative and qualitative changes in the phenolic compounds in milk and dairy products have not been fully elucidated. Indeed, the potential use of phenolic as functional additives has been embraced by most sectors of the food industry, with the notable exception of the dairy industry. Therefore, the objective of this project is to establish a method based on liquid chromatography-mass spectrometry to determine the concentration of different phenolic compounds in milk and dairy products to contribute to the understanding of milk composition and potential benefits in dairy products.

Metabolomics as a tool in nutrition studies

Main subject area

Animal Nutrition / Animal Science / Human health

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 8715 8078

Project start

Any time.

Physical location of project and students work

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

Short project description

Metabolomics is the detection of low molecular weight metabolites and their intermediates from biological samples (blood, urine, digesta, tissue etc.). The metabolome is made up of endogenous metabolites, products of the metabolism, metabolites originating from the microbial fermentation as well as exogenous metabolites originating from the feed, e.g. phytochemicals. Changes in the metabolome may thus reflect altered metabolic pathways or changes in the microflora or its activity.

In the Molecular Nutrition and Reproduction group we have samples from several dietary intervention studies where metabolomics analyses are relevant. We have samples from studies with a human health perspective but it is also possible to do experiments where the aim is studies on animal nutrition and health.

Examples of studies and sample types:

- Urine samples from obese Göttingen minipigs fed diet with low or high protein and low or high dietary fibre.
- Urine samples from horses fed different diets and sampled before and after training.

Additional information

The master's student should be interested in laboratory work as well as extensive data processing using various software tools as well as internet based databases. We have samples for the study at hand.

Study of mink Mannose-Binding Lectin (MBL) expression in different mink tissues

Main subject area

Animal Health and Welfare / Mink immunology / qPCR

Department and Supervisor

Department of Animal Science

Post doc Rikke B. Kjærup

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

Telephone: 87 15 78 89

Project start

Project start and ECTS content flexible.

Physical location of project and students work

Flexible.

Possibility to do office work in Aarhus.

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

Short project description

Background: Mannose-Binding Lectin (MBL) is an important innate factor in disease protection and MBL has a high affinity for binding to mannose and other sugar residues present on the cell wall of bacteria, viruses and parasites. MBL is an acute phase protein and mainly secreted by hepatic cells. Results from our lab have shown that low amount of circulating MBL is associated with increased disease severity after infection. These results as well as other studies from mammals, show that MBL plays a major role in disease resistance. In other species extra-hepatic production of MBL has been reported. So far MBL is unstudied in mink. However, indications of MBL being present in mink have been observed.

Aims: To determine MBL gene expression in selected tissues from healthy and sick mink.

Research plan: The student will purify RNA from the sampled tissues. MBL gene expression will be analyzed by qPCR. If possible the student will also study gene expression of other acute phase molecules.

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 be trained in RNA purification, reverse transcriptase and real-time PCR.

Greenlandic sheep farming on coastal mountains: Productivity and feeding strategies to promote increased meat production with a higher quality on marginal lands

Main subject area

Livestock farming and productivity. Animal nutrition and feeding.

Department and supervisor

Main supervisor: Troels Kristensen, senior scientist

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

Email: Troels.Kristensen@agro.au.dk

Co-supervisor: Jakob Sehested, associate professor

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

Email: Jakob.Sehested@anis.au.dk

Co-supervisor: Jesper Overgård Lehmann, postdoc

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

Email: JesperO.Lehmann@agro.au.dk

Project start

Summer 2018 or as soon as possible.

Physical location of project and student work

Department of Agroecology, Aarhus University Foulum

Blichers Alle 20

8830 Tjele

Short project description

Greenlandic sheep farming in the subarctic is characterised by extensive mountain grazing during summer and supplemental feeding of breeding ewes inside during winter. Climate change is causing more severe and more frequent droughts, which affects pasture availability and quality as well as winter-feed production potential. Most lambs are slaughtered directly from pasture, and there is an apparent large variation between lambs in slaughter-weight and carcass quality. This thesis should focus on production strategies and nutritional needs required to raise lambs on extensive pastures under subarctic conditions, which support a sufficient weight gain and carcass quality. Furthermore, this thesis should include an analysis of the productivity of Greenlandic sheep over the past 6-7 years, which in combination with the literature review can be used to come up with a guideline for Greenlandic farmers.

Additional information

The student should have sufficient background in ruminant nutrition and farming systems as well as good data and analytical skills.

The following data is available for around 40 Greenlandic farmers and should be analysed as a part of the thesis:

- Feed production and feed purchases per farm for 2010 – 2016
- Herd size, lambing rates and mortality per farm for 2011 – 2016
- Slaughter weight and quality per lamb and sheep per farm for 2010 - 2017

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
Faculty of Science and Technology
Aarhus University
Homepage: <http://anis.au.dk>

Mogens Vestergaard, senior scientist

Email: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

Project start

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.

Thesis based on analyses of existing feed intake and feeding behavior data from experiments performed at the Aarhus University combined with a literature study.

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

30-45-60 ECTS thesis as appropriate. The 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
Faculty of Science and Technology
Aarhus University
Homepage: <http://anis.au.dk>

Mogens Vestergaard, senior scientist

Email: mogens.vestergaard@anis.au.dk

Phone: +45 8715 7843

Project start

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.

Thesis 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.

Pro- and pre-biotics for growing calves – effects on health and performance

Main subject area

Animal Science, cattle nutrition and physiology, calves. Animal Health and Welfare.

Department and Supervisor

Department of Animal Science
Faculty of Science and Technology
Aarhus University
Homepage: <http://anis.au.dk>

Mogens Vestergaard, senior scientist
Jakob Sehested, associate professor
Email: mogens.vestergaard@anis.au.dk
Phone: +45 8715 7843

Project start

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.

Thesis is based on a field trial with pre- and pro-biotics fed in the milk to unweaned calves used for beef production combined with a literature study.

Short project description

Dairy bull calves to be used for beef production are exposed to many environmental, feeding and health-related challenges when sold from the dairy producers to the specialized beef producer. This is due to mixing of calves from many dairy herds, new feed rations etc. Attempts to improve the robustness and health of the calves include strategic feeding interventions. Also, there is a common wish to reduce diseases and the use of medication. A field trial in private slaughter calf productions will be performed in late 2018 to early 2019. Calves arriving from private dairy farms will be given pre- or probiotics in the milk. Recordings from calves will include live weights, growth rates, analyses from blood samplings, and clinical scorings. A smaller number of calves will be slaughtered in order to study changes in the microbiota and fermentation patterns as well as intestinal parameters. The specific topic will be decided together with the student. Visits to private farms and hands-on recordings can be expected.

Additional information

45-60 ECTS thesis as appropriate.

Effect of seaweed on calf health

Main subject area

Ruminant nutrition and physiology.

Department and Supervisor

Department of Animal Science

Jakob Sehested, Associate Professor

E-mail: jakob.sehested@anis.au.dk

Phone: +45 8715 7893

Project start

Late August 2018.

Physical location of project and students work

Aarhus University, Foulum.

Short project description

There is a documented effect of seaweed extracts on intestinal function in piglets, and seaweed further contains a range of proteins and minerals. Some farmers practice to feed seaweed products to young animals to increase their health status. In this project we will use seaweed harvested in Danish coastal areas as a supplement (as a dried and milled powder) for pre-weaned calves to document effects on animal health. It is planned to mix the seaweed into the milk and to study effects on calf performance and health, blood parameters and intestinal health. The tasks include experimental treatment of calves, clinical recordings, registrations and data sampling, and analyses.

Additional information

The project is suitable for a master thesis for students with an animal science or veterinary background.

Read more about the project at <https://tangnu.dk/>

Reduced excretion of phosphorous in dairy cows

Main subject area

Ruminant nutrition and physiology.

Department and Supervisor

Department of Animal Science

Jakob Sehested, Associate Professor

E-mail: jakob.sehested@anis.au.dk

Phone: +45 8715 7893

Project start

Late August 2018.

Physical location of project and students work

Aarhus University, Foulum.

Short project description

Farmers are met with new restrictions on the amount of manure phosphorous (P) they apply to their land. At the same time dairy cows are fed a dietary P level above their requirement. This means, that dairy farmers need more land per cow, or need to reduce the manure P content through less dietary P or a higher P utilization in the animals. Therefore there is a need for more knowledge on the utilization and excretion of P in dairy cows. The purpose of this project is to: 1) Quantify the manure P content at feeding according to recommended dietary P-levels; 2) To test the effect of dietary phytase on P utilization in cows fed according to recommended dietary P-levels.

The tasks include experimental treatment of cows, registrations and data sampling, and analyses.

Additional information

The project is suitable for a master thesis for students with an animal science or veterinary background.

Read more about the project at <http://anis.au.dk/forskning/projekter/reduceret-udskillelse-af-fosfor/>

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, AU-Foulum.

Professor Martin Riis Weisbjerg, Martin.Weisbjerg@agrsci.dk

Senior Scientist Peter Lund, Peter.lund@agrsci.dk

Associate Prof. Jakob Sehested, Jakob.sehested@agrsci.dk

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. The MSc student is invited as a co-author on the outcoming scientific paper.

A new method to study immunological communication in chickens

Main subject area

Animal science / chicken health / disease protection.

Department and Supervisor

Department of Animal Science

Tina Dalgaard MSc, PhD

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

Telephone: 87 15 80 52

Project start

Project start and ECTS content flexible. Degree of lab work adjustable according to ECTS.

Physical location of project and students work

Flexible. Possibility to do office work in Aarhus. Lab work at Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Short project description

Project subject: Validation of an ELISPOT assay for detection of avian interferon gamma.

Background: Interferon gamma is an important cytokine in adaptive immunity. Production of interferon gamma can be assessed by numerous methods but the ELISPOT technique provides both qualitative (type of immune protein) and quantitative (number of responding cells) information in a simple and inexpensive way. When established the method will be used for monitoring avian immune responses in experimental vaccination/infection studies.

Aim: To establish and validate an ELISPOT assay for detection of avian interferon gamma as a parameter for T cell mediated immunity.

Methods: The student will coat a polymer membrane in micro plates with capture antibody and add cells of interest stimulated with specific antigen or mitogen. After culture, produced interferon gamma will be visualized on the membrane with a detection antibody. The assessment of interferon gamma production under different conditions by ELISPOT will be compared with interferon gamma detection by other methods e.g. intracellular staining and flow cytometry. If time allows it, the assay will be applied to samples from an experimental infection.

Additional information

The master student will be attached to a group of scientists, post docs, and PhD-students and their experimental work in on-going projects. The student will primarily be trained in cell culture and the ELISPOT technique but other relevant techniques like ELISA and flow cytometry can be included in the project.

The return of an old disease in organic and free-range poultry production

Main subject area

Animal science / organic chicken / health / robustness/ disease resistance.

Department and Supervisor

Department of Animal Science

Tina Dalgaard MSc, PhD

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

Phone: +45 87 15 80 52

Project start

Project start and ECTS content flexible. Degree of lab work adjustable according to ECTS.

Physical location of project and students work

Flexible. Possibility to do office work in Aarhus. Lab work at Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Short project description

Erysipelas is a severe infectious disease caused by the bacterium *Erysipelothrix rhusiopathiae* (ER). Following the change in housing for laying hens in Europe, erysipelas has become an emerging disease in several countries with outbreaks of high mortality in layer flocks in indoor aviaries and free-range/organic production. Erysipelas is a well-known acute disease in pigs and a suspected cause of arthritis and considerable economic losses in organic pigs. Erysipelas is difficult to prevent in the growing sector of animal friendly production systems for pigs and poultry. Moreover, ER infections constitute an occupational hazard for humans (zoonosis).

Although a well-known disease, vital basic knowledge particularly on the infection in chickens, is lacking. The work will comprise establishment of an experimental model including definition of optimal conditions to reproduce the disease observed in the field. We will then use the model to study the pathogenesis of the disease and immune reactions elicited by the infection.

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 e.g. animal experimentation, cell culture, flow cytometry, and ELISA.

Study of mink Mannose-Binding Lectin (MBL) expression in different mink tissues

Main subject area

Animal Health and Welfare / Mink immunology / qPCR.

Department and Supervisor

Department of Animal Science

Post doc Rikke B. Kjærup

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

Telephone: 87 15 78 89

Project start

Project start and ECTS content flexible

Physical location of project and students work

Flexible. Possibility to do office work in Aarhus. Lab work at Department of Animal Science, AU-Foulum, DK-8830 Tjele.

Short project description

Background: Mannose-Binding Lectin (MBL) is an important innate factor in disease protection and MBL has a high affinity for binding to mannose and other sugar residues present on the cell wall of bacteria, viruses and parasites. MBL is an acute phase protein and mainly secreted by hepatic cells. Results from our lab have shown that low amount of circulating MBL is associated with increased disease severity after infection. These results as well as other studies from mammals, show that MBL plays a major role in disease resistance. In other species extra-hepatic production of MBL has been reported. So far MBL is unstudied in mink. However, indications of MBL being present in mink have been observed.

Aims: To determine MBL gene expression in selected tissues from healthy and sick mink.

Research plan: The student will purify RNA from the sampled tissues. MBL gene expression will be analyzed by qPCR. If possible the student will also study gene expression of other acute phase molecules.

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 be trained in RNA purification, reverse transcriptase and real-time PCR.

Impact of feeding during transition and/or lactation on performance of sows and piglets during lactation

Main supervisor (including e-mail and telephone number)

Peter K. Theil (Peter.Theil@anis.au.dk).

Physical location of the project

Department of Animal Science, Aarhus University, Foulum.

Project start

Any time.

Extent and type of project

30 ECTS: Theoretical thesis based on literature studies and/or analyses of issued 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.

Main subject area

Nutrition and physiology of late gestating / lactating sows. Improved production of colostrum and milk yield to reduce piglet mortality and increase robustness of the offspring.

Additional information

You are most welcome to contact me by E-mail and to visit my homepage

[http://pure.au.dk/portal/da/persons/peter-kappel-theil\(1869a922-3d79-4a49-8eac-148b15f19bfb\).html](http://pure.au.dk/portal/da/persons/peter-kappel-theil(1869a922-3d79-4a49-8eac-148b15f19bfb).html)

Short project description

Background: Recent research has documented that feeding during transition and lactation periods is highly important to maximize performance of sows and piglets. The transition period is characterized by an abrupt change from gestation to lactation, and feeding is important to allow the sows to farrow fast and thereby minimize stillborn piglets. Furthermore, colostrum is produced in the mammary gland and that is crucial for the piglets in order to survive the first few days of life. At d 2, milk production is initiated and then the milk yield increases greatly from day to day until the third week of lactation. A deeper insight into the nutrient requirements and development of new feeding strategies are necessary to improve the performance of the sows.

Aim: Improve the performance of suckling piglets and/or lactating sows

Methods: Feeding strategy or feed composition or both around parturition may be manipulated with the aim of improving the performance of sows (yield of colostrum and milk) and the performance of piglets (intake of colostrum and milk and their survival) will be measured.

Kale – a promising source of health beneficial bioactive compounds

Main subject area

Human health / cell biology.

Department and Supervisor

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

Stig Purup, senior scientist

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

Phone: 8715 7808

Project start

Any time.

Physical location of project and students work

Department of Animal Science, AU-Foulum.

Short project description

Vegetables are an important part of the human diet and are known to contain a major source of biological active substances with potential health promoting effects in humans such as in type 2 diabetes, but may also have satiety-inducing effects suppressing appetite and therefore being potential beneficial in challenging obesity. Kale and root vegetables are of specific interest due to their content of bioactive secondary metabolites. Identification of these bioactive components and their effect are of significant interest for both the pharmaceutical and nutraceutical industry.

The aim of the MSc project is to study the health beneficial or disease preventing properties of different sorts of kale. Cell-based models chosen from our portfolio of cell-based models will be used to assess the effects of kale after small intestine digestion performed in an in vitro model.

Additional information

30-45-60 ECTS. As a MSc student you will be trained in cell culture work and also be involved in current activities in our cell biology and reproduction platform at the institute. For more information, please contact Stig Purup.

Horse (mare) milk and human health

Main subject area

Human health/ cell biology.

Department and Supervisor

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

Stig Purup, senior scientist

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

Phone: 8715 7808

Project start

Any time.

Physical location of project and students work

Department of Animal Science, AU-Foulum.

Short project description

Mare milk is a traditional foodstuff consumed in several European countries, such as Germany, Italy and the Netherlands, and it has been reported that 30 million individuals regularly consume mare milk worldwide. The increased interest in consuming mare milk is considered to be associated with special nutritional and therapeutic properties of mare milk, including influence on the bowel flora, metabolic disorders, arthritis and cancer. It is therefore of importance for both the elderly, convalescent and newborn. The whey fraction of mare milk contain a number of bioactive components that can have special health beneficial effects on animal and humans. Identification of these bioactive components and their effect are of significant interest for both the pharmaceutical and nutraceutical industry.

The aim of the MSc project is to study the health beneficial or disease preventing properties of mare milk. Based on a literature review, cell-based models will be chosen from our portfolio of cell-based assays, and relevant parameters will be measured after treatment of cells with whey fractions of milk collected from individual mares.

Additional information

30-45-60 ECTS. As a MSc student you will be trained in cell culture work and also be involved in current activities in our cell biology and reproduction platform at the institute. For more information, please contact Stig Purup.

Targeting chicken c-type-lectins for novel and sustainable vaccine development

Main subject area

Animal Health and Welfare / Chicken Immunology / Disease Protection / Vaccine Development.

Department and Supervisor

Department of Animal Science

PhD fellow Frederik T. Larsen

E-mail: ftl@anis.au.dk

Telephone: 87 15 60 00

Project start

Project start and ECTS content flexible.

Physical location of project and students work

Office work and project writing is flexible and can be performed in Aarhus.

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

Short project description

Background: C-type lectins (CTLs) comprise a large superfamily of carbohydrate binding proteins. Myeloid CTLs are present on the cell surface of innate immune cells such as NK cells, macrophages, and dendritic cells where they can function as pathogen recognition receptors (PRRs). PRRs bind pathogen-associated molecular patterns (PAMPs) present on pathogens, which lead to activation of cell signalling pathways or receptor-mediated endocytosis and subsequent antigen presentation via MHCI or MHCII. Direct targeting of CTLs on dendritic cells with carbohydrate ligands coupled to specific viral/or bacterial antigens can be exploited in vaccine development. Use of biodegradable carbohydrates as adjuvants is a novel and sustainable approach, which show great promise in disease prevention in domestic animals.

Aims: To determine gene expression of a chicken c-type lectins in mucosal and immunological organs from chickens. Construction, furthermore, of plasmids containing certain chicken c-type lectin carbohydrate-recognition domain (CRD) linked to Fc portion of antibodies in order to find carbohydrate ligands to be used as adjuvants.

Research plan: The student will purify RNA from sampled tissues. CTL gene expression will be analysed by qPCR. Depending on project size/ECTS amount, the student will also construct plasmids containing coding sequences of CRD-Fc fusion proteins.

Additional information

The student will work together with researchers, postdoctoral researchers, and PhD-students in a down-to-earth working environment. The experimental work will be part of cutting edge research in on-going projects. The student will acquire experimental know-how in RNA purification, reverse transcriptase, quantitative PCR, molecular cloning, and possibly cell culture handling.

Organic pig production and prevention of weaning diarrhea

Main subject area

Animal health and welfare, animal science.

Department and Supervisor

Senior Scientist, Head of section, Charlotte Lauridsen (charlotte.lauridsen@anis.au.ak)
Immunology and Microbiology, Department of Animal Science, AU-Foulum

Project start

February 2017.

Physical location of project and students work

AU-Foulum.

Short project description

Diarrhoea is a frequently observed production disease in organic pig production, although the weaning age is higher than in conventional production. From a theoretical point of view, the gastrointestinal tract should be more resilient at 7 weeks comparing to 4 weeks of age at weaning. Resilience and robustness against infectious diseases depends on the immunological matureness and the composition of the microflora. Both conditions are probably highly influenced by the dietary treatment, i.e. the provision of sow milk and the intake of feed pre- and post-weaning. In addition, the frequency of diarrhoea seems to depend on the season, as more diarrhoea is observed during the late Summer/Autumn than during Spring-time. In order to identify strategies to ensure an optimal gastrointestinal health in piglets reared in organic production systems, there is a need to investigate how the composition of the microflora and the immune responses of the gut are influenced by the sow and the weaning strategy, and time of the year.

This project consists of the following parts:

- Establish whether microbial composition and immune responses of the gut are influenced by the weaning strategy (abrupt versus gradually weaning)
- Establish whether microbial composition and immune responses of the gut are influenced by the season
- Investigate how diarrhoea in organic piglets can be prevented using alternative strategies to high levels of zinc.

Additional information

The MSc project will be conducted in close connection to similar projects and there will thus be other scientists and technicians involved, who can support the MSc student theoretically as well as practically.

Deposition of intramuscular fat in pigs

Main subject area

Animal nutrition and product quality.

Department and Supervisor

Senior scientist, head of section, Charlotte Lauridsen (charlotte.lauridsen@anis.au.ak)
Immunology and Microbiology, Department of Animal Science, AU-Foulum

Project start

September 2017.

Physical location of project and students work

AU-Foulum.

Short project description

The content and composition of intramuscular fat is of major importance for the quality of pork and pork products. Breeding towards leaner pigs has reduced the content of intramuscular fat, but also other factors such as sex, slaughter weight, and age can influence the content of intramuscular fat. Less researched is the influence of dietary effects on the deposition of intramuscular fat, and there is an increasing interest in the modern swine production to influence the quality of the pork by dietary means. New lipid sources available for pig nutrition and specific fatty acid molecular structure may influence the deposition in the intramuscular fat, and the aim of this thesis project is therefore to perform a literature synthesis of existing information on the potential effects of various lipids sources and derived products on the influence of the formation and deposition of the intramuscular fat in relation to the quality of pork.

Evaluation of genetic variation in allicin content and antibacterial activity of garlic and ramsons.

Department and supervisor

Department of Food Science (FOOD), AU-Aarslev, Martin Jensen, senior scientist, Martin.Jensen@food.au.dk, tel.: 87158331, mobile: 40594286.

Co-supervisor: senior researcher Ole Højberg, Department of Animal Science (ANIS), AU-Foulum.

Physical location of the project and students work

Shared between FOOD, AU-Aarslev, 5792 Aarslev and ANIS, AU-Foulum, 8830 Tjele.

Project start

Start any time, length from 6 - 9 months.

Main subject area

Chemical characterization of variation in allicin concentration by HPLC in a Danish genetic pool of wild ramsons and cultivated garlic varieties. Evaluation of variation in antibacterial activity against pathogenic E coli, including demonstration of dose-response effects.

Short project description

FOOD has in recent years together with ANIS and DMRI (Danish Meat Research Institute) built up knowledge on food-based plants with antibacterial compounds that may be used in both food preservation and as an alternative to antibiotics and zinc oxide in livestock production. The compound allicin, found in both ramsons (*Allium ursinum*) and in garlic (*Allium sativum*), is known for its antimicrobial properties and using dried powders from these species has shown very promising effects against several pathogenic bacteria. Especially E. coli may be controlled effectively by adjusting the content of allicin to provide an effective dose. Only limited knowledge is, however, available on the variation of allicin in different plant material of ramsons and garlic, and expanding this knowledge is crucial for ensuring reproducible antibacterial activity and for optimizing plant production and lower costs. This study will investigate the biochemical concentration of allicin (FOOD) in a range of plant material of the two species focusing on Danish produced plant resources. In addition, the study will evaluate the antimicrobial activity (ANIS) of the same samples and establish a firm dose-response base for the antibacterial activity of allicin. The outcome of this MSc study is a scientific manuscript ready for submission.

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

The study will be aligned to an ongoing FOOD project RAMVAR that collect ramsons from all over Denmark for characterization of phenotypic and genotypic differences in growth and chemical contents. Plant material will be available at FOOD. Antibacterial test methods using pathogenic E coli are available at ANIS, where Ole Højberg is expert in microbiology with relevance for animal production.

Learning and fearfulness in horses

Main subject area

Behaviour and Stress Biology.

Department and Supervisor

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

Janne Winther Christensen, Associate professor

E-mail: jwc@anis.au.dk

Phone: +4587158075

Project start

The projects are independent and can start any time.

Physical location of project and students work

Can be conducted at private horse facilities and studs.

Short project description

I have a number of suggestions for Master projects on horses learning and training. For example, social learning between humans and horses and the salience of positively and negatively reinforced cues. It is also possible to conduct projects on horse fearfulness, e.g. measuring the effect of environmental enrichment as well as breed differences. Contact me if you are interested in a project.

Additional information

You need to be able to work independently and mainly collect the data on your own. Access to a car is also needed (unless you have private contacts and live close to a stud where the project can be conducted).

Effect of shade and/or insect harassment on welfare of horses during summer

Main subject area

Behaviour and Stress Biology.

Department and Supervisor

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

Janne Winther Christensen, Associate professor

E-mail: jwc@anis.au.dk

Phone: +458715 8075

Project start

The data collection must be conducted during summer.

Physical location of project and students work

Can be conducted at private horse facilities and studs.

Short project description

There is increasing interest in the welfare of animals kept 24-h on pasture. Recent data suggest that even under Scandinavian conditions, horses may benefit from access to shade during hot summer days. Also, horses may suffer from insect harassment during summer and access to shelters can decrease insect bites. The project can either focus on the effect of shade provision on risk of heat stress, or on strategies to reduce insect harassment.

The data collection will consist of registrations of behaviour, direct observations and/or using video recordings, measurements of rectal and surface temperature and perhaps insect trapping.

Additional information

You need to be able to work independently and collect the data on your own. Access to a car is also needed (unless you have private contacts and live close to a stud where the project can be conducted).