

ANIMAL SCIENCE

Master Thesis Projects

Topics for Master Thesis Projects available in 2013-2014

Department of Animal Science

Aarhus University



Master Thesis Projects

Topics for master thesis projects available in 2013-2014

Preface

This catalogue of master thesis projects available in 2013-2014 at 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 Agrobiological, Sustainable Animal Nutrition and Feeding, Biology and for other animal science related master degree students who would like to do their master thesis project at Aarhus University.

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/>

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/students/>

Jakob Sehested

Associate Professor

Degree programme director for Agrobiological (M.Sc.)

Degree programme director for Sustainable Animal Nutrition and Feeding (M.Sc.)

Email: Jakob.Sehested@agrsci.dk

Tel.: +45 8715 7893

Three thesis types are 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 can be found here:

<http://studerende.au.dk/en/studies/subject-portals/agroecology-food-and-environment/undervisning-og-eksamen/undervisning-danish-only/saerligt-for-kandidatstuderende/masters-thesis-and-open-projects/>

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New feeding concept for dairy calves

Main subject area

Animal Health and Welfare / Dairy calves / Animal nutrition and health

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and literature study.

Short project description

Different intensive feeding experiments have been performed (2006-2010) with milk-fed calves. In some experiments we studied alternative low starch concentrates, in other we studied various grass-based silages/hay and the selection preferences of the calves to type of concentrate and to type of roughage. In some experiments rumen metabolism was studied. Experimental data on feed intake and growth, and samples from rumen, rumen wall, and blood are available for further analyses. Some laboratory work and statistical analysis can be expected. International publishing will be possible

Additional information

2 x MSc-project will be possible.

Datasets are available in Excel and SAS-files

Crossbreeding as a tool to enhance production performance and carcass value of dairy bull calves

Main subject area

Animal Health and Welfare / Animal nutrition and health / Beef production

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and literature study.

Short project description

The main subject area is beef production based on dairy bull calves and calves arising from crosses between a dairy breed and a beef breed. Recordings from designed experiments include feed intake recording, performance, carcass quality and animal health. A recent experiment showed improved performance of crossbreds but will they fit into existing beef production concepts? (MSc-project).

Additional information

Datasets are available in Excel and SAS-files

Estimation of day-to-day variation in feed intake of bull calves and its relation to ration composition, health and performance

Main subject area

Animal Health and Welfare / Animal nutrition and health / Beef production

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and literature study.

Short project description

The main subject area is beef production based on dairy bull calves, feed intake recording, performance, and animal health. To investigate the influence of ration composition, e.g., total mixed rations vs. pelleted concentrate feeding, on the feed intake patterns. The aim is to estimate the variation in feed intake between days and within days in growing young bulls and relate the findings to disease recordings/veterinary treatments, performance of animals and health with a long term perspective of minimizing feeding-related stress on rumen function and animal health. (MSc-project).

Additional information

Datasets are available in Excel and SAS-files.

Will chicory roots compared with barley feeding change CLA and other fatty acids in the meat of organic raised and finishing-fed dairy steers?

Main subject area

Animal Health and Welfare / Organic Agriculture / Beef production / Animal nutrition / Product quality

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and literature study.

Short project description

Data from an experiment with 40 Holstein steers during the finishing period after the second grazing season are available. Data include production performance, slaughter and carcass quality characteristics, some meat quality characteristics, eating quality as well as complete fatty acid profiles of the meat. Are you ready to write an international manuscript?

Additional information

Datasets are available in Excel and SAS-files.

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

Main subject area

Animal Health and Welfare / Animal nutrition / Beef production / Product quality

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and 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 will be basis for an international manuscript (MSc-project).

Additional information

Datasets are available in Excel and SAS-files.

Development of optimal feeding regimens for early and normal weaned beef calves

Main subject area

Animal Health and Welfare / Beef production / Production systems / Animal nutrition

Department and Supervisor

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

Mogens Vestergaard, head of research unit

E-mail: mogens.vestergaard@agrsci.dk

Phone: +45 8715 7843

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on analyses of existing data and literature study.

Short project description

How should beef calves weaned early due to low grass quality and low milk yield of the dam be finishing-fed in order to optimize production efficiency and carcass quality? We studied early vs. normal weaning age and three different feeding strategies until slaughter. The feeding strategies include large amounts of grass silage and are of relevance for organic farming. The work will be based on existing Danish data in combination with results of the literature.

Additional information

Datasets are available in Excel and SAS-files.

What concentrate does a cow prefer?

Main subject area

Animal Health and Welfare / Ruminant nutrition

Department and Supervisor

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

Martin Riis Weisbjerg, senior scientist

E-mail: martin.weisbjerg@agrsci.dk

Phone: +45 8715 8046

Project start

Preferably spring 2013

Physical location of project and student's work

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

Short project description

Background: Use of automatic milking systems (AMS) with free cow traffic is dependent on the cows' voluntary visit in the AMS. Concentrate offer is the usual way to assure satisfactory visit frequency, and higher offer can increase AMS visit frequency.

However, separate concentrate offer may be problematic for the health of the cows, and should be kept as low as possible. Therefore, detection of palatable concentrate which in smaller quantities can attract the cows is wanted.

Aim: Detect feeds which can attract cows to the AMS.

Content: Cows' preferences will be examined in intensive experiments, where cows using a cafeteria principle will be offered different concentrates, and allowed to choose.

Additional information

The present study is intended to be followed by a test at the KFC (an AMS herd), a study which could also be used for a master thesis.

Ration effect on dairy cows milk production

Main subject area

Animal Health and Welfare / Ruminant nutrition

Department and Supervisor

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

Martin Riis Weisbjerg, senior scientist

E-mail: martin.weisbjerg@agrsci.dk

Phone: +45 8715 8046

Project start

2013 or later

Physical location of project and student's work

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

Short project description

Background: Forage type and quality is essential for dairy cows milk production

Aim: Study importance of ration and forage type on dairy cows milk production

Content: Based on either running or already performed (depending on start of MSc project) production trials with dairy cows, the effect of forage and ration composition is studied.

Additional information

Also literature studies/meta-analysis are possible.

Estimation of fibre degradation

Main subject area

Animal Health and Welfare / Ruminant nutrition

Department and Supervisor

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

Martin Riis Weisbjerg, senior scientist

E-mail: martin.weisbjerg@agrsci.dk

Phone: +45 8715 8046

Project start

2013

Physical location of project and student's work

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

Short project description

Background: Estimation of iNDF is important in modern feed evaluation systems, however, present in situ methods are very resource demanding.

Aim: Develop laboratory methods for iNDF determination

Content: Laboratory methods for iNDF determination. Use of Ankom Daisy to estimate in situ iNDF. Based on a sample bank with known in situ iNDF, Ankom method is developed using different incubation length and eventually spiking during incubation.

Additional information

A number of other topics within feedstuff evaluation would also be possible.

Extended lactation in dairy cows – feeding strategy, efficiency, reproduction mammary gland development, milk quality

Main subject area

Animal Health and Welfare / Ruminant Nutrition, Feeding, Physiology, Reproduction, Milk secretion

Department and Supervisor

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

Jakob Sehested, Associate Professor (and others)

E-mail: jakob.sehested@agrsci.dk

Phone: +45 8715 7893

Project start

Autumn 2013 or later

Physical location of project and student's work

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

Short project description

The Master Thesis project(s) will be based on running experiments (2013 to 2015) with extended lactation on research station or on private farms, and will include animal experimentation, chemical and data analyses and literature study.

The overall aim of the project behind the experiments is to establish new knowledge as a basis for innovative and sustainable strategies for reproduction and feeding that significantly reduce the environmental load from milk production and at the same time improve productivity and animal welfare without compromising milk quality and farm economic return. The project holds a number of opportunities for Master Thesis projects in different areas, e.g. feeding strategies supporting extended lactation, interaction between reproductive strategy and efficiency of milk production / reproduction / cow health / mammary gland development or milk quality.

Effect of dietary electrolytes on fecal consistency and milk composition in dairy cows

Main subject area

Animal Health and Welfare / Ruminant Nutrition

Department and Supervisor

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

Jakob Sehested, Associate Professor

E-mail: jakob.sehested@agrsci.dk

Phone: +45 8715 7893

Project start

Any time

Physical location of project and student's work

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

Short project description

The Master Thesis project will be based on issued data (experiment and most chemical analyses have been performed) and literature study, but there will be possibilities to get 'hands on' in animal experiments and lab work.

Liquid feces has negative impact on hoof and udder hygiene and health and fecal consistency is often used as a tool to evaluate feeding and health of the cow.

The objective of the project is to analyse the effect of dietary electrolytes (K, Na and Cl) intake on fecal consistency and on milk composition.

A 4*4 Latin square experiment with 20 lactating dairy cows, 4 periods and 4 dietary treatments was conducted. Dietary treatments were: 1) Low-Na/Low-K; 2) Low-Na/High-K; 3) High-Na/High-K; 4) High-Na/High-K-high fiber. Treatment levels were 12 or 35 g K and 1 or 10 g Na per kg dry matter by addition of chloride salts, and low or high indigestible fiber content by iso-energetic substitution of rolled oats by alfalfa pellets.

Fresh fecal consistency was scored by a 9 step score-system (1=liquid, 5=firm), and fecal dry matter content and water-binding capacity were measured.

Feeding high amounts of DDGS and glycerol for dairy cows

Main subject area

Animal Health and Welfare / Ruminant Nutrition and Feeding

Department and Supervisor

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

Jakob Sehested, Associate Professor (and others)

E-mail: jakob.sehested@agrsci.dk

Phone: +45 8715 7893

Project start

Autumn 2013 or later

Physical location of project and student's work

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

Short project description

The Master Thesis project(s) will be based a running experiments (March to September 2013) on the use of DDGS (dried distillers grains with solubles) and glycerol in dairy cow feeding, and could include animal experimentation, chemical and data analyses and/or literature study.

The overall aim of the project is to create knowledge that enables dairy farmers to optimize their use of the increasing amounts of by-products from the increasing production of bio-ethanol and –diesel in the feed ration. A series of dairy cow feeding experiments will be performed during 2013 on the effect of quality and proportion of DDGS and glycerol on dairy cow performance and milk quality.

Intestinal digestibility of phosphate from ruminal microbes

Main subject area

Animal Health and Welfare / Ruminant Nutrition

Department and Supervisor

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

Jakob Sehested, Associate Professor

E-mail: jakob.sehested@agrsci.dk

Phone: +45 8715 7893

Project start

Any time

Physical location of project and student's work

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

Short project description

The Master Thesis project will be based on issued data (experiment and most chemical analyses have been performed) and literature study, but there will be possibilities to get 'hands on' in animal experiments and lab work.

Data on content and intestinal digestibility of P in ruminal microbes are very sparse.

The significant microbial synthesis in lactating dairy cows could cause a significant loss of P in feces depending on digestibility of microbial P.

The objective of the present study is to measure the intestinal digestibility of microbial P. Ruminal evacuations was performed on 5 ruminally fistulated and lactating Holstein Friesian dairy cows, and microbes were isolated from liquid and particle fractions.

Intestinal digestibility of rumen microbial P and N were estimated using the rat model.

Five groups of 5 male Wistar rats were adapted to the 5 experimental diets for 4 d followed by a balance period of 4 d. Rat diets were based on rumen microbes.

Thirst - measuring the motivation to drink in pigs

Main subject area

Animal Health and Welfare / Ethology / Motivation / Needs

Department and Supervisor

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

Margit Bak Jensen, senior scientist

E-mail: margitbak.jensen@agrsci.dk

Phone: +45 8715 7941

Project start

Autumn 2013

Physical location of project and student's work

Department of Animal Science, AU Foulum

Short project description

Thirst is the motivation to drink. Thirst ensures maintenance of the body fluid balance within a relative small range, and is closely regulated. The search for water and drinking is elicited when thirst reaches a certain threshold. If the animal does not have access to water then thirst will exceed this threshold and become prolonged. Prolonged thirst is associated with negative subjective states and reduced welfare. The key question is; at what level is thirst prolonged.

Measures of thirst are (a) significant higher water intake in the hours after water access (compensatory water intake; Sprenger et al., 2009), and (b) significant higher response measured as number of operant responses, where the motivation is expressed in uniform responses with a well-defined effort (Jensen and Pedersen, 2008). This measure has previously used to measure prolonged hunger (Jensen et al. 2012).

Sows are subjected to three levels of water deprivation and the effect on daily water intake, compensatory water intake and operant responding is measured.

References

Jensen, M.B., Pedersen, L.J. 2008. Using motivation tests to assess ethological needs. *Appl. Anim. Behav. Sci.* 113: 340-356

Jensen, M. B., Pedersen, L.J., Theil, P.K., Yde, C.C., Bach Knudsen, K.E. 2012. Feeding motivation and plasma metabolites in pregnant sows fed diets rich in dietary fiber either once or twice daily. *J. Anim. Sci.* 90, 1910-1919.

Sprenger, M., vangestel, C., Tuytens, F.A.M. 2009. Measuring thirst in broiler chickens. *Animal Welfare* 2009, 18: 553-560.

Tryptophan requirement of piglets evaluated by animal performance and blood plasma parameters

Main subject area

Animal Health and Welfare / Animal Science / Pigs / Nutrition / Physiology

Department and Supervisor

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

Jan Værum Nørgaard, Assoc. professor

E-mail: jan.noergaard@agrsci.dk

Phone: +45 8715 7816

Project start

Spring-Summer-Autumn 2013

Physical location of project and student's work

AU-Foulum

Short project description

Tryptophan is a very expensive amino acid and it is commonly used in pig diets. Therefore it is very important that the recommendations are correct, and therefore is the debate of the optimum tryptophan recommendation always ongoing and relevant as ever. We will evaluate tryptophan requirement by conducting a dose-response experiment. The response parameters are besides gain and feed intake, also to be found in blood plasma. We will look for physiological biomarkers in the blood and try to find some indicating tryptophan requirement.

Contact me for a more thorough description.

Additional information

You will write a scientific paper and have the change of being co-author on the published version. There is a phd student working on similar aspects of other amino acids.

Blue mussels and starfish from Limfjorden as a protein source for piglets

Main subject area

Animal Health and Welfare / Animal Science / Pigs / Nutrition / Physiology

Department and Supervisor

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

Jan Værum Nørgaard, Assoc. professor

E-mail: jan.noergaard@agrsci.dk

Phone: +45 8715 7816

Project start

Summer-autumn 2013

Physical location of project and student's work

AU-Foulum

Short project description

Blue mussels are filtering the sea water to get nutrients for growth. The Danish Shellfish Centre (Dansk Skaldyr Center, part of DTU and project leader) are improving the concept of blue mussel farms, where mussels are grown on lines in the sea/Limfjorden. The mussels are fixing nutrients thereby mitigating the effects of sea water pollution from e.g. pig farms. Starfish are predators eating mussels and these years considered as a pest because of its numerous population.

This project is studying the use of blue mussels and starfish for pigs (and poultry in a partner MSc project available at Sanna Steinfeld). Together with the small company Lumino A/S we are going to develop a mussel silage and other partners in the project are producing dry mussel meal. We are using T-cannulated pigs to estimate the ileal digestibility.

Contact me for a more thorough description.

Additional information

You will write a scientific paper and have the change of being co-author on the published version. Note that a parthnership with a fellow student is possible at a corresponding project on poultry.

Reduced content of protein in pig diets with focus on N turnover, meat characteristics and environment

Main subject area

Animal Health and Welfare / Animal Science / Pigs / Nutrition / Physiology

Department and Supervisor

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

Jan Værum Nørgaard, Assoc. professor

E-mail: jan.noergaard@agrsci.dk

Phone: +45 8715 7816

Project start

Spring or summer 2013

Physical location of project and student's work

AU-Foulum

Short project description

The level of dietary protein and especially the amino acid composition of dietary protein in pig diets are crucial for both animal performance and environmental impact. The utilization of dietary protein is acknowledged to be a major determinant for ammonia emission from pig barns and it may also affect the emission of odorants from the production facilities.

By including the commercially available crystalline amino acids (lysine, threonine, methionine, tryptophan, and valine) it is possible to optimize diets 15% lower in digestible crude protein and still fulfilling the Danish minimum recommendations of essential amino acids.

There is need of knowledge on the physiological and biological mechanisms of feeding different levels of crude protein to the Danish finisher pigs.

Working hypothesis:

- Feeding low CP diets does not affect animal performance (gain and carcass composition) as long as sufficient essential amino acids (EAA) are supplied.
- Meat% increases at higher CP because of lower fat deposition due to the energy used for AA catabolism. I.e. meat% does not increase because of more EAA for protein synthesis.
- Ammonia emission will be reduced by lowering dietary CP

Contact me for a more thorough description.

Additional information

The practical exp is running from February to Juni 2013 – you are welcome to join. The lab analysis will probably be finish before summer holidays and therefore you have data available from the beginning if you cannot start before after summer. We also have some scanning images to evaluate, so there will be a change of some practical work as well. The exp is in collaboration with the Dept. of Engeneering and medical doctors at the University Hospital. You will write a scientific paper and have the change of being co-author on the published version.

Meat quality of beef produced on natural grassland

Main subject area

Raw meat quality

Department and Supervisor

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

Margrethe Therkildsen, Associate professor

E-mail: Margrethe.therkildsen@agrsci.dk

Phone: +45 8715 8007

Project start

Open

Physical location of the project and student's work

Department of Food Science, AU, Foulum

Extent and type of project

45 or 60 ECTS master thesis project

Short project description

Development of a concept for nature conservation through grazing with cattle will only succeed if the meat can be differentiated from traditional beef. Thus the aim of the present project is to describe the meat quality of beef produced on extensive grasslands, meadows, heaths etc. in order to pinpoint quality differentiations from traditional beef, which can be used in marketing of the concept. Very little is known about the effect of specific Danish biotopes on meat quality traits like colour, structure, fatty acid profile and taste and further on variations in response between breeds, ages, sex and length of access to grassland. These factors will be studied in the present experiment.

Additional information

The project will be part of a large project "Smag på landskabet" (taste the environment), which aims at developing a concept for nature conservation through grazing with cattle. The concept involves the full chain through grazing systems, animal production, meat quality and branding and marketing of meat products. The project runs from January 1, 2013 to December 31, 2014.

Impact of feeding during transition on performance of sows during lactation

Main subject area

Animal Health and Welfare / Animal nutrition and product quality

Nutrition and physiology of lactating sows. Improve feed and feeding strategies for reproductive sows with the overall aim of reducing piglet mortality and improving sow and piglet productivity.

Department and Supervisor

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

Peter K. Theil, senior scientist

E-mail: Peter.Theil@agrsci.dk; Phone: 8715 7803

Project start

Any time

Physical location of the project and student's work

Department of Animal Science, Aarhus University, Foulum

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.

Short project description (max. 650 tegn incl. mellemrum)

Background: Previous science with nutrition of lactating sows has focused on intake and nutrient requirement at peak lactation. Recent science has documented that the transition period is more important for the sows performance than is the period at peak lactation. Feed and feeding of the sow in the transition period is important for several reasons. Firstly, sows are exposed to a dietary shift in late gestation. Secondly, the intermediary metabolism of sows are changed from an anabolic to a catabolic state, and thirdly, nutrient allocation is prioritized between foetal growth, udder growth and colostrum production on late gestation while it becomes redirected towards milk copious milk production after farrowing. A deeper insight into the nutrient metabolism and development of a new feeding strategy is necessary to improve the performance of the sows.

Aim: Improve the performance of lactating sows to reduce the piglet mortality

Methods: Feeding strategy or feed composition or both around parturition may be altered and the impact on the performance of the sow (yield of colostrum and milk) and the performance of piglets (intake of colostrum and milk and their survival) will be measured.

Additional information

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

<http://pure.au.dk/portal/da/peter.theil@agrsci.dk>

Pre- and probiotic effects on colonic butyrate production and health in pigs as models for humans

Main subject area

Nutrition and health /Pre-and probiotic effects on colonic health and peripheral insulin sensitivity in pigs as models for humans

Department and Supervisor

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

Tina Skau Nielsen, post doc

E-mail: TinaS.Nielsen@agrsci.dk

Phone: +45 8715 7962

Project start

August 2013 or earlier

Physical location of the project and student's work

Department of Animal Science, Aarhus University, Foulum

Extent and type of project

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

45 ECTS: Experimental thesis 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.

Short project description (max. 650 tegn incl. mellemrum)

Background: Sufficient amounts of the short-chain fatty acid, butyrate, is essential both for the health of the large intestine (colon) and for peripheral tissues with implications for insulin sensitivity and glucose homeostasis. Butyrate is produced by bacterial fermentation of mainly undigested carbohydrates within the large intestine, absorbed to the portal vein and, although a large fraction is cleared in the liver, measurable quantities reach the peripheral circulation. However, inadequate amount of butyrate is common especially in the distal colon when consuming diets common to western lifestyle – Western Style Diet (WSD), characterized by high fat, high protein, high refined carbohydrates, and low dietary fiber contents.

Aim: to improve colonic health, peripheral insulin sensitivity and glucose homeostasis by increased colonic butyrate production brought about by prebiotics (such as resistant starch and arabinoxylans) and probiotics (*B. Fibrisolvens*) alone or in synergy (synbiotics).

Methods: To conduct an animal experiment with slaughter pigs fed a western style diet (WSD) or a WSD diet with different types of dietary fibers and probiotics added. Parameters related to colonic health and peripheral insulin sensitivity in blood, tissue, intestinal content and feces will be measured.

Additional information

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

<http://pure.au.dk/portal/da/tinas.nielsen@agrsci.dk>

Gastric ulcers in pigs (1)

Main subject area

Animal Science / Animal nutrition / Gastrointestinal health

Department and Supervisor

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

Charlotte Lauridsen, head of research unit

E-mail: charlotte.lauridsen@agrsci.dk

Phone: +45 8715 8019

Project start

As soon as possible

Physical location of the project and student's work

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

Theoretical thesis based on literature study.

Short project description

Ulceration of the nonglandular esophageal region of the porcine stomach is a major problem for the swine industry in general. Stomach ulcers can lead to reduced daily growth of slaughter pigs and ultimately lead to increased mortality. Older research has focused on processing of feed as being one of the most predominant etiological factors, however, environmental changes, transportation, lack of access to straw, and crowding, all commonly experienced by pigs in modern production systems, are potentially stressful events or conditions that were associated with increased occurrence of pars esophageal ulcerations. The aim of this thesis project is to perform a literature synthesis of existing information on 1) the potential risk factors for the development of gastric ulcer, 2) to describe potential biomarkers for the development of these health changes and 3) to describe potential feeding strategies to overcome the problem.

Gastric ulcers in pigs (2)

Main subject area

Animal Science / Animal nutrition / Gastrointestinal health

Department and Supervisor

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

Karin Hjelholt Jensen, Senior scientist

E-mail: karinh.jensen@agrsci.dk

Phone: +45 8715 7954

Project start

As soon as possible

Physical location of the project and student's work

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

Experimental thesis based on laboratory analyses on existing stomach biopsies and data analysis.

Short project description

Ulceration of the nonglandular esophageal region of the porcine stomach is a major problem for the swine industry in general. Stomach ulcers can lead to reduced daily growth of slaughter pigs and ultimately lead to increased mortality. Older research has focused on processing of feed as being one of the most predominant etiological factors, however, environmental changes, transportation, lack of access to straw, and crowding, all commonly experienced by pigs in modern production systems, are potentially stressful events or conditions that are associated with increased occurrence of pars esophageal ulcerations. The aim of this thesis is to study the inflammatory state in different regions of the stomach in relation to the absence or presence of ulcer and to the intragastric milieu. The laboratory work includes purification of RNA for gene expression studies by the qPCR method using relevant primers and probes.

Additional information

The master student should have a strong interest in laboratory work. The student will primarily be trained in purification of RNA and RT-qPCR, but other relevant techniques may be included in the project.

Optimization of antigen presentation for *in vitro* studies of T cell mediated immunity in chickens

Main subject area

Animal Health and Welfare / Chicken immunology / Cell culture/ Flow cytometry

Department and Supervisor

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

Tina Dalgaard MSc, PhD

E-mail: tina.dalgaard@agrsci.dk

Phone: +45 8715 8052

Project start

As soon as possible

Physical location of project and student's work

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

Short project description

Background: Quantification and functional analyses of antigen-specific T cells are often carried out by *in vitro* recall stimulation, i.e. T cells from immune animals are cultured in the presence of specific antigens presented on the surface of an antigen presenting cell by MHC molecules. Often the method relies on e.g. antigen presenting cells, already present in the blood sample, in which T cell responses are measured. A correct antigen presentation is crucial for the method and enrichment with antigen-pulsed professional antigen presenting cells or use of relevant co-stimulation strategies have earlier been shown to improve *in vitro* T cell responses in human samples.

Aim: To develop strategies for optimal antigen presentation usable for *in vitro* stimulation of antigen-specific chicken T cells.

Methods: The student will culture antigen presenting cells, pulse them with relevant antigen and use them for *in vitro* stimulation of chicken white blood cells. Different co-stimulation strategies will be applied as well. Activated T cells will be detected using read-outs like: proliferation, lymphoblastogenesis and cytokine production.

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 flow cytometry but other relevant techniques like RT-qPCR and ELISA may be included in the project.

Binding studies of chicken Mannose-Binding Lectin to different pathogens

Main subject area

Animal Health and Welfare / Chicken immunology / Binding assays

Department and Supervisor

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

Helle Juul-Madsen, senior scientist

E-mail: Helle.JuulMadsen@agrsci.dk

Phone: +45 8715 7837; Mobile: +45 2370 7611

Project start

As soon as possible

Physical location of project and student's work

Department of Animal Sciences, AU-Campus Foulum

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 using chickens selected for a high or a low serum concentration of MBL have shown that a low amount of circulating MBL is associated with increased disease severity after infection. These results confirm that MBL, as proven in mammals, plays a major role in disease resistance in chickens. In humans it has already been demonstrated that MBL is able to bind to a whole range of different pathogens from bacteria to viruses. However, this has not been demonstrated in chickens although we have shown that chicken MBL is involved in disease resistance. Thus, we would like to know which pathogens chicken MBL are able to bind and use this knowledge in relation to our experimental disease models.

Aims: To determine which pathogens chicken MBL is able to bind to.

Research plan: The student will first grow different bacterial cultures and test for MBL-binding by use of flow cytometry. Next, the student will receive/grow virus and test for MBL-binding by use of ELISA. This study can be expanded by analysis of complement activation if time allows for it. In focus for 2013 will be Mareks Disease by use of serum with high/low MBL concentration.

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 bacterial cultures, virus cultures, flow cytometry, and ELISA.

Functional characterization of chicken CD4+CD8+ double positive cells

Main subject area

Animal Science/ Chicken immunology / Cell culture/ Flow cytometry

Department and Supervisor

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

Tina Dalgaard MSc, PhD

E-mail: tina.dalgaard@agrsci.dk

Phone: +45 8715 8052

Project start

As soon as possible

Physical location of project and student's work

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

Short project description

Background: Chicken T lymphocytes are essential for adaptive immune responses in the chicken. The cell population comprise CD4+ T helper cells and CD8+ cytotoxic T cells. In several species mature T cells expressing both CD4 and CD8 have also been described. Phenotypic studies of this double positive population (DP) have been performed in the chicken but thorough functional characterization is lacking. In other species, DPs are defined as part of the memory T cells pool increasing with age and antigen contact. In this project we will address if this is also the case in the chicken.

Aim: The aim of the project is to perform detailed functional analyses of chicken DPs in order to elucidate activation status, proliferative capacity and cytokine production potential of these cells.

Methods: The student will study chicken lymphocytes from peripheral blood and spleen ex-vivo. Different activation strategies will be applied and phenotype, proliferation and cytokine production will be addressed by flow cytometry analyses.

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 flow cytometry but other relevant techniques like RT-qPCR and ELISA may be included in the project.

Validation of an ELISPOT assay for detection of avian interferon gamma

Main subject area

Animal Health and Welfare / Chicken immunology / Cell culture

Department and Supervisor

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

Tina Dalgaard MSc, PhD

E-mail: tina.dalgaard@agrsci.dk

Phone: +45 8715 8052

Project start

As soon as possible

Physical location of project and student's work

Department of Animal Science, AU-Foulum, 8803 Tjele

Short project description

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.

Assessment of local innate immune responses in chickens subjected to experimental infection

Main subject area

Animal Health and Welfare / Chicken immunology / local immunological tissues / qPCR

Department and Supervisor

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

Liselotte Rothmann Norup, post doc

E-mail: liselotter.norup@agrsci.dk

Phone: +45 8715 7889

Project start

As soon as possible

Physical location of project and student's work

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

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.

At our department we have established a wide range of infection models in chickens. By now the knowledge of the adaptive immunological reactions in chickens towards these infections is widely elaborated, while there is still a need for further investigation of innate immune reactions in the disease models.

Aim: To use the quantitative RT-PCR method for determination of the expression of a variety of innately related immunological genes in local tissues after an infection.

Methods: Generally the student will use already purified RNA from an earlier infection experiment for the gene expression studies. The studies will be performed by the qPCR method using relevant primers and probes. The cytokine mapping study *A. galli* will be in focus for 2013.

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 RT-qPCR, but other relevant techniques like cell culture, RNA purification, flow cytometry and ELISA may be included in the project.

Do chicken macrophages produce Mannose-Binding Lectin?

Main subject area

Animal Health and Welfare / Chicken immunology / Cell cultures

Department and Supervisor

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

Helle Juul-Madsen, senior scientist

E-mail: Helle.JuulMadsen@agrsci.dk

Phone: +45 8715 7837; Mobile: +45 2370 7611

Project start

As soon as possible

Physical location of project and student's work

Department of Animal Sciences, AU-Campus Foulum

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 using chickens selected for a high or a low serum concentration of MBL have shown that a low amount of circulating MBL is associated with increased disease severity after infection. These results confirm that MBL, as proven in mammals, plays a major role in disease resistance in chickens. In relation to intestinal disease models we would like to know if functional MBL can be released by chicken macrophages so deposition of MBL can be performed directly during intestinal infection. In humans, it has been demonstrated that a macrophage cell line is capable of transcribing the human MBL gene in response to LPS stimulation.

Aims: To determine if chicken macrophages are capable of transcribing the MBL in order to release functional MBL in response to stimulation with LPS and/or other surface components from bacteria.

Research plan: The student will first grow the cell line HD11 and stimulate it with different surface components from bacteria or whole bacteria. The cells will be analyzed for the transcription of the MBL gene by qPCR and the supernatant will be analyzed for the presence of the MBL protein by ELISA. If the cell line produces MBL, the study will be expanded to include *ex vivo* stimulation of white blood cells from chickens.

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 cell cultures, stimulation assays, ELISA, and qPCR.

Functional analysis of chicken phagocytes

Main subject area

Animal Science/ Chicken immunology / Cell culture/ Flow cytometry

Department and Supervisor

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

Tina Dalgaard MSc, PhD

E-mail: tina.dalgaard@agrsci.dk

Phone: +45 8715 8052

Project start

As soon as possible

Physical location of project and student's work

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

Short project description

Background: Phagocytes are key cells of the innate immune response. Chicken phagocytes comprise cellular subsets that diverge from their mammalian counterparts. In order to elucidate functional differences in innate immunity between chicken breeds it is necessary to establish laboratory methods to study e.g. phagocyte function in this species. In our lab, establishment of a bead based flow cytometric phagocytosis assay has been initiated. However, the method must be further optimized before use in studies of avian heterophil, monocyte and thrombocyte phagocytosis. In addition, a new assay to study phagocyte production of toxic oxygen compounds in the same subset of cells will be in focus.

Aim: The aim of the project is to optimize an existing method and to establish a new method to study avian phagocytes. Functional analyses will subsequently be performed using cells from chickens that are genetically resistant or susceptible to disease.

Methods: Standard cell culture and flow cytometry will be the major techniques used in the project by the student. Cytokine expression analysis by qPCR as well as a colorimetric method for measurement of nitric oxide production may also be included in the project.

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.

Transcription activity of the mannose-binding lectin in chickens

Main subject area

Animal Health and Welfare / Chicken immunology / Cell cultures / gene transcription

Department and Supervisor

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

Rikke Munkholm Kjærup MSc, PhD student

E-mail: RikkeM.Kjaerup@agrsci.dk

Phone: +45 8715 4264

Project start

As soon as possible

Physical location of project and student's work

Department of Animal Sciences, AU-Campus Foulum

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 using chickens selected for a high or a low serum concentration of MBL have shown that a low amount of circulating MBL is associated with increased disease severity after infection. These results confirm that MBL, as proven in mammals, plays a major role in disease resistance in chickens. Research in our lab has also revealed several Single Nucleotide Polymorphisms (SNPs) in the MBL promoter region which correlates with different MBL serum levels.

Aims: To determine important areas of the MBL gene involved in altered transcription activity in different haplotypes.

Research plan: The student will first sequence different parts of the cMBL gene from chickens with different MBL serum concentrations. This work includes PCR and cloning. The student will then grow the chicken liver cell line LMH and transfect it with the constructs made during the sequencing work. This will be tested for MBL transcription activity using a luciferase assay. If there is time different cell lines will be used.

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 cell cultures, PCR, molecular cloning and transcription analysis.

Validation of faeces cortisol metabolites as a tool to evaluate stress in foals

Main subject area

Animal Health and Welfare / Ethology

Department and Supervisor

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

Main supervisor: Jens Malmkvist, senior scientist

E-mail: Jens.Malmkvist@agrsci.dk

Phone: +45 8715 7956

Project supervisor: Janne Winther Christensen, scientist

E-mail: JanneWinther.Christensen@agrsci.dk

Phone: +45 8715 8075

Project start

Summer 2013

Physical location of project and student's work

Department of Animal Science, AU, Foulum, or elsewhere. The experiment will be carried out at a private horse stud.

Short project description

Faeces cortisol metabolites (FCM) have been validated as a non-invasive tool for measuring HPA-axis activation in several species, including adult horses. The extent to which FCM reflects stress in pre-weanling foals remains to be investigated. This experiment aims to investigate the effect of a standardised stressor (transport) on acute stress responses (salivary cortisol concentrations, heart rate variability and behavioural responses) and correlations to FCM values. The experiment will be carried out in a private stud. There will be basis for an international manuscript.

Additional information

60 ECTS experimental project in which the student is responsible for the experimental design as well as collection of data in close co-operation with the supervisors. Cortisol concentrations will be analysed at a lab in Vienna.

Effects of three different types of bedding on horse behaviour and welfare

Main subject area

Animal Health and Welfare / Ethology

Department and Supervisor

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

Main supervisor: Janne Winther Christensen, scientist

E-mail: JanneWinther.Christensen@agrsci.dk

Phone: +45 87158075

Project supervisor: Eva Søndergaard, AgroTech, Agro Food Park 15, Skejby.

E-mail: evs@agrotech.dk

Phone: +45 8743 8461

Project start

As soon as possible

Physical location of project and student's work

Department of Animal Science, AU, Foulum, or elsewhere as data will be available in electronic version as well as from video recordings.

Short project description

Four types of bedding used in horse boxes are evaluated in an experiment with focus on the quality of bedding in relation to horse welfare and stable environment. The scope of the thesis can be adjusted according to the interest of the student. Video recordings of 20 horses in an 8-week period will be available for analysis of horses' behaviour in relation to type of bedding, time of the day, management etc. More or less

focus can be attributed to the effect of bedding on the stable environment. There will be basis for an international manuscript.

Additional information

45-60 ECTS experimental project in which the student is responsible for analysis of original raw data from video recordings and additional data collected in the stable.

The effect of reduced protein content in mink feed on mink plasma metabolome

Main subject area

Animal Health and Welfare / Animal Science / Mink Nutrition

Department and Supervisor

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

Mette Skou Hedemann, Senior scientist

E-mail: Mette.Hedemann@agrsci.dk

Phone: +45 8715 8078

Project start

As soon as possible, August 2013 at the latest

Physical location of project and student's work

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

Short project description

In order to reduce the environmental impact of mink production mink producer has been instructed to reduce the excretion of nitrogen with the slurry. In order to reach this the protein content of the feed has to be reduced. Reduced protein has been shown to affect growth and health negatively. Hepatic lipidosis has been shown to be a common disease in mink and it may be caused by imbalance in the nutrient composition (amino acids and fatty acids), high intake of carbohydrates, choline or vitamin B deficiency, and bad feed quality. Some forms of hepatic lipidosis are reversible and changes in the feeding strategy may normalize the fat content of the liver.

In the present study the protein content of mink feed will be reduced during the growth period (August-November) and in groups with high frequency of fatty liver the feed composition will be changed and e.g. vitamin E, glucose, taurin, and choline will be added. Blood samples will be collected during the growth period and they will be analysed using liquid chromatography mass spectrometry (LC-MS) based metabolomics. This is an explorative, hypothesis generating technique and using this method metabolites important for changes in the metabolism will potentially be identified

Additional information

The master student will be affiliated to an ongoing research project and should have a strong interest in laboratory work.

Temperament in different colour types of mink

Main subject area

Animal Health and Welfare / On-farm animal behaviour

Department and Supervisor

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

Steen Henrik Møller, senior scientist

E-mail: steenh.moller@agrsci.dk

Phone: +45 8715 7926

Project start

Autumn 2013

Physical location of project and student's work

Department of Animal Science, AU Foulum, DK-8830 Tjele and data collection on private farms.

Short project description

A fairly simple, yet precise and well-validated test of temperament in mink has been used for more than 25 years. In various projects the test has been applied in private mink farms since 1987. There are results enough to suggest that different colour types of mink do have different distributions of explorative, fearful and aggressive animals at farm level. A systematic assessment of the consistency of such a distribution across different farms is, however, still missing.

By testing the temperament of the four most common colour types on 4 or 5 farms, the difference as well as the consistency of the difference between colour types can be assessed.

Additional information

The master student will get a thorough introduction to the temperament test, and can get help from data recording already planned in the autumn. The student must have a drivers licence in order to visit farms around Denmark.

Improved piglet survival following arginine addition to the diet of the pregnant sow

Main subject area

Animal Health and Welfare / Nutrition of pregnant sows

Department and Supervisor

Department of FOOD / <http://Food.au.dk>

Niels Oksbjerg, Senior Scientist

E-mail: Niels.Oksbjerg@agrsci.dk

Phone: +45 8715 7809

Project start: September / October 2013

Physical location of project and students work: AU-Foulum

Short project description

Around 23% of piglets within a litter are still born or die shortly after farrowing. Within a litter there is a large variation in birth weight ranging from 0.7 to 2.4 kg, and the small ones have the lowest survival rate compared to their large littermates. The small piglets surviving also have poorer performance traits as daily gain and feed conversion rate. The reason for this is that small piglets contain fewer muscle fibres in their muscles. It seems well accepted that small birth weight piglets (intra uterine growth restricted, IUGR) are due to under-nutrition during foetal development. Interventions, which can improve the transport of nutrients across the placenta from the mother to the foetuses will increase birth weight and increase piglet survival rate. The functional amino acid, arginine, is a precursor for the formation of nitrogen oxide (NO) being a potent vasodilator. This conversion is catalysed by NO synthase. Arginine is also a precursor for the formation of ornithine catalysed by arginase and further to polyamines (spermidine, spermine and putrescine), which stimulate cell division.

Hypothesis: Dietary inclusion of arginine to pregnant sows will increase blood flow across the placenta resulting in increased nutrition especially to the small foetuses.

Experiment: Four sows are control and 4 sows are treated with arginine from d 15 to d 90 and then slaughtered. Following bleeding of the sows the uterus is taken out and the foetuses are bled by cutting the umbilicus cord. Udder tissue and placenta tissue are weighed and gene expression of NOS and Vascular Endothel Growth Factor (VEGF) analysed by RT. Samples of the placenta will also be measured for polyamines.

Finally, the udder will be analysed for DNA content.

Additional information