1 Course Details

1.1 Calendar Description

This course provides an opportunity for directed hands-on projects involving live animals and laboratory techniques. A set of selected projects will be provided by Animal Biosciences faculty within their broad fields of study.

Pre-Requisites: 14.00 credits including ANSC*3080
Restrictions: Restricted to students in BSCH.ABIO, BSAG.ANSC and BBRM.EQM. Instructor consent required.

1.2 Course Description

Over the course of the semester, groups of students will be involved in conducting a single experiment on agricultural animals at one of the research stations. Students will be provided with an outline for the experiment but will develop their own hypotheses and experimental plan and execute data collection. Individual groups conducting separate projects will meet separately for the development of hypotheses, experimental design, data collection and analysis. Students will be responsible for measuring behaviour, monitoring growth, production or reproduction and collecting blood or saliva. Students will learn and practice sampling techniques and assays for measuring hormones or metabolites. They will also analyze data and interpret and present their results in written and oral format.

Students will meet weekly (Tuesday at 2:30 p.m., ANNU Room 102 or connect by Zoom) for presentations on techniques used in different areas of research and to present group status reports. This will expose students to the variety of experimental approaches used in various fields of research. Students will be expected to integrate or consider the impact of these ideas in their experimental design.
1.3 Timetable

Tuesday 2:30 p.m. - 5:30 p.m., ANNU 102 or connect by Zoom (link is available in the course calendar), other times as required

Timetable is subject to change. Please see WebAdvisor for the latest information.

1.4 Final Exam

There is no final exam. The different groups will present their results during the final class (April 6) and individual lab reports are due the end on the final week (April 9)

2 Instructional Support

2.1 Instructional Support Team

Instructor: James Squires
Email: jsquires@uoguelph.ca
Telephone: +1-519-824-4120 x53928
Office: ANNU 146
Office Hours: By Appointment

Lab Co-ordinator: Julie Kim
Email: jungmi@uoguelph.ca
Telephone: +1-519-824-4120 x56477
Office: ANNU 254
Office Hours: By Appointment

2.2 Teaching Assistants

Teaching Assistant: Ash Thanabalan
Email: thanaba@uoguelph.ca
Office Hours: By Appointment

Teaching Assistant: Brenda Christensen
Email: christeb@uoguelph.ca
Office Hours: By Appointment
2.3 Netiquette Expectations

Inappropriate online behaviour will not be tolerated. Examples of inappropriate online behaviour include:

- Posting inflammatory messages about your instructor or fellow students
- Using obscene or offensive language online
- Copying or presenting someone else's work as your own
- Adapting information from the Internet without using proper citations or references
- Buying or selling term papers or assignments
- Posting or selling course materials to course notes websites
- Having someone else complete your quiz or completing a quiz for/with another student
- Stating false claims about lost quiz answers or other assignment submissions
- Threatening or harassing a student or instructor online
- Discriminating against fellow students, instructors and/or TAs
- Using the course website to promote profit-driven products or services
· Attempting to compromise the security or functionality of the learning management system

· Sharing your user name and password

· Recording lectures without the permission of the instructor

### 2.4 Communicating with Your Instructor

During the course, your instructor will interact with you on various course matters on the course website using the following ways of communication:

- **Announcements**: The instructor will use Announcements on the Course Home page to provide you with course reminders and updates. Please check this section frequently for course updates from your instructor.
- **Questions**: All questions should be directed to the TA first for resolution. If necessary, it will be escalated to the instructor.
- **Email**: If you have a conflict that prevents you from completing course requirements, or have a question concerning a personal matter, you can send your instructor a private message by email. The instructor will attempt to respond to your email within 24 hours.

### 3 Learning Resources

#### 3.1 Required Resources

**Required Texts (Textbook)**
None

#### 3.2 Recommended Resources

**Recommended Texts (Textbook)**
None

#### 3.3 Additional Resources
Lab Manual (Lab Manual)
project descriptions and lab protocols are posted on Course Link

Other Resources (Other)
Lecture notes and additional information pertinent to the course are posted on CourseLink

3.4 Project Description

Project 1 – Piglet feed management during the post-weaning period

Background
Piglets experience a post-weaning growth lag that is related to poor feed intake, limited gut capacity, exposure to novel pathogens, introduction of feed allergens (e.g. soybean meal), and social stressors (i.e. establishment of a new social hierarchy). To combat this post-weaning growth lag, nutritionists and producers often feed very expensive and highly digestible diets to promote feed consumption. In addition, the search for alternatives to in-feed antibiotics as growth promoters is on going.

It is common for nursery piglets to be fed multiple phases of diets with decreasing nutrient density and digestibility. Based on mathematical models, we estimate the optimum body weight to conduct feed switches. However, the piglet itself may be more effective at eating to its nutrient requirements given the choice between high and low nutrient density diets.

Additionally, when piglets are mixed into new social groups (i.e. litter mates are often separated) piglets are preoccupied with establishing new social hierarchies in the first several hours after weaning. During this time, piglets often do not explore the feeders or consume any feed. Adding feeders and feed after the initial social hierarchy is established may promote increased exploratory behaviour and an overall greater feed intake within the first 24 hours of weaning.

Objectives and overview
The objectives of this project are to determine the effects of various feed management strategies after weaning on feed intake, piglet growth, and feeding and social behaviour. Sixty four piglets will be obtained at the Arkell Swine research station on the day of weaning and randomly assigned to 1 of 16 identical nursery pens (ensuring that equal numbers of littermates are present in each pen). One of many different feed management strategies can be studied. For example:
1. Timing of feed introduction - In half of the pens feeders will be pre-filled with nursery diet (standard practice; control group). In the remaining pens feeders and feed will not be provided until 4-6 hours after mixing (treatment group). Behaviour will be monitored immediately after mixing and 4-6 hours later (when feeders are added to treatment pens). Collect saliva samples for cortisol analysis throughout the day. Monitor per pen daily feed intake and individual piglet body weights.

2. Feed selection by piglets post weaning - In half of the pens 2 feeders will be provided, one with a high and one with a low nutrient density feed (treatment). In the remaining pens, two feeders will be provided with a standard ration (control; nutrient composition is the average of the treatment diets). Monitor feeding behaviour, piglet growth rates, and feed disappearance from each of the feeders.

3. Test different feed additives to maximize feed intake and growth after weaning (e.g., flavours, exogenous enzymes, new feed ingredients like insect meal, or highly digestible enzyme-treated soybean meal).

4. Offsetting social and dietary stress at weaning- At weaning half of the litters will be mixed and the other half weaned into a pen with only littermates. 2-days post-weaning the litters kept within litter groups will be mixed. Aggression, stress (i.e. Cortisol), feeding latency (at weaning and after mixing), feed intake and growth can be monitored.

References:


Colson V, Martin E, Orgeur P, Prunier A. 2012. Influence of housing and social changes on


3.4 Project Description
Project 2 - Comparative evaluation of hydrolysed yeast (HY40) and pharmacological zinc oxide in nursery pigs

Background

Weaning exposes piglets to nutritional, environmental and psychological stresses that result in reduced feed intake, little or no weight gain and in some instances diarrhea, morbidity and death (Pluske, 2016). The post-weaning growth performance lag is often managed by use of sub-therapeutic levels of in-feed antibiotics, specialty feed ingredients and additives (Kiarie et al., 2016; Pluske, 2016). There are growing concerns in Canada and around the world on indiscriminate use of antibiotics and linkage to the emergence of antibiotic resistant pathogens (Tang et al., 2017). Moreover, following the ban of use of antimicrobial growth promoters in the EU, zinc oxide is used widely across the EU to prevent and control post-weaning diarrhea (PWD) and bowel edema disease in young pigs. An estimated 70-90% of starter diets in the UK contain zinc oxide at therapeutic levels. However, the European Commission confirmed the EU-wide ban on the use of zinc oxide at medicinal levels in piglet feed effective June 2022 because of environmental pollution. In this context, identifying alternative nutritional strategies for managing newly weaned pigs is a topical issue across the globe. Dietary prebiotics such as hydrolysed yeast cell walls are among the dietary strategies that has been proposed to be beneficial in transitioning piglets upon weaning. There is little available information on comparative efficacy of prebiotics and typical antibiotics/antimicrobials e.g. pharmacological zinc oxide used for growth promotion to record the magnitude of responses. Moreover, growth promoting mechanisms of AGP (antimicrobials and pharmacological zinc oxide) and those of proposed alternatives may differ considerably (Kiarie et al., 2018).

Objective: To investigate comparative effects of feeding HY40 and zinc oxide on immune development, intestinal microbial activity, incidences of diarrhea, apparent ileal nutrient digestibility, and growth performance in nursery pigs.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUP</td>
<td>3848</td>
</tr>
<tr>
<td>Lead</td>
<td>Youngji Rho <a href="mailto:rhoy@uoguelph.ca">rhoy@uoguelph.ca</a></td>
</tr>
<tr>
<td></td>
<td>Cuilan Zhu <a href="mailto:czhu@uoguelph.ca">czhu@uoguelph.ca</a></td>
</tr>
<tr>
<td>Number of treatments</td>
<td>4</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td><strong>Details</strong></td>
</tr>
<tr>
<td>---------------</td>
<td>-------------</td>
</tr>
<tr>
<td>1. Control, no additive</td>
<td></td>
</tr>
<tr>
<td>2. Control + HY40, 0.5%</td>
<td></td>
</tr>
<tr>
<td>3. Control + ZnO, 3,000 ppm</td>
<td></td>
</tr>
<tr>
<td>4. Control + HY40 and ZnO</td>
<td></td>
</tr>
<tr>
<td><strong>Phase II additives step-down:</strong> HY40, 0.25%, ZnO 1500 PPM</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Replicates per treatment</strong></th>
<th><strong>9 (36 pens)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Animals per replicate</strong></td>
<td><strong>4 piglets (2 gilts and two barrows)</strong></td>
</tr>
<tr>
<td><strong>Housing</strong></td>
<td><strong>Group housed, tenderfoot flooring, see our recent publication for further description (Kiarie et al., 2018)</strong></td>
</tr>
<tr>
<td><strong>Species, breed and sex</strong></td>
<td><strong>(Yorkshire x Landrace) x Duroc</strong></td>
</tr>
<tr>
<td><strong>Initial age</strong></td>
<td><strong>21 days old (~6kgs)</strong></td>
</tr>
<tr>
<td><strong>Range of trial</strong></td>
<td><strong>Start January 5, 2021 42 day</strong></td>
</tr>
<tr>
<td><strong>Animal density</strong></td>
<td><strong>0.54 m²/pig</strong></td>
</tr>
<tr>
<td><strong>Experimental unit</strong></td>
<td><strong>Pen</strong></td>
</tr>
<tr>
<td><strong>Trial phases</strong></td>
<td><strong>2 phases (Starter 1 – week 1-2; Starter 2 – weeks 3-6)</strong></td>
</tr>
<tr>
<td><strong>Diet form</strong></td>
<td><strong>Pellet</strong></td>
</tr>
<tr>
<td><strong>Feeding Schedule</strong></td>
<td><strong>Feed and water <em>Ad libitum</em></strong></td>
</tr>
<tr>
<td><strong>Basal diet information</strong></td>
<td><strong>Basal diet a mix of cereal grains (corn, wheat, barley), vegetable proteins (soy, rapeseed), Quantum blue (500 FTU and Econase XT (8000 BXU) should not</strong></td>
</tr>
</tbody>
</table>
include any prebiotic, probiotic, anticoccidial or antimicrobial growth promoting substance. No animal by-products (pork meal, poultry by-products etc), yeast type products and mycotoxin binders.

<table>
<thead>
<tr>
<th>Feed analysis</th>
<th>Proximate analysis; DM, energy, fat, protein, ash, mycotoxin panel in each base diet by phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurement and sampling schedule</td>
<td>Performance; ADG, ADFI and G: F (corrected and uncorrected for mortality)</td>
</tr>
<tr>
<td></td>
<td>Per pen basis</td>
</tr>
<tr>
<td></td>
<td>Diarrhoea score &amp; fecal DM</td>
</tr>
<tr>
<td></td>
<td>Necropsy (1 pig per pen)</td>
</tr>
<tr>
<td></td>
<td>Intestinal &amp; immunity development (1 piglet/pen</td>
</tr>
<tr>
<td></td>
<td>1. Jejunal histomorphology</td>
</tr>
<tr>
<td></td>
<td>2. Gene expression (Table 1): tight junction proteins, digestive enzymes, nutrient transporters and cytokines (Waititu et al., 2014; Leung et al., 2018)</td>
</tr>
<tr>
<td></td>
<td>3. Protein: jejunal IgA (Lu et al., 2019),</td>
</tr>
<tr>
<td></td>
<td>4. Immune organ weights (small intestine, spleen &amp; liver)</td>
</tr>
<tr>
<td></td>
<td>5. Plasma IgA</td>
</tr>
<tr>
<td></td>
<td>Microbial activity?</td>
</tr>
<tr>
<td></td>
<td>1. Colon SCFA</td>
</tr>
<tr>
<td></td>
<td>2. 16SRNA or targeted PCR (Alimetrics)</td>
</tr>
<tr>
<td></td>
<td>3. <em>E. coli</em> abundance-ileal?</td>
</tr>
</tbody>
</table>
Fecal grab samples; ATTD – DM, CP, GE, Ti | Day 7, 14, 28

Appropriate measurements of behaviour and stress may also be done to compare the effects of the different diets.

References


ANSC*4350 C01 W21 v1.00


3.4 Project Description

*Project 3 and 4 - The Behaviour and Physiology of Sows and Piglets in Different Farrowing Environments*

*Background*

Neonatal mortality accounts for significant losses to the swine industry and crushing by the sow is most often the cause of these losses during the first week postpartum. Farrowing crates were developed to prevent crushing; they restrict the sows’ movements, which deters the sows from rolling over on the piglets. Because piglets require a much higher temperature than sows, supplemental heat is used in the farrowing environment to provide piglets with a comfortable thermal environment. The supplemental heat source may be located some distance from the sow's udder, which attracts piglets away from the sow and may also reduce crushing.

On the day before farrowing sows are highly motivated to engage in nest-building behaviour.
Farrowing crates are criticized on animal welfare grounds because they prevent nest-building behaviour and may increase stress in the sow. Their design may also impair the sow’s ability to perform the movement required for normal postural adjustments (i.e. changing from lying to standing and vice-versa) and the resulting stress can impair lactation. Alternative farrowing systems furnished with straw provide more space to the sow and allow sows to perform nestbuilding, but they can also affect piglet thermoregulatory and suckling behaviours. There is some evidence that performing behaviours associated with nesting is more important than the availability of nesting material. Therefore, small modifications to the crate (e.g., the addition of cloth tassels) may improve sow welfare while the piglets are still protected through the crate structure. Enriched farrowing environments have also been shown to affect behaviour of piglets.

**Objectives and overview**

The objectives of this experiment are to examine the effects of farrowing accommodation, environmental enrichment, and/or sow feed management on the behaviour and physiology of sows and their piglets. One group will focus on sow behaviour and physiology, the other group will focus on piglets. Groups will share access to twelve sows beginning several days before farrowing. Six of the sows will be kept in standard farrowing crates; six will be kept in pens supplied with enrichments. The behaviour of sows and piglets can be measured using live observation and video recordings. Routine management practices such as teeth clipping and castration will be done by animal care staff, and piglets’ behavioural and physiological responses to these practices can be compared in the different housing systems. Body weights, growth rates and mortality of piglets can be measured. Endocrine changes associated with parturition and onset of lactation or stress response can be analyzed from saliva samples collected from the sows. Measures of immune response can be made in the sows or piglets.

There are a couple of different approaches that groups can use to address this topic. For example you can:

- Compare nest-building behaviour, stress response and immune status of sows
and/or gilts in the two farrowing environments

- Assess the effect of farrowing environment on thermoregulatory behaviour, suckling behaviour, growth rates and immune response of piglets
- Compare the standing and lying behaviour of sows and/or gilts in the two farrowing environments in relation to risk of crushing piglets
- Compare pre- and post-partum sow feed intake in different farrowing environments and using different feeding strategies (e.g. stepwise increases in feed allowance versus ad libitum feeding from day 1 after farrowing or versus ad libitum feeding from 1 week prior to farrowing until weaning) on sow eating behaviour (feed intake), behaviour time budgets, piglet behaviour and growth
- Compare the responses of piglets to teeth clipping, tail docking or castration in the different housing systems

References:


3.4 Project Description

Project 5 - Impact of replacing soybean meal with black soldier fly larvae meal in broiler chicken feeds on growth performance, gut physiology, and litter quality

Background:

Insect meal is becoming increasingly popular and is one of the most promising new protein sources, particularly in broiler nutrition. Insects are palatable to poultry and are excellent converters of organic waste (often from livestock production), into a source of protein that is highly available to poultry, as insects are a part of their "natural" diet, and they have also been
found to improve feed conversion (Mwaniki and Kiarie, 2018; Khan, 2018). Production of insects is very sustainable and efficient, more so than other protein sources, such as soybean meal (SBM) and fish meal, and they have a comparable nutrient composition to that of SBM (Parolini et al. 2020; Moula et al. 2018). The protein, amino acids, and other nutrients contained in insect meal are highly bioavailable to the broiler for digestion and absorption (Khan, 2018). It has been shown that the standardized ileal digestibility of many of the amino acids in black soldier fly larvae meal (BSFLM) are much higher than the standardized ileal digestibility of amino acids in other protein sources (soybean meal, feather meal, fish meal, etc.) (Mwaniki and Kiarie, 2018). The crude protein content of standard meal ranges from 40-44% (Mwaniki and Kiarie, 2018). Black soldier flies contain medium chain fatty acids (MCFA), which naturally have antimicrobial properties, as well as minimal pathogens and anti-nutritional factors (Khan, 2018; Rimoldi et al. 2019). Additionally, insects contain chitin, which have positive effects on gut health in terms of fermentation, and aids in the production of short chain fatty acids (SCFA) and vitamins (Rimoldi et al. 2019).

Necrotic enteritis is a major issue in broiler production, in terms of flock performance and cost to the producer, from both treatment costs and lighter flocks (Shojadoost et al. 2012). It is a bacterial challenge common in broiler chickens, caused by *Clostridium perfringens*, that results in endogenous losses of amino acids, negatively affecting tissue synthesis and therefore, growth (Bortoluzzi et al. 2020). Protein sources with poor digestibility bypass the stomach and small intestine, entering the caecum in an undigested form. This leads to the proteolytic fermentation of proteins in the large intestine, causing the replication of *Clostridium perfringens* and release of toxins such as ammonia, therefore increasing the risk of developing necrotic enteritis (Zanu et al. 2020; Apajalahti and Vienola, 2016). As insect meal in commercial diets has minimal studies surrounding it, there is a possibility that feeding insect meal, a highly digestible protein source, will improve growth performance and decrease the risk of a necrotic enteritis.

**Objective:** Impact of replacing SBM with BSFLM on growth and economic performance, gastrointestinal measurements, breast yield and litter quality of broilers

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUP</td>
<td>4403</td>
</tr>
<tr>
<td>Lead Researcher</td>
<td>Hannah Facey <a href="mailto:hfacey@uoguelph.ca">hfacey@uoguelph.ca</a></td>
</tr>
<tr>
<td>Number of treatments</td>
<td>6 (see details below)</td>
</tr>
<tr>
<td>Replicates per treatment</td>
<td>8</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Animals per Replicate</td>
<td>25</td>
</tr>
<tr>
<td>Housing</td>
<td>Group housed, wood shavings bedding-Brooder rooms 2 to 5 (Arkell Poultry Research Station)</td>
</tr>
<tr>
<td>Species, Breed and Sex</td>
<td>Ross 708 - male</td>
</tr>
<tr>
<td>Initial Age</td>
<td>1 day old</td>
</tr>
<tr>
<td>Range of trial</td>
<td>49 day (Start date, February 8, 2021)</td>
</tr>
<tr>
<td>Animal density</td>
<td>&lt;31 kg/M²</td>
</tr>
<tr>
<td>Experimental unit</td>
<td>Pen</td>
</tr>
<tr>
<td>Trial Phases</td>
<td>3 phases; starter (d 0-10), grower (d 11-24), &amp; finisher (d 25-49)</td>
</tr>
<tr>
<td>Diet form (pellet/mash)</td>
<td>Fine crumbles for starter, coarse crumbles for grower and pellets for finisher phases</td>
</tr>
<tr>
<td>Feeding Schedule</td>
<td>Feed and water <em>Ad libitum</em></td>
</tr>
<tr>
<td>Basal diet information</td>
<td>6 different diets formulated to meet nutrient specifications. Diets 1 and 2 will be based on soybean meal (0 %BSFLM) and will have similar nutrients and ingredients concentration with exception of antimicrobial growth promoter (BMD/Avilamycin) in diet 1. Four of diets will be made by incorporating BSFLM at 12.5, 25, 50 and 75% to replace SBM in Diet 2.</td>
</tr>
<tr>
<td>Measurement and sampling schedule</td>
<td>Performance; BWG, FI and FCR (corrected and uncorrected for mortality)</td>
</tr>
<tr>
<td></td>
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<td>----------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>Per pen basis</td>
<td></td>
</tr>
<tr>
<td>Organ weights</td>
<td>(gizzard, small intestine, ceca, liver, spleen, liver bursa)</td>
</tr>
<tr>
<td></td>
<td>2 bird per pen</td>
</tr>
<tr>
<td>Day 10 and 24</td>
<td></td>
</tr>
<tr>
<td>Jejunal histology</td>
<td></td>
</tr>
<tr>
<td>Day 10</td>
<td></td>
</tr>
<tr>
<td>Breast yield</td>
<td></td>
</tr>
<tr>
<td>Day 49</td>
<td></td>
</tr>
<tr>
<td>Litter samples</td>
<td>(Moisture), foot pad lesion scores</td>
</tr>
<tr>
<td>Day 46-49</td>
<td></td>
</tr>
</tbody>
</table>

Appropriate measurements of behaviour and stress may also be done to compare the effects of the different diets.

**References (selected)**


3.4 Project Description

Project 6- Egg quality and behaviour of hens housed in different systems

Background

The Canadian egg industry is in transition because of pressure to adopt alternative housing and to reduce the use of sub-therapeutic preventive antimicrobials (AGP). With respect to housing, shift from conventional cages (CC) to enriched colonies (EC) and cage-free (AV) operations will mean more bird activity (scratching, foraging and dust bathing) inside the house potentially leading to increased airborne pollutants like dust and ammonia. A move from CC to either an enriched cage or a non-cage system may affect the safety or quality, or both, of the eggs laid by hens raised in this new environment. The safety of the eggs may be altered microbiologically through contamination with pathogens. Quality may be affected through changes in the integrity of the shell, yolk, or albumen along with changes in function, composition, or nutrition. An understanding of these different effects is prudent as the egg industry embrace alternative housing system is undertaken.

Objectives and overview

The objective of this project is to conduct a survey of egg quality characteristics of eggs produced by Arkell general flocks housed in enriched cages and aviary systems. Examples

1. Record number (frequency) of eggs found on the floor and nests in aviary
2. Record number (frequency) of cracked soft-shelled, and dirty eggs in a population of eggs collected in a day as per Arkell schedule over a period
3. Take samples of eggs and conduct eggshell (thickness, breaking strength) and
internal (Hugh unit, yolk color) quality measurements in sub-samples
4. Assess behavioural differences between birds kept in conventional cages and in alternative housing.

References

NFACC. 2017. Code of Practice for the Care and Handling of Pullets and Laying Hens. Egg Farmers of Canada and the National Farm Animal Care Council Ottawa, Canada


3.4 Course Technology and Technical Support

CourseLink

This course is being offered using CourseLink (powered by D2L's Brightspace), the University of Guelph's online learning management system (LMS). By using this service, you agree to comply with the University of Guelph’s Access and Privacy Guidelines. Please visit the D2L website to review the Brightspace privacy statement and Brightspace Learning Environment web accessibility standards.


Technical Support

If you need any assistance with the software tools or the CourseLink website, contact CourseLink Support.
Email: courselink@uoguelph.ca

Tel: 519-824-4120 ext. 56939 Toll-Free (CAN/USA): 1-866-275-1478

Support Hours (Eastern Time):

Monday thru Friday: 8:30 am–8:30 pm

Saturday: 10:00 am–4:00 pm

Sunday: 12:00 pm–6:00 pm

Teams (via Office 365)

Office 365 Teams is a collaboration service that provides shared conversation spaces to help teams coordinate and communicate information. This course will use Teams for one on one meetings with your Instructor. It is recommended that you use the desktop version of Teams. As a student you are responsible for learning how to use Teams and it’s features.

For Teams Support visit the CCS website for more information.

https://www.uoguelph.ca/ccs/services/office365/teams
Zoom

This course will use Zoom for some lectures and the link is available on the course calendar. Check your system requirements to ensure you will be able to participate.

https://opened.uoguelph.ca/student-resources/system-and-software-requirements

3.4 Technical Skills

Technical Skills

As part of your learning experience, you are expected to use a variety of technologies for assignments, lectures, teamwork, and meetings. In order to be successful in this course you will need to have the following technical skills:

- Manage files and folders on your computer (e.g., save, name, copy, backup, rename, delete, and check properties);
- Install software, security, and virus protection;
- Use office applications (e.g., Word, PowerPoint, Excel, or similar) to create documents;
- Be comfortable uploading and downloading saved files;
- Communicate using email (e.g., create, receive, reply, print, send, download, and open attachments);
• Navigate the CourseLink learning environment and use the essential tools, such as Dropbox, Quizzes, Discussions, and Grades (the instructions for this are given in your course);
• Access, navigate, and search the Internet using a web browser (e.g., Firefox, Internet Explorer); and
• Perform online research using various search engines (e.g., Google) and library databases.

3.4 Library Access

As a student, you have access to the University of Guelph’s library collection, including both physical and electronic materials. For information on checking out or couriering physical library items, accessing electronic journals and returning items to the library, visit the library’s website.

If you are studying off campus and would like to access the library’s electronic resources, use the Off Campus Login and login using your Single Sign On credentials or using your last name and library barcode.

https://www.lib.uoguelph.ca/

https://www.lib.uoguelph.ca/campus-login

4 Learning Outcomes

Specific Learning Outcomes:

The goal of this course is to introduce you to the world of independent research.

By the end of the course, you will:

4.1 Course Learning Outcomes

By the end of this course, you should be able to:
1. be familiar with issues of animal care and safety in the laboratory
2. be familiar with the development of hypotheses and the design of experiments  
3. be exposed to laboratory techniques used in different areas of animal biology research  
4. develop skills for observing and measuring animals' behavioural and endocrine responses to the physical, social or nutritional environment  
5. be able to organize your group time to perform experiments, collect and analyse data  
6. critically evaluate and interpret your results to integrate various measures of response in order to deepen understanding of biological function  
7. write a scientific paper and present your results to the class  

---

5 Teaching and Learning Activities

5.1 Lecture

PLEASE NOTE THIS SCHEDULE IS BY WEEK - CLASS IS ALWAYS ON THE TUESDAY BUT YOU MUST SCHEDULE ADDITIONAL TIME TO COMPLETE LAB WORK.

<table>
<thead>
<tr>
<th>Week of</th>
<th>Lecture</th>
<th>Lab Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan. 11</td>
<td>Introduction</td>
<td>Organize groups, choose topic and discuss/plan the literature review</td>
</tr>
<tr>
<td></td>
<td>Guest lecture on Behaviour data collection techniques</td>
<td></td>
</tr>
<tr>
<td>Jan. 18</td>
<td>Develop hypotheses and work schedule</td>
<td>Develop hypotheses and work schedule</td>
</tr>
<tr>
<td>Jan. 25</td>
<td>Presentation of research protocols</td>
<td>Set up experiments</td>
</tr>
<tr>
<td>Date</td>
<td>Activity Description</td>
<td>Notes</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Feb 1</td>
<td>Animal Care (Dr. Anna Bolinder)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Farm and Lab Safety (Christi Cooper, EHS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data and sample collection</td>
<td></td>
</tr>
<tr>
<td>Feb. 8</td>
<td></td>
<td>Data and sample collection</td>
</tr>
<tr>
<td>Feb. 15</td>
<td><strong>Winter Break</strong></td>
<td><strong>Winter Break</strong></td>
</tr>
<tr>
<td>Feb. 22</td>
<td>Groups present status reports</td>
<td>Data and sample collection</td>
</tr>
<tr>
<td>Mar 1</td>
<td>Hormone assay validation</td>
<td>Validation study</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data and sample collection</td>
</tr>
<tr>
<td>Mar. 8</td>
<td>Groups present status reports</td>
<td>Hormone assays</td>
</tr>
<tr>
<td>Mar. 15</td>
<td></td>
<td>Hormone assays completed</td>
</tr>
<tr>
<td>Mar. 22</td>
<td>Discussion of data analysis and report preparation</td>
<td>Data analysis</td>
</tr>
<tr>
<td>Mar. 29</td>
<td>Draft report for comments</td>
<td></td>
</tr>
<tr>
<td>Apr 5</td>
<td>Lab report due and</td>
<td></td>
</tr>
</tbody>
</table>
5.2 Lab

The class will be divided into groups, with each group conducting a different project at either Arkell Poultry or Arkell Swine Research Stations. Students will focus on measuring performance, behaviour and endocrine changes in the animals.

The potential projects are:

Project 1. Piglet feed management during the post-weaning period

Project 2 - Comparative evaluation of hydrolysed yeast (HY40) and pharmacological zinc oxide in nursery pigs

Projects 3 and 4. The Behaviour and Physiology of Sows and Piglets in Different Farrowing Environments

Project 5 - Impact of replacing soybean meal with black soldier fly larvae meal in broiler chicken feeds on growth performance, gut physiology, and litter quality

Project 6- Egg quality and behaviour of hens housed in different systems

Each group of students will conduct one experiment and individuals within each group will receive training and be assigned responsibility for animal handling, sample collection and hormone analysis. Sample and data collection and analytical procedures will be conducted both during and outside of scheduled lab time as arranged by the groups. Each group member is expected to do their fair share of the work and to
participate in group meetings. Evaluations of all individual group members will be conducted at the end of the course. Technical assistance will be provided as needed. Schedules vary with experiment but all animal measurements and sampling will be completed by early March.

Each member of the group will receive a complete data set for their experiment and will write an individual lab report in the format of a journal paper (Journal of Animal Science). Please refer to links under “Writing Up your Report” posted on CourseLink for instructions, format and help guides.

Each group will present their experimental results in the last week of the semester. The format of the presentation may be similar to that of the lab report.

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# 6 Assessments

## 6.1 Marking Schemes & Distributions

<table>
<thead>
<tr>
<th>Name</th>
<th>Scheme A (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review</td>
<td>15</td>
</tr>
<tr>
<td>Presentation of Research Protocol</td>
<td>10</td>
</tr>
<tr>
<td>Refinement of Wet Lab Protocol</td>
<td>5</td>
</tr>
<tr>
<td>Laboratory Report - Journal Format</td>
<td>40</td>
</tr>
<tr>
<td>Presentation of Results</td>
<td>20</td>
</tr>
<tr>
<td>Participation and Contribution for Group work</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

## 6.2 Assessment Details

**Literature Review (15%)**

*Date:* Tue, Jan 26  
*Learning Outcome:* 2, 3, 4, 5  
Development of Hypotheses and Experimental Design
15% - Individual Mark

**Presentation of Research Protocol (10%)**
- **Date:** Tue, Jan 26
- **Learning Outcome:** 2, 3, 4, 5, 6
- 10% - Group Mark

**Refinement of Wet Lab Protocol (5%)**
- **Date:** Tue, Mar 9
- **Learning Outcome:** 1, 3, 5
- 5% - Individual Mark

**Laboratory Report - Journal Format (40%)**
- **Date:** Thu, Apr 8
- **Learning Outcome:** 4, 5, 7
- 40% - Individual Mark

**Presentation of Results (20%)**
- **Date:** Tue, Apr 6
- **Learning Outcome:** 4, 5, 6, 7
- 20% - Group Mark

**Participation and Contribution for Group work (10%)**
- **Learning Outcome:** 6
- 10% - Individual Mark

### 7 Course Statements

#### 7.1 Grading Policies

Assignments should be submitted via dropbox by 4:30 p.m. on the due date. Late penalties of 2 % per day will be assessed for late submissions.

#### 7.2 Course Policy on Group Work

All groups will determine and agree to expectations for themselves and their fellow group members using a contract with terms given below. At the end of the semester, group members will provide a review of themselves and their fellow group members regarding compliance with the expectations and contract. 10% of the course mark will reflect each student’s participation and contribution to the group.

**Group Contract**
List Group members:

Expectations (grade) for major project:

Five Processes for Effective Teams:

1. How will we make decisions? (e.g. consensus, leader dictates)
2. How do we make sure that everyone gets a chance to discuss or raise concerns?
3. How will we handle differences amongst us?
4. How will we ensure the completion of our work?
5. How will we change things that are not producing results?

Signatures:

7.3 Dropbox Submissions

Assignments should be submitted electronically via the online Dropbox tool. When submitting your assignments using the Dropbox tool, do not leave the page until your assignment has successfully uploaded. To verify that your submission was complete, you can view the submission history immediately after the upload to see which files uploaded successfully. The system will also email you a receipt. Save this email receipt as proof of submission.

Be sure to keep a back-up copy of all of your assignments in the event that they are lost in transition. In order to avoid any last-minute computer problems, your instructor strongly recommend you save your assignments to a cloud-based file storage (e.g., OneDrive), or send to your email account, so that should something happen to your computer, the assignment could still be submitted on time or re-submitted.
It is your responsibility to submit your assignments on time as specified on the Schedule. Be sure to check the technical requirements and make sure you have the proper computer, that you have a supported browser, and that you have reliable Internet access. Remember that **technical difficulty is not an excuse not to turn in your assignment on time.** Don’t wait until the last minute as you may get behind in your work.

If, for some reason, you have a technical difficulty when submitting your assignment electronically, please contact your instructor or CourseLink Support.

http://spaces.uoguelph.ca/ed/contact-us/

### 8 University Statements

#### 8.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

#### 8.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Graduate Calendar - Grounds for Academic Consideration
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

Associate Diploma Calendar - Academic Consideration, Appeals and Petitions
https://www.uoguelph.ca/registrar/calendars/diploma/current/index.shtml

#### 8.3 Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all students (undergraduate, graduate and diploma) except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in their respective Academic Calendars.
8.4 Copies of Out-of-class Assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

8.5 Accessibility
The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

For Guelph students, information can be found on the SAS website https://www.uoguelph.ca/sas

For Ridgetown students, information can be found on the Ridgetown SAS website https://www.ridgetownc.com/services/accessibilityservices.cfm

8.6 Academic Integrity
The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community—faculty, staff, and students—to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University’s policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.
Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Graduate Calendar - Academic Misconduct
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml

8.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

8.8 Resources

The Academic Calendars are the source of information about the University of Guelph’s procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
https://www.uoguelph.ca/academics/calendars

8.9 Disclaimer

Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings and academic schedules. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website (https://news.uoguelph.ca/2019-novel-coronavirus-information/) and circulated by email.

8.10 Illness

The University will not normally require verification of illness (doctor’s notes) for fall 2020 or winter 2021 semester courses. However, requests for Academic Consideration may still require medical documentation as appropriate.