ANSC*4350 Experiments in Animal Biology

Winter 2023
Section(s): C01

Department of Animal Biosciences
Credit Weight: 0.50
Version 1.00 - January 05, 2023

---

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) 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, 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 4) and individual lab reports are due the end on the final week (April 7)

---

2 Instructional Support

2.1 Instructional Support Team

Instructor: Lee-Anne Huber
Email: huberl@uoguelph.ca
Office Hours: By Appointment

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

2.2 Teaching Assistants

Teaching Assistant (GTA): Cristhiam Jhoseph Munoz Alfonso Swine projects
Email: munozalc@uoguelph.ca
Office Hours: By Appointment

Teaching Assistant (GTA): Clara Zeizold poultry projects
Email: cziezold@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 – Maximizing immune competence of piglets after birth and around weaning using enzymatically treated yeast

Background

The epitheliochorial nature of the porcine placenta implies that the new-born piglet is immunologically naı ve and must acquire maternal immunoglobulins (IgG, IgM, IgA) from ingested colostrum and milk for passive immune protection until its immune system fully develops (Mackie et al., 1999; Rooke and Bland, 2002; Harris et al., 2006). In this context, it is critical for piglets to access IgG in colostrum because of the short time window during which the new-born piglet can absorb intact immunoglobulins and transfer them to the bloodstream.

The transmission of dam immunoglobulins to progeny can be manipulated through dam nutrition. For example, carbohydrates abundantly found in yeast cell wall are absent in mammals, enabling efficient recognition by the host immune surveillance mechanisms (Angrand et al., 2019). As such, concentrations of IgG and IgM in colostrum were greater in sows fed diets containing yeast cell wall mannooligosaccharides compared to those provided the control diet, and IgA tended to be increased (Czech et al., 2010). Additionally, serum concentrations of IgG at birth and 21 days of age, and IgM concentrations at birth were greater in piglets from sows provided yeast product.

Yeast products can also be supplied to piglets after weaning (Kiarie et al., 2011; Kiarie et al., 2020; Chance et al., 2021). β-glucans and mannan oligosaccharides are functional parts of yeast, and are responsible for the immune-modulating properties and prevention of pathogenetic bacteria (e.g., E. coli) binding and proliferating on intestinal surfaces (Kogan and Kocher, 2007).

Therefore, feeding yeast products to the sows prior to and during lactation or to the offspring after weaning can each have beneficial effects on offspring outcomes, via differing mechanisms.

Objectives and overview

The objectives of this project are to determine the effects of feeding yeast products to the sow prior to farrowing and during lactation and/or to the offspring after weaning on milk

production and composition, piglet growth rates and survivability, and/or maternal transfer of antibodies to the offspring. Up to 12 sows (gilts) + litters will be available (B. Christensen; PhD student). Sows will be provided diets with 0, 0.25 or 1% inclusion of yeast product between day 85 of gestation and day 21 of lactation (weaning). Upon weaning, litters will be assigned to either a yeast- or no yeast- feeding program in the nursery. The experimental diets are fixed, but you may look at many different outcomes/combinations of outcomes. For example:

Option 1 - lactation

1. Maternal transfer of antibodies to the offspring (within the first 24 hours after farrowing via colostrum or via milk) – can collect colostrum and/or milk and blood samples from the sow and/or offspring

2. Lactating sow performance (e.g., average daily feed intake, body weight and back fat losses, milk composition) and behaviour, milk production (offspring growth rates), offspring pre-weaning survivability

Option 2 – nursery (after weaning the offspring)

3. Offspring growth performance (average daily gain, average daily feed intake, feed efficiency) and survivability after weaning, feeding behaviour after weaning, incidence of diarrhea and antibiotic treatments etc.

References:

Angrand, G., A. Quillévéré, N. Loaëc, C. Daskalogianni, A. Granzhan, M.-P. Teulade-Fichou, R. Fahraeus, R. Prado Martins, and M. Blondel. 2019. Sneaking Out for Happy Hour: Yeast-Based Approaches to Explore and Modulate Immune Response and Immune Evasion. Genes 10: 667.

Chance, J.A., J.M. DeRouchey, R.G. Amachawadi, V. Ishengoma, T.G. Nagaraja, R.D. Goodband, J.C. Woodworth, M.D. Tokach, H.I. Calderón, Q. Kang, J.A. Loughmiller, B. Hotze, and J.T. Gebhardt. 2021. Live yeast and yeast extracts with and without pharmacological

levels of zinc on nursery pig growth performance and antimicrobial susceptibilities of fecal Escherichia coli. J. Anim. Sci. 99(12): 1-10. doi:10.1093/jas/skab330.

Czech, A., E. R. Grela, A. Mokrzycka, and Z. Pejsak. 2010. Efficacy of mannanoligosaccharides additive to sows diets on colostrum, blood immunoglobulin content and production parameters of piglets. Pol J Vet Sci 13: 525-531.

Harris, N. L., I. Spoerri, J. F. Schopfer, C. Nembrini, P. Merky, J. Massacand, J. F. Urban, A. Lamarre, K. Burki, B. Odermatt, R. M. Zinkernagel, and A. J. Macpherson. 2006. Mechanisms of Neonatal Mucosal Antibody Protection. The Journal of Immunology 177: 6256-6262.

Kiarie, E., S. Bhandari, M. Scott, D.O. Krause, and C.M. Nyachoti. 2011. Growth performance and gastrointestinal microbial ecology responses of piglets receiving Saccharomyces cerevisiae fermentation products after an oral challenge with Escherichia coli (K88). J. Anim. Sci. 89(4). doi:10.2527/jas.2010-3424.

Kiarie, E., C. Voth, D. Wey, C. Zhu, L.-A. Huber, and E.J. Squires. 2020. Growth performance, organ weight, fecal scores, plasma, and ceca digesta microbial metabolites in growing pigs fed spent biomass of Pichia kudriavzevii. Transl. Anim. Sci. 4(3). doi:10.1093/tas/txaa152.

Kogan, G., and A. Kocher. 2007. Role of yeast cell wall polysaccharides in pig nutrition and health protection. Livest. Sci. 109: 161–165. doi:10.1016/j.livsci.2007.01.134.

Mackie, R. I., A. Sghir, and H. R. Gaskins. 1999. Developmental microbial ecology of the neonatal gastrointestinal tract. The American Journal of Clinical Nutrition 69: 1035s-1045s.

Rooke, J. A., and I. M. Bland. 2002. The acquisition of passive immunity in the new-born piglet. Livest Prod Sci 78: 13-23.

3.4 Project Description

Project 2 - Behaviour and Physiology of Sows and/or 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 crushing piglets during postural changes. Because piglets require a much higher environmental 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 behaviours. Farrowing crates are criticized on animal welfare grounds because they prevent nest-building behaviours and may increase sow stress. 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 performance. Alternative farrowing systems furnished with straw, provide more space to the sow and allow sows to perform nest-building, 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 project 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. Twelve sows will be available beginning several days before farrowing.

The sows can be separated into two different treatment groups of your choosing (e.g., open vs. closed farrowing crates, different types of supplemental heat, enriched vs. non-enriched farrowing crates, different feed management programs for sows etc.). Litter characteristics will be recorded (e.g., number of stillbirths, total born alive, litter birth weight). The behaviour of sows and piglets can be measured using live observation and video recordings. Routine management practices such as teeth clipping and castration of male piglets 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 (incidence and apparent cause) of piglets can be recorded. Endocrine changes associated with parturition and onset of lactation or stress response can be analyzed from saliva samples collected from the sows. There are a couple of different approaches that groups can use to address this topic. For example you can:

Option 1 – sows

- Compare nest-building behaviour, stress response and immune status of sows in two farrowing environments (e.g., use different heat sources and placement for piglets, provide nesting material, or change the configuration of the farrowing crate etc.)
- 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

Option 2 - piglets

- Assess the effect of farrowing environment on thermoregulatory behaviour, suckling behaviour, and growth rates of piglets
- Compare the standing and lying behaviour of sows in two farrowing environments in relation to risk of crushing piglets
- Compare the responses of piglets to teeth clipping, tail docking, or castration in the

different farrowing environments

NOTE: If two groups decide to work on this project (one for sows and one for piglets), the groups must carefully coordinate so that the experimental designs are compatible.

References:

Cronin, G.M. and J.A. Smith, 1992. Suckling behaviour of sows in farrowing crates and straw-bedded pens. Appl. Anim. Behav. Sci. 33:175-189.

Cronin, G.M., J.A. Smith, F.M. Hodge and P.H. Hemsworth, 1994. The behavior of primiparous sows around farrowing in response to restraint and straw bedding. Appl. Anim. Behav. Sci. 39: 269-280.

Hrupka, B.J. et al., 1998. The effect of farrowing crate heat lamp location on sow and pig patterns of lying and pig survival. J. Anim. Sci. 76:2995-3002.

Jarvis, S., Calvert, D.M. Weary, E.A Pajor, D. Fraser and A.M. Honkanen 1996. Sow body movements that crush piglets: a comparison between two types of farrowing accommodation. Appl. Anim. Behav. Sci. 49: 149-158.

Jarvis, S., D'Eath, R. B., Robson, S. K., and A.B, Lawrence. 2006. The effect of confinement during lactation on the hypothalamic-pituitary-adrenal axis and behaviour of primiparous sows. Physiol. & Behav. 87, 345-352.

McGlone, J.J., T.M., Widowski, K.D., Stricklen, D. Mitchell, S.E., Curtis. 1996. Sow access to tassel pre-farrowing: preliminary evidence of stillbirth rate. J. Anim. Sci. 74 (1), 127, Suppl.

Sulabo, R. C., J. Y., Jacela, M. D., Tokach, S. S., Dritz, R. D., Goodbrand, J. M., DeRouchey, and

J. L., Nelssen. 2010. Effects of lactation feed intake and creep feeding on sow and piglet performance. J. Anim. Sci. 88: 3145-3153.

von Borell, et al. 2009. Animal welfare implications of surgical castration and its alternatives in pigs. Animal 3:1488-1496.

Vanheukelom, V., B. Driessen and R. Geers, 2012. The effects of environmental enrichment on the behaviour of sucklings piglets and lactating sows: A review. Livestock Science 143:116-131.

Widowski, T,M., S.E., Curtis. 1990. The influence of straw, cloth tassel or both on the pre-partum behavior of sows. Appl. Anim. Behav. Sci, 27, 53-71.

3.4 Project Description

Project 3: Broiler breeder supplementation with enzymatically treated yeast on egg characteristics and hatchability

Background

In broiler chickens, the nutrients and factors deposited in the hatching egg by the hen are the only source of nutrients available to the embryo (Uni and Ferket, 2004; Uni et al., 2005; Ferket, 2012). The protective role of maternal immunoglobulins (IgY and IgA) is of particular interest due to the precocial nature of chickens (Friedman et al., 2012). These maternal antibodies are provided during the process of egg formation, and continue to function in the hatchling until its own immune response can take over (Friedman et al., 2012).

The transmission of hen immunoglobulins to progeny can be manipulated through hen nutrition. For example, carbohydrates abundantly found in yeast cell wall are absent in poultry, enabling efficient recognition by the host immune surveillance mechanisms (Angrand et al., 2019). Moreover, most commercial broiler breeder farms and terminal broiler hatcheries have concentrated on relatively mature hens to supply hatching eggs to farms, especially those beyond 28 weeks of age. However, broiler breeder hens start laying at about 20 weeks of age, but chicks hatched from young hens tend to have performance issues (Ipek & Sozcu, 2015; Mahmoud & Edens, 2012). Unfortunately, this has often led to a large proportion of eggs

going to waste as compost or pet food. The ability of feed additives such as yeast products to increase egg quality and hatchability in young breeders is unexplored.

Objectives and Overview

The objectives of this project are to determine the effects of feeding yeast products to the broiler breeder prior to and during egg laying on egg hatchability and chick survival, and/or maternal transfer of antibodies to the offspring. Up to 12 pens of 20 hens (+ 2 cockerels) will be available (A. Maina; PhD student). Broiler breeders will be 20 weeks of age on January 23, 2023 (start of lay) and will be provided diets with 0 or 0.05% inclusion of yeast product during the pre- and laying periods. Eggs can be collected routinely and set for hatching and/or to explore egg quality. The experimental diets are fixed, but you may look at many different outcomes/combinations of outcomes. For example:

1. Assess egg production by the broiler breeders (e.g., egg counts and weights) + assess egg quality (e.g., shell breaking strength, yolk color, albumen height etc.)
2. Assess maternal transfer of immunity to the offspring (hen blood samples, analyze eggs for antibodies)
3. Hatch chicks (eggs will be fertile), check hatchability, fertility rate

References

Angrand, G., A. Quillévéré, N. Loaëc, C. Daskalogianni, A. Granzhan, M.-P. Teulade-Fichou, R. Fahraeus, R. Prado Martins, and M. Blondel. 2019. Sneaking Out for Happy Hour: Yeast-Based Approaches to Explore and Modulate Immune Response and Immune Evasion. Genes 10: 667.

Ferket, P. R. 2012. Embryo epigenomic response to breeder management and nutrition XXIV World's Poultry Congress. p 1-11, Salvador, Bahia, Brazil.

Friedman, A., O. Elad, I. Cohen, and E. Bar Shira. 2012. The Gut Associated Lymphoid System in the Post-Hatch Chick: Dynamics of Maternal IgA. Isr J Vet Med 67: 75-81.

Ipek, A., & Sozcu, A. (2015). The effects of broiler breeder age on intestinal development during hatch window, chick quality and first-week broiler performance. Journal of Applied Animal Research, 43(4), 402–408. https://doi.org/10.1080/09712119.2014.978783

Mahmoud, K. Z., & Edens, F. W. (2012). Breeder age affects the small intestine development of broiler chicks with immediate or delayed access to feed. British Poultry Science, 53(1), 32–41. https://doi.org/10.1080/00071668.2011.652596

Uni, Z., P. R. Ferket, E. Tako, and O. Kedar. 2005. In ovo feeding improves energy status of late-term chicken embryos. Poultry Sci 84: 764-770.

Uni, Z., and R. P. Ferket. 2004. Methods for early nutrition and their potential. World Poultry Sci J 60: 101-111.

3.4 Project Description

Project 4 - Egg quality and behaviour of hens housed in different systems or of different heritage breeds

Background

With respect to housing, the egg industry is shifting from conventional cages to conventional cages with furnishings, enriched cages, and cage-free systems (aviaries), which 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 conventional cages 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. Quality may be affected through changes in the integrity of the shell, yolk, or albumen. An understanding of these different effects is prudent as the egg industry embraces alternative housing systems. Additionally, certain heritage breeds are becoming popular with backyard and organic systems. Many heritage breeds are considered 'dual purpose' as they can be used for both egg and meat production. As these breeds have not undergone intensive selection for egg production, egg quality characteristics and hen behaviour vary widely among genotypes. Characterizing egg production, quality, and hen behaviour will assist producers in selecting the best genotype for their farming objectives.

Available housing systems and genetics:

Aviary – four different heritage breeds housed together (with roosters; White Leghorn, Columbian Rock, Rode Island Red, Plymouth Barred Rock)

Enriched versus conventional cages (housing the same breed and age of hens)

Enriched, conventional cages – four different heritage breeds (with roosters); 288 birds/breed

Objectives and overview

The objective of this project is to conduct a survey of egg quality characteristics, behaviour, and/or stress response of different heritage breeds or hens housed in different housing systems. For example:

Option 1 (compare housing systems with the same breeds)

1. Assess egg production, egg/eggshell quality (e.g., shell thickness, breaking strength;

Hugh unit, yolk colour), and/or behaviour of hens housed in different systems (e.g., enriched versus conventional cages)
2. Assess the effects of stocking density in enriched cages on egg production, behaviour, and indices of stress (e.g., plasma corticosterone)

Option 2 (compare heritage breeds within the same housing system)

1. Assess egg production, egg/eggshell quality (e.g., shell thickness, breaking strength; Hugh unit, yolk colour), and/or behaviour and hen-hen interactions of heritage breeds

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

Karcher, D. M., D. R. Jones, Z. Abdo, Y. Zhao, T. A. Shepherd, and H. Xin. 2015. Impact of commercial housing systems and nutrient and energy intake on laying hen performance and egg quality parameters. Poult. Sci. 94: 485-501. doi: 10.3382/ps/peu078

Mwaniki, Z., M. Neijat, and E. Kiarie. 2018. Egg production and quality responses of adding up to 7.5% defatted black soldier fly larvae meal in a corn-soybean meal diet fed to Shaver White Leghorns from wk 19 to 27 of age. Poult Sci 97(8):2829-2835. doi: 10.3382/ps/pey118

Onbasilar, E. E., N. Unal, E. Erdem, A. Kocakaya, and B. Yaranoglu. 2015. Production performance, use of nest box, and external appearance of two strains of laying hens kept in conventional and enriched cages. Poult. Sci. 94: 559-564. doi: 10.3382/ps/pev009

Sosnowka-Czajka, E., E. Herbut, I. Skomorucha, and R. Muchacka. 2011. Welfare levels in heritage breed vs. commercial laying hens in the litter system. Annal. Anim. Sci. 11: 585-595. doi: 10.2478/v10220-011-0010-2

Vits, A., D. Weitzenburger, H. Hamann, and O. Distl. 2005. Production, egg quality, bon strength, claw length, and keel bone deformities of laying hens housed in furnished cages with different group sizes. Poult. Sci. 84: 1511-1519. doi: 10.1093/ps/84.10.1511

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.

http://www.uoguelph.ca/web/privacy/ https://www.d2l.com/legal/privacy/ https://www.d2l.com/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 may 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

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 Lectures

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

Week of	Lecture	Lab Work
Jan. 9	Introduction to the course and presentation of projects	Organize groups, choose topic and discuss/plan the literature review
Jan. 16	Guest lecture on Behaviour data collection techniques Develop hypotheses and work schedule	Develop hypotheses and work schedule
Jan. 23	Presentation of research protocols	Set up experiments
Jan 30	Animal Care (Dr. Anna Bolinder) Farm and Lab Safety (Christi Cooper, EHS)	Data and sample collection
Feb. 6	Guest Lecture Dr. R. Friendship	Data and sample collection
Feb. 13	Groups present status reports	Data and sample collection
Feb. 20	**Winter Break**	**Winter Break**
Feb 27	Hormone assay validation	Validation study Data and sample collection
Mar. 6	Groups present status reports	Hormone assays
Mar. 13		Hormone assays completed
Mar. 20	Discussion of data analysis and report preparation	Data analysis
Mar. 27	Draft report for comments	
Apr 3	Lab report due and presentation of projects	

5.2 Labs

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 – Maximizing immune competence of piglets after birth and around weaning using enzymatically treated yeast

Project 2 - Behaviour and Physiology of Sows and/or Piglets in Different Farrowing Environments

Project 3: Broiler breeder supplementation with enzymatically treated yeast on egg characteristics and hatchability

Project 4- Egg quality and behaviour of hens housed in different systems or of different heritage breeds

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.

---

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Literature Review	15

Name	Scheme A (%)
Presentation of Research Protocol	10
Refinement of Wet Lab Protocol	5
Laboratory Report - Journal Format	40
Presentation of Results	20
Participation and Contribution for Group work	10
Total	100

6.2 Assessment Details

Literature Review (15%)
Date: Tue, Jan 24
Learning Outcome: 2, 3, 4, 5
Development of Hypotheses and Experimental Design

15% - Individual Mark

Presentation of Research Protocol (10%)
Date: Tue, Jan 24
Learning Outcome: 2, 3, 4, 5, 6
10% - Group Mark

Refinement of Wet Lab Protocol (5%)
Date: Tue, Mar 7
Learning Outcome: 1, 3, 5
5% - Individual Mark

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

Presentation of Results (20%)
Date: Tue, Apr 4
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.

Undergraduate Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Graduate Calendar - Registration Changes
https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml

Associate Diploma Calendar - Dropping Courses
https://www.uoguelph.ca/registrar/calendars/diploma/current/c08/c08-drop.shtml

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 make a booking at least 14 days in advance, and no later than November 1 (fall), March 1 (winter) or July 1 (summer). Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time.

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, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. 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

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g.. final exam or major assignment).

8.11 Covid-19 Safety Protocols

For information on current safety protocols, follow these links:

- https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
- https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.
