Principles of Animal Breeding
Animal Sciences/Dairy Science 363
Spring 2014

Lecture: 8:50 MWF, 212 Animal Sciences Building
Laboratory: 2:25 – 4:20 Thursday, CALS Computer Lab or TBA

Instructors:
David L. Thomas, 438 Animal Sciences Building, Phone: 263-4306
Email: dlthomas@wisc.edu
Office hours: Call or email for an appointment or drop in
Guilherme Rosa, 436 Animal Sciences Building, Phone: 265-8617
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Lab Instructor and Course Assistant:
Francisco Peñagaricano; Email: fpenagarican@wisc.edu
Tom Murphy; Email: twmurph88@gmail.com

Required Text:
Bourdon, R. M. 2000. Understanding Animal Breeding. Second Edition. Prentice-Hall, Inc.

Course email discussion group:
A class email can be accessed at: dysci363-1-s14-ihg@lists.wisc.edu
Students are encouraged to direct questions or comments on subject matter to the course email list. Usually a question or concern of one student will be shared by several others. Class announcements also will be made via this email list.

Learn@UW course web site: https://learnuw.wisc.edu/

Course objectives:
- Gain a clear understanding of the concepts, principles, and models of animal genetics.
- Apply those concepts and principles toward methods for improving the value and well-being of livestock.
- Learn decision-making about improvement of animals and animal populations with imperfect information.
- Critically examine historical and contemporary practices in genetic improvement of animals with a view toward developing improved practices for the future.
- Critically evaluate scientific and popular information related to genetic improvement of animals.
- Learn the processes of scientific inquiry and critical thinking as applied to animal genetics.
- Confidently discuss animal breeding programs and practices using the terminology and concepts of scientific animal genetics.

Expectations of students:
- Purchase the textbook.
- Read to comprehend assignments in the textbook prior to class time.
- Attend every class prepared to begin work at the start of the period.

- Come to class prepared to discuss the material and share your insights and understandings with other students in the class.
- Participate actively as both a listener and a speaker in class discussions.
- Inform faculty by email in advance when absence from class is anticipated.

Modes of instruction:

- Virtually all of the basic concepts and principles are well explained in the textbook. We will rely heavily on students studying the text to gain an understanding of this material. Lectures will not be used to reiterate the material in the text.
- Class time will be used to develop understanding and application of the concepts and principles that are presented in the text.
- We will use student-to-student interaction to share knowledge among students, identify and clear up misconceptions, practice communication in the language of animal genetics, and discuss issues and options in animal improvement.
- Laboratories will be designed to apply key models and processes used in animal genetics.
- Quizzes, homework, and examinations will emphasize the models, decision processes, as well as the basic concepts and knowledge of animal genetics.

Discussion:

Some class periods will end with an in-class discussion. The purposes of these discussions are to add interest to the class period, explore applications of concepts, enable students to practice the language of animal breeding, and enable students to learn from one another. Also, we use the discussion summaries by students to learn about students' misconceptions and to gauge students' level of understanding. We then use this insight to correct misconceptions and misunderstandings. Therefore, it is critical that discussion summaries be clearly expressed and give a candid and accurate picture of the groups' discussion. Discussion summaries are scored on participation and effort; they are not scored on correctness of responses. Ground rules for discussion summaries include:

- Record only the names of students in attendance
- Write responses in more or less complete sentences with subject and verb unless the discussion question calls for a simple list
- Clearly separate comments during your group's discussion from any notes that are written on the discussion summary page during the whole-class discussion.

Computer simulation:

A computer simulation exercise (SIMBULL) allows students to manage and breed a dairy herd over a number of years and enables students to apply lessons of selection. Reports on herd progress and breeding policies will constitute some of the laboratory assignments.

Attendance:

Students are expected to attend each class period. A significant amount of graded work is done during the class period. Advance notice for absences due to religious holidays or observances will be allowed with no penalty to the student, but email **both** Dave Thomas (dlthomas@wisc.edu) and Guilherme Rosa (grosa@wisc.edu) in advance of the absence.

Grading:

Quizzes, Homework & Class discussions	25%	Quizzes at the start of most modules (about every-other class period) and discussions on many class periods
Laboratories/SIMBULL	25%	Laboratory reports/activities and SIMBULL reports
Exams 1 and 2	50%	25% on each exam

A student obtaining an average percentage of weighted points over all course work falling within the following ranges is guaranteed at least the associated letter grade.

% of possible points	Guaranteed minimum letter grade
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

Old exams are on reserve in Steenbock Library Electronic Reserves and can be accessed through your MyUW portal by following the following path: MyUW/Academic/Library Reserves By Department/Animal Sciences or Dairy Science/363/Section 001/Reserves.

General References: (**not on reserve** but at Steenbock Library)

Falconer, D. S., and T. F. C. MacKay. 1996. Introduction to Quantitative Genetics, 4th edition. Longman Group, Ltd.

Lasley, J. 1987. Genetics of Livestock Improvement, 4th edition. Prentice-Hall, Inc.

Nicholas, F. W. 2003. Introduction to Veterinary Genetics, 2nd edition. Blackwell Publishing.

Simm, Geoff. 1998. Genetic Improvement of Cattle and Sheep. Farming Press, Ipswich, UK.

Van Vleck, L. D., E. J. Pollack and E. A. B. Oltenacu. 1987. Genetics for the Animal Sciences. W.H. Freeman and Co., New York.

Warwick, E. J., and J. E. Legates. 1990. Breeding and Improvement of Farm Animals, 8th edition. McGraw-Hill.

Wills, M. B. 1991. Dalton's Introduction to Practical Animal Breeding. 3rd edition. Blackwell Scientific Publications.

Species References: (**not on reserve** but at Steenbock Library)

Cattle: Fries, R., and A. Ruvinsky, ed. 1999. The Genetics of Cattle. CAB International. Wallingford, Oxon, UK.

Dogs: Hutt, F.B. 1979. Genetics for dog breeders. W. H. Freeman and Co.

Horses: Bowling, A. T., and A. Ruvinsky, ed. 2000. The Genetics of the Horse. CAB International, Oxon, UK.

Bowling, A.T. 1996. Horse Genetics. Wallingford, Oxon: CAB International.

Poultry: Crawford, R. D. 1990. Poultry Breeding and Genetics. Elsevier.

Sheep: Piper, L., and A. Ruvinsky, ed. 1997. The Genetics of Sheep. CAB Internat'l, Oxon, UK.

Sheep Production Handbook. 1996. Sheep Industry Development Program, Inc. (on reserve under ANS 430 – Sheep Production)

Swine: Rothschild, M. F., and A. Ruvinsky, ed. 1998. The Genetics of the Pig. CAB International, Wallingford, Oxon, UK.

McKay, R.M. 1992. Practical Guide to Swine Breeding. Agriculture Canada

Single gene traits and lethal recessives: Hutt, F.B. 1964. Animal Genetics. The Ronald Press Company, NY.

Lecture and Lab Schedule			
Day	Date	Topics	Text reading
Mon	Mar 24	Repeated records, Repeatability, and Estimated Producing Ability	Chapter 9: 179-194
Wed.	Mar 26		
Lab		**Introduction to SIMBULL**	
Fri	Mar 28	Predicting breeding values, Multiple sources of information	Chapter 11
Mon	Mar 31		
Wed	Apr 2	Large scale genetic evaluation	Chapter 12
Lab		**Environmental effects and contemporary groups**	
Fri	Apr 4	Nucleus breeding schemes; Reference sire schemes; Progeny testing	
Mon	Apr 7	Genotypic and phenotypic correlations, Correlated response to selection	Chapter 13
Wed.	Apr 9		
Lab		**Performance traits; Using sire summaries**	
Fri	Apr 11	Selection for multiple traits, Selection index	Chapter 14
Mon	Apr 14	Mating systems for simply inherited traits, Random and assortative mating	Chapters 15, 16
Wed	Apr 16	Inbreeding depression	Chapter 17: 333-362
Lab		**Selection indexes and correlated responses**	
Fri	**Apr 18**	**Exam 1**	
Mon	Apr 21	Outbreeding, Hybrid vigor, Types of hybrid vigor	Chapter 17: 362-367 Chapter 18: 371-378
Wed	Apr 23		
Lab		**SIMBULL Workshop**	
Fri	Apr 25	Retained hybrid vigor	Chapter 18: 379-392
Mon	Apr 28	Introduction to marker-assisted selection and genomic selection	TBA
Wed	Apr 30	The Future of Genomic Selection in Animal Agriculture? – Prof. Jerry Taylor, Division of Animal Sciences – University of Missouri – 2014 A.B. Chapman Invited Lecturer	TBA
Lab		**Genomic selection**	
Fri	May 2	Application of genomic selection to dairy herd replacement heifers – Prof. Kent Weigel, Department of Dairy Science, UW-Madison	TBA
Mon	May 5	Crossbreeding systems	Chapter 19
Wed	May 7		
Lab		**Developing crossbreeding systems**	
Fri	May 9	Course Evaluation; SIMBULL Summary	
Tue	**May 13**	**Exam 2, during the final exam period, 10:05-12:05 p.m.**	

Note: A blank in the "Topics" column of the schedule indicates a carryover of the topic from the previous lecture period.