Economic Breeding Programs  
Spring 2015  

Course Syllabus

1) Instructors

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2) Schedule and Credit

This on-line course will begin on Monday March 30, 2015 and last for five weeks. The ending date for the course is Friday May 1, 2015. {Please note that the lead instructor (MM) will be unavailable on Friday May 1 due to planned international travel and that the final grades for the course will be compiled no later than Friday May 8.} The content of the course is consistent with a one-credit graduate level course. There is no text book per se for the course. However, the course will rely heavily on selected papers from the literature. These papers will be posted on the course website.

3) Prerequisite

Selection Index Theory and Application, which is offered in the Animal Breeding and Genetics Online curriculum, is a prerequisite for this course. Equivalent courses can be substituted given the approval of the Instructor.

4) Goals

The primary goal of this course is to provide a survey of methodology for developing an economic basis for multiple trait selection to improve the profitability of production. Much of the material is abstracted from the scientific literature, from which a sampling of relevant references will be provided. Therefore, an overarching goal of this course is instill the capacity to critically analyze relevant literature as an aid to solving future problems. Specific topics included are: a review of concepts relevant to selection index, an introduction to the concept of systems analysis, linear programming, and simulation with emphasis on economic values useful for selection index.

5) Learning Objectives

Week 1: Transition from phenotypes to estimated breeding values

Upon completion of this week, you will be able to:

1.1 Appreciate the use of selection index, the rationale for traits that would be included in it, and its use in a real-world context.

1.2 Transition in perspective from basing indexes on phenotypes as selection criteria to using Estimated Breeding Values.

1.3 Apply the theoretical framework of index construction to its use in practice.
Week 2: Introduction to concepts of systems analysis
Upon completion of this week, you will be able to:

2.1 Describe the concepts of systems analysis.

2.2 Develop foundational understanding of approaches to multi-faceted problems.

2.3 Develop an introductory simulation model.

Week 3: Straightforward economic weights and profit equations
Upon completion of this week, you will be able to:

3.1 Develop a sense of the long term process for construction and implementation of industry breeding schemes.

3.2 Construct a profit equation, and derive economic values from it.

Week 4: Increasing complexity
Upon completion of this week, you will be able to:

4.1 Develop insight into use of simulation as a vehicle for deriving economic values for complex production systems.

4.2 Derive economic values for traits with non-linear merit.

4.3 Derive economic values for traits affecting longevity

Week 5: Linear programming
Upon completion of this week, you will be able to:

5.1 Recognize use of linear programming as a tool to maximize (or minimize) an objective in the presence of constraints.

5.2 Solve a simple linear programming problem using Excel.

6) Course Outline

Week 1: Transition from phenotypes to estimated breeding values

Required readings:


Written assignment: Justify selection index as a tool for selection.

Forum: Identify and interpret parts of at least one paper from the scientific literature (not a textbook), beyond those listed in the syllabus, that is needed to fulfill the assignment.

Week 2: Introduction to concepts of systems analysis

Required readings:


Written assignment: Assume 1000 candidates for selection and the aggregate breeding value for merit of Hazel (1943). Assess the effect of 10% error in each of the economic weights on evaluation of the candidates.

Forum: Identify and interpret parts of at least one paper from the scientific literature (not a textbook), beyond those listed in the syllabus, that is needed to fulfill the assignment.

Week 3: Straightforward economic weights and profit equations

Required readings:


Written assignment: Develop a profit equation for pork or poultry production and solve for economic values for a reproductive trait and a product trait.
Forum: What are the important inputs to and outputs from pork and poultry production? What affects their prices?

Week 4: Increasing complexity

Required readings:


Forum: What constitutes a sound critique of a scientific paper?

Week 5: Linear programming

Required readings:


Forum: Solve the LP problem on page 2 of 5 in the “Purplemath” modules using the Excel Solver.

Assignments

Written assignments

Written exercises are intended to provide opportunities to build upon and extend the material presented in the course. Your address of each assignment is limited to a maximum of 6000 characters (including spaces, but not including citations or references).
It is anticipated that you will use additional creditable resources in addressing the issues raised in the assignment. All references are to be indicated in the form of the Journal of Animal Science.

Written assignments are due Friday at 11:59 p.m. (your local time zone) of the week following that in which it is assigned. For the most part, they will be graded over the weekend that follows immediately and therefore **being late is not acceptable.**

**Forum participation**

Forums are intended as opportunities for the students to be helpful to one another in successfully fulfilling the assignments. These represent a chance to develop a degree of collegiality with other students that can extend well beyond this course.

Your contribution to the forum will be assessed based on its relevance and usefulness in addressing the current week’s assignment. Thus, the forums will be monitored. However, instructor participation in the forums will be limited.

My expectation is that each student will contribute a minimum of one forum post per week. Forum postings are due by the Monday at 11:59 p.m. (your local time zone) of the week following that in which it is assigned. Being late is not acceptable.

8) **Grading**

Your performance will be evaluated based on your weekly contribution(s), a minimum of one per week, to the Forum (cumulatively equal to one written assignment); and the four written assignments. Each of the five components will be graded on a scale of 0-100; 0 = not completed, <70 indicates a sub-par effort or one more of less consistent with a high school student, 70-80 indicates a satisfactory effort from an undergraduate student (one which restates course material without critical thought or additional effort), 80-90 indicates a satisfactory effort from a graduate student (one which shows some critical thought or analysis and(or) includes recognition of prior published contributions), and >90 indicates a professionally completed effort (i.e., one showing critical thought and adequately recognizing prior published contributions).

Proportional weighting (an index, if you will) applied to each is as follows: 30% to your “best” effort (i.e., the criterion for which you receive the highest grade), 25% to your 2nd best effort, 20% to your 3rd best effort, 15% to your 4th best effort, and 10% to your 5th best effort. Final grades will be: 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, and >60 = F. Fractional grades will be rounded to the nearest integer. Plus and minus grades will be awarded for scores within 2 points of the boundary between grades.

9) **Student Evaluation**

There will be formal opportunities at the middle and end of the course for students to evaluate its instruction, flow and content. These evaluations will be entirely anonymous. You will be contacted with specific instructions at the times when these evaluations are sought.
In addition, the lead instructor (MM) welcomes your feedback at any time. Seriously, this is only the third time this course has been offered and its development is an ongoing process. I have only recently returned to teaching after an absence of more than 30 years and I am sure whatever I offer can be improved. Unfortunately, I will be out of the country for much of the time when this course is taught. Reaching me by telephone will be virtually impossible. Please use email for private communications.

10) Honor Code

The Kansas State University Honor Code will be enforced in this course. All assignments will be subject to its stipulations. In particular, it is important that you not claim the work of others as your own and that credit is given where credit is due.