Experiential Learning in Quantitative Genetics Online: CyberSheep

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Introduction

- Experiential learning
  - Entails active engagement of students
  - Encourages deeper learning of complex topics

Increasingly incorporated into instructional programs

(Kolb and Kolb, 2005)

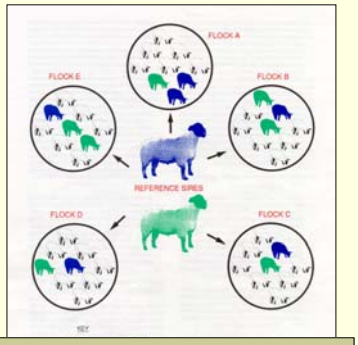
Introduction

- Technology-mediated simulations
  - Provide authentic context for learning
  - Allow application of discipline-specific concepts to solve real-world problems
- Used in quantitative genetics instruction
  - Typically emulate cattle breeding scenarios
  - Seldom incorporate economics

(Edlund et al., 1979; Hocking et al., 1983; Buchanan et al., 1988; Casellas et al., 2009)

CyberSheep

- Web-based game
  - Run at Virginia Tech
  - New interface fall 2012
- Emulates sheep breeding cooperative
- Considers genetic and economic principles



Today's objectives:
- Describe CyberSheep
- Summarize student feedback

Game objectives

Genetic change

Spider allele

(Photo D. Thomas)

Game objectives

Earnings

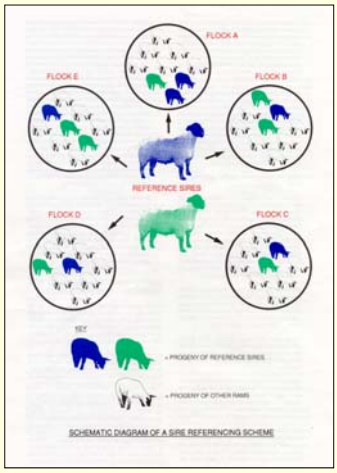
TEAM ACCOUNT

Round	Transaction	Details	Amount
1	Initial Balance	Initial balance	$1500
1	Purchased Genotype Test	User bought genotype tests for 1 animals	$16
1	Culled Rams	Culled 2 rams	$50
1	Culled Lambs	Culled 36 lambs under threshold weight (2980.75 pounds)	$2712.48
1	Retained Sire	Retainer fee for 1 reference sires	$500
1	Sold Semen	Sold 30 straws of semen	$450

Stochastic simulation

- Traits
  - Market weight
  - Litter size
  - Simply-inherited lethal
- Evaluations
  - Linear animal model (BLUP)
  - Inbreeding coefficients
- Parameters amendable

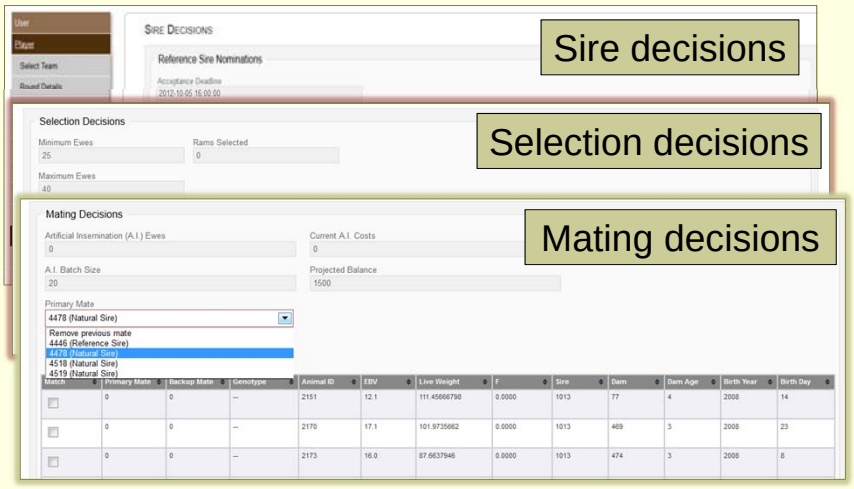
(Lewis and Simm, 2000)



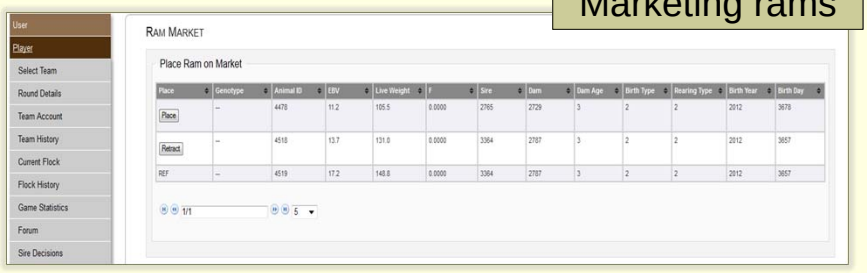
Play

Joining the play

Play

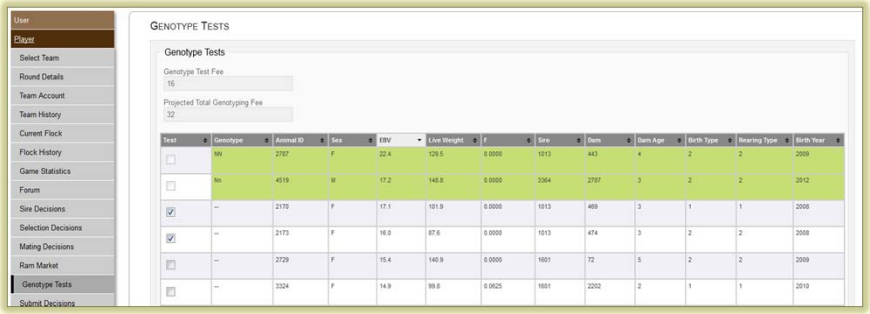

Sire decisions
Selection decisions
Mating decisions
Sire Decisions
Reference Sire Nominations
Selection Decisions
Minimum Ewes
Rams Selected
Maximum Ewes
Mating Decisions
Artificial Insemination (A.I.) Ewes
Current A.I. Costs
A.I. Batch Size
Projected Balance
Primary Mate
4478 (Natural Sire)
Remove previous mate
4446 (Reference Sire)
4478 (Natural Sire)
4518 (Natural Sire)
4519 (Natural Sire)

Play


Marketing rams
Ram Market
Place Ram on Market
User
Player
Select Team
Round Details
Team Account
Team History
Current Flock
Flock History
Game Statistics
Forum
Sire Decisions

Play

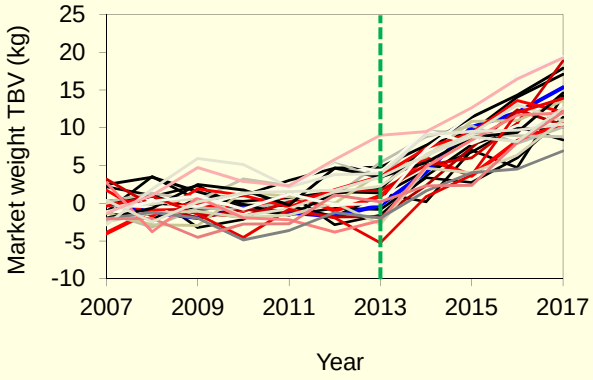
Genotype testing



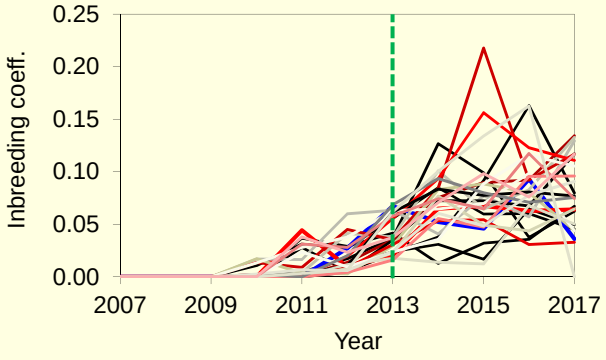
Pedagogy

Played in teams

Evaluations: genetic gain

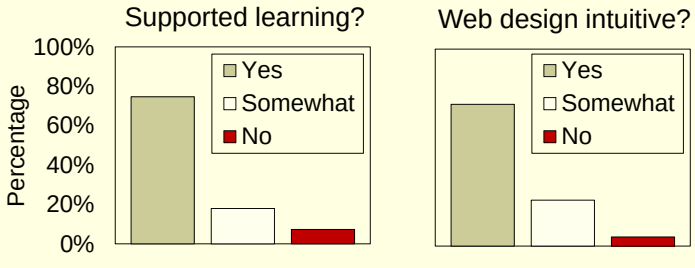


Evaluations: inbreeding



Student feedback

- Student online survey (anonymous)
  - Fall 2012 & spring 2013
  - 5 undergraduate universities
  - 151/419 (36% response)
- Feedback



Conclusions

- CyberSheep is a technology-enriched tool
  - Fits undergraduate and graduate instruction
  - Reaches a geographically dispersed audience
- CyberSheep facilitates experiential learning
  - "It is more effective for them to be able to experience the practical effects of different behaviors and strategies in a learning situation than to passively observe them" (Morgan, 2008)

Thank you

- Web developers
  - Likhita Krishnamurthy
  - Daniel Boynton
- Peer reviewers
  - Mike Davis
    (Ohio State Univ.)
  - Charles Gaskin
    (Washington State Univ.)
- Instructional design review
  - Miriam Larson

- CyberSheep 'coaches'
  - Debra Aaron
    (Univ. of Kentucky)
  - Kristi Cammack
    (Univ. of Wyoming)
  - Joe Cassady
    (North Carolina State Univ.)
  - Alan Culham
    (Michigan State Univ.)
  - Mike Davis
    (Ohio State Univ.)
  - Basil Wolf
    (Aberystwyth Univ., Wales, UK)