SeeBeefGenetics: Evaluation of Optimized Feedback in a Beef Cattle Breeding Simulation

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Introduction

- Feedback helps students interpret their results leading to cognitive change or learning.
  - Critical for novice students (Clark et al., 2009; Kirschner et al., 2006).

- Not all feedback is effective.
  - Feedback on easy tasks inhibits learning (Bangert-Drowns et al., 1991)
  - Feedback shown before decision making does not initiate change (Shute, 2008)
  - Feedback that is too detailed overwhelms students (Roll et al., 2014; Van Dijk et al., 2016).
Recommendations for feedback design are conflicting (Shute 2008; Wong et al. 2019)

Researchers suggest more work focused on:
- Feedback Timing (Kulik & Kulik, 1988; Johnson, et al., 2016)
- Feedback Content (Timmers & Veldkamp, 2011; Attali & van der Kleij, 2017)
- Learner Characteristics (Kulyuga et al., 2007)
- Interaction of Design Types (Wang et al., 2019)
Objective

Determine the effectiveness of optimized feedback in a beef cattle breeding simulation using an iterative approach.
The Simulation

- SeeBeefGenetics™ is an online, beef cattle breeding simulation.

- Illustrates long-term cattle breeding concepts including:
  - Stochastic Genetic Principles
  - EPD-based Selection
  - Relevant Production Traits

- Features objective-based modules on topics including:
  - Mendelian Genetics
  - Quantitative Genetics
  - Correlated Response
  - Selection Methods
  - Sire Selection
  - Crossbreeding
Iterative Testing

1. Classroom Testing
2. Review Results
3. Implement Changes

The process iterates as follows:

- Classroom Testing leads to Review Results, which then lead to Implement Changes, which in turn lead back to Classroom Testing.
Iteration 1

181 Students

| Michigan State University | University of Missouri |

Objective: General Feedback

Correlated Response Scenario

Completed scenario and survey (IRB #2009504 C)
Iteration 2

152 Students

University of Missouri

Objective: Establish feedback necessity

Tandem Selection | Independent Culling | Index Selection

Completed pretest, scenario, posttest and survey (IRB #2009504 C)
Iteration 2 Results

- No difference in pretest and posttest score.

- Qualitative responses:
  - "It was hard to understand what my data meant for my herd."
  - "I didn’t know if my herd was improving or not."
Iteration 3

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<th>Angelo State University</th>
<th>Colorado State University</th>
<th>Kansas State University</th>
<th>Michigan State University</th>
<th>South Dakota State University</th>
<th>Tennessee Tech</th>
<th>University of Guelph</th>
<th>University of Missouri</th>
<th>University of Tennessee-Murfreesboro</th>
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Objective: Determine most effective complexity level

- Guidance
- Suggestive
- Diagnostic

Completed pretest, scenario, posttest and survey (IRB #2009504 C)
“Vince sometimes contradicted what my goals for my breeding operation were.”
“I did not read Vince’s suggestions.”

“I didn’t really use Vince.”
Iteration 4

242 Students

| Missouri State University | Morehead State University | New Mexico State University | Northwest Missouri State University | Northwest Oklahoma State University | South Dakota State University | Tennessee State University | University of California-Chico | University of Missouri | University of Wyoming |

Objective: Determine most effective delivery method

Interactive  Static

Completed pretest, scenario, posttest and survey (IRB #2012193 MU)
“Personally, I liked when he asked me questions as I went along. It really helped me to understand the entire scope of the scenario.”

“He pointed out some important things to me that I otherwise may have overlooked.”
“It did help but I probably could have had a little more.”

“He needed to have a tad more detail.”

“Sometimes I needed more.”
“He would give advice I already knew”

“I didn’t really need his help”
Conclusions

- Feedback is not one-size-fits-all.

- Must consider:
  - Learner characteristics such as prior knowledge
  - Student engagement with feedback
  - Content
  - Timing
Future Work

- Determine effects of complexity level using interactive feedback

- Students will be randomly assigned to one feedback group:
  - Interactive, Conformational Feedback
  - Interactive, Knowledge of Correct Answer
  - Interactive, Elaborated Feedback

- Will take students ~1 hour to complete study.
A big thanks to all the students and professors who have participated in this research study.

This work was supported by NIFA Grant No. 2018-67011-28051, the MU STAR Grant Program, and NSF I-Corps Sites.
Questions or Comments

- Information about SeeBeefGenetics™ is available at [www.seegenetics.com](http://www.seegenetics.com)

- Contact me at [maria.haag@quetza.org](mailto:maria.haag@quetza.org) if you would like more information.