A revolutionary approach to practicing cow handling skills

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Animal welfare: A multi-stakeholder issue requiring multi-disciplinary approaches

**biological science:** understanding animals

**social science:** understanding people

Icons from the Noun Project
Dairy farmers expressed need for training

- personnel injuries
- cow injuries
- cow stress levels
- milk yield
- consumer confidence

Training on cow handling hasn’t been universal

As of 2018, only 55% of US dairy farms provided training on moving or handling cows

Challenges:
- lack of time
- lack of resources
- language barriers


Annual continuing education

- Effective January 2020 (Version 4.0)
- Anyone on the farm who directly handles animals
- Must be documented
- “Training” is open ended

Dairy farmers expressed need for training

↓ personnel injuries
↓ cow injuries
↓ cow stress levels
↑ milking parlor efficiency
↑ milk yield
↑ consumer confidence

Building public trust in dairy farming:
Understanding the role of farm culture, training, and risk factors that lead to poor animal handling

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Rationale

Knowledge Gap:
Attitudes/expectations for cow-handling practices

Public citizens  Dairy labor force
Other dairy industry professionals

How aligned or disparate are these groups?
Are farmers wearing rose-colored glasses? 🧐

Previous research suggested:

- Farmers report a positive view of the welfare of livestock, whereas the public holds more negative views¹,²
- Economically motivated animal use (e.g., dairy farming vs. companionship) → ↓ perceptions of capacity for animals to experience negative affect (i.e., suffer)³

¹Te Velde et al. (2002); ²Vanhonacker et al. (2008); ³Serpell (2004)

Rationale

Knowledge Gap: Attitudes/expectations for cow-handling practices

Problem:
Limitations in current learning programs on cow handling

Public citizens
Dairy labor force
Other dairy industry professionals

Lack evidence of effectiveness
Lack understanding of handlers’ attitudes

How aligned or disparate are these groups? How can we improve behavior modification?
**Hypothesis**

- **Public engagement** while developing learning tools
- Integrate **values** of both public + industry stakeholders
- Learning tools targeting both **attitudes** + behaviors toward cows
- Improve cow handling practices
- Improve animal welfare
- Build public trust

**Survey study on public vs. industry perceptions**

*Perceptions of dairy cow handling situations: A comparison of public and industry samples*

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Public vs. industry participants

- **Wisconsin public**: n = 136 (PUB)
  - Stratified by U.S. census data
    (age, gender, educational attainment, income)

- **U.S. dairy industry** professionals: n = 201 (IND)
  - (professional networks, ‘snowball’ technique, email listservs, Facebook groups)

Video clip selection

- 12 video clips from public training videos (2), activist exposé (1), filmed by research team (9)
- Classified by our team as:
  - POS (n = 4): **positive**, unlikely to increase fear in cows (slow, predictable movement; any physical contact is gentle, including petting, stroking, or resting hand on cow)
  - NEG (n = 8): **negative**, aversive, likely to increase fear in cows (fast and sudden movements, shouting, or physical contact such as slaps, pushes, hits)
    - NEG1 (n = 4): lighter slaps, pushes, hits
    - NEG2 (n = 4): forceful slaps, pushes, hits; tail-twists

Classifications based on: Sorge et al. (2014); Hemsworth et al. (2000, 2002); Breuer et al. (2000)
Video clip editing and presentation

- Duration: 14.3 ± 4.5 seconds (mean ± SD; range 9 to 24 seconds)
- All in color, pixel size 640 × 360. 10 had sound, 2 were silent.
- Identifying characteristics blurred (human faces, company logos)
- Brief written descriptions (29.3 ± 26.6 words)
- Each video’s questions appeared after enough time elapsed to watch it at least once
- Videos #1-2 (POS, NEG2) counterbalanced to norm respondents away from using only the ends of the response scales for subsequent videos. Order of videos #3-12 randomized.

Measures

- Demographics
- Preexisting perceptions of how cows are treated on U.S. dairy farms
- Responses to each video:
  - Attitudes toward the behavior of the handler(s): acceptable, appropriate, humane? (7-pt)
  - Perceived commonness of behavior on U.S. farms (7-pt)
  - Perceived emotional experience of the cow(s): calm/agitated, at-ease/distressed, pleasant/unpleasant? (5-pt)
  - Personal emotional experience: calm/agitated, at-ease/distressed, pleasant/unpleasant? (5-pt)
Differences in degree, not kind: Ratings differed quantitatively between the samples, but the relative rankings of the scenarios were similar in terms of attitudes and both cow and viewer experience.

Videos which were rated more positively (attitudes, cows’ and respondents’ emotional experiences) were perceived as more common in both samples.
Industry seems more aware of cows’ emotions

- Overall, across all scenarios, industry participants rated cows as experiencing negative emotion, compared to public.
- Our results contradict the idea of desensitization or rationalizing away animal suffering to reduce cognitive dissonance\(^1\)
- Likewise, pig farmers have ascribed their animals with the capacity for suffering\(^2\)

\(^1\)Serpell (2004); \(^2\)Peden et al. (2020)

Are farmers wearing rose-colored glasses? 🕶️

- No. Attitudes toward cow handling practices were generally similar between the U.S dairy industry and Wisconsin general public, despite differences in knowledge of industry practices and in socio-demographic factors.
- Industry participants were perhaps more aware of cows’ emotional states.
- The overall agreement we observed between IND and PUB stakeholders regarding dairy cow handling practices could perhaps provide a common starting point for addressing other, more contentious animal welfare issues.

How do we get low-stress handling to stick?

- The principles are well established…
- Why do people struggle to apply the concepts?
Timeline

- 2018: Identified need
- 2019 January: Idea of ‘flight simulator’

Why a game?

- “Serious games” have produced positive learning outcomes in:
  - military and professional training
  - classrooms
  - health-behavior education

- Games offer:
  - Engagement and interaction
  - Opportunities to apply concepts, practice skills
  - Superior learning and retention vs. conventional instruction

Clark et al., 2016; Wouters et al., 2013; Stamats, 2017
Timeline

2018
- Identified need

2019 January
- Idea of ‘flight simulator’

2019 February – 2021 February
- Laying the groundwork…

2021 June
- Received funding!

2022 January – 2023 January
- Iterative development of Mooving Cows Version 1.0

Iterative design and development process

Prototype 1 ➔ Research group feedback ➔ Prototype 2 ➔ Stakeholder feedback

Iterative design and development process

Van Os et al., in preparation

Game programmed by: filamentgames
Stakeholder engagement: Focus groups

- **n = 4** on-campus professional trainers
  - English

- **n = 10** farm owners, bilingual consultants, vets
  - English
  - Spanish

- **n = 20** staff members on 2 farms separated by farm, language, role, shift
  - English
  - Spanish

Examples of feedback to improve the game

- **Game mechanics:** Players couldn’t tell which way to go. Have character start at the gate, as well as zoom out to show whole environment.
- **Learning objectives:** More manure as indicator of cow stress (“the dirtier your character is, the worse job you did”) 
- **Art relevance:** Add water troughs, cow brushes, salt blocks
Iterative design and development process

- Stakeholder feedback
- Prototype 3
- Researcher feedback
- Final Version (1.0)

Game programmed by:
Van Go et al., in preparation

Learning objectives of the game

- inappropriate handling
- ↑ cow fear/stress
- ↓ milk yield
- ↑ unpredictable cow behavior
- ↓ worker safety
Why a video game?

Benefits:
- ✓ active (vs. passive) learning – learn by doing
- ✓ visualization to help convey concepts
- ✓ immediate feedback
- ✓ experience situations that are challenging to mimic in real life due to cost, time, or safety
- ✓ controlled, safe environment to learn from mistakes

Accessibility

- Designed with diverse end users in mind
- Must consider:
  ✓ Linguistic appropriateness
  ✓ Literacy levels
  ✓ Cultural relevance

https://blogs.extension.wisc.edu/languageaccess/
Accessibility

In our game:
- Minimal written text
- Voiceover narration of all tutorial text
- Choice of 6 avatars to improve self-visualization and identification while playing the game

Evaluation of full game

- Assessed change in knowledge on 3 new farms (34 people)
- Solicited feedback to further improve the game
Participant demographics (n = 25)

Job roles

- Milk cows in the parlor (85%)
- Move cows to/from parlor (76%)
- Other (88%):
  - Herdsman, herd manager
  - Move and sort cows for animal health, breeding
  - Newborn, calf, down cow care
  - Bedding management
  - “Un poco de todo”
    (a little of everything)

Started with n = 34 participants. Due to a procedural error, 9 participants did not complete the entire game (all Spanish-speaking, 7 male, 2 female).

Participant demographics (n = 25)

Age (years)

Years working on the current dairy farm

Ruiz-Ramos, Van Os et al., in preparation
In general, how much do you enjoy working with dairy cows?

- It’s very enjoyable: 5
- It’s fairly enjoyable: 4
- It’s neither enjoyable nor unenjoyable: 3
- It’s fairly unenjoyable: 2
- It’s very unenjoyable: 1

How good or bad do you believe are you at moving cows to where you want them to go?

- Very good: 5
- Fairly good: 4
- Neither good nor bad: 3
- Fairly bad: 2
- Very bad: 1
How safe do you feel when working with dairy cows?

- Very safe (5)
- Fairly safe (4)
- Neither safe nor unsafe (3)
- Fairly unsafe (2)
- Very unsafe (1)

(n = 25) (n = 16) (n = 9)

How comfortable do you feel with using smartphones or tablets?

- Very comfortable (5)
- Fairly comfortable (4)
- Neither comfortable nor uncomfortable (3)
- Fairly uncomfortable (2)
- Very uncomfortable (1)

(n = 25) (n = 16) (n = 9)
No language difference in game completion time

Knowledge improved after playing the game
How enjoyable did you find the game overall?

- Very enjoyable: 5
- Fairly enjoyable: 4
- Neither enjoyable nor unenjoyable: 3
- Fairly unenjoyable: 2
- Very unenjoyable: 1

(n = 25) (n = 16) (n = 9)

Ruiz-Ramos, Van Os et al., in preparation

How easy or challenging did you find the game overall?

- Very challenging: 5
- Fairly challenging: 4
- Neither challenging nor easy: 3
- Fairly easy: 2
- Very easy: 1

(n = 25) (n = 16) (n = 9)

Ruiz-Ramos, Van Os et al., in preparation
How often would you want to play the game again in the future?

![Bar chart showing frequency of playing the game again, with categories: All the time (5), Frequently (4), Occasionally (3), Rarely (2), and Never (1).](chart1)

- **All the time**: 5 responses
- **Frequently**: 16 responses
- **Occasionally**: 9 responses

(n = 25) (n = 16) (n = 9)

How useful do you think the game would be for:

![Bar chart showing usefulness of the game, with categories: Extremely (5), Very (4), Moderately (3), Slightly (2), and Not at all (1).](chart2)

- **Experienced**
  - Extremely: 1 response
  - Very: 1 response
  - Moderately: 1 response
  - Slightly: 1 response
  - Not at all: 1 response

- **Inexperienced**
  - Extremely: 4 responses
  - Very: 4 responses
  - Moderately: 4 responses
  - Slightly: 4 responses
  - Not at all: 4 responses

Someone with little to no experience working with dairy cows to learn how to handle cows

Someone who already has experience working with dairy cows to review handling practices

(n = 25)
Focus group discussions

- Cow-moving tasks in the game
- Character and cow behavior in the game
- Instructions provided in the game
- Feedback to players within the game
- Artwork in the milking parlor, freestall pens
- Character selection
- Ideas for future cow-moving scenarios
- Other ideas for improvements to the game

Expanding testing with new audiences

Version 1.0

Testing, user feedback

New audiences

- 4th-year vet students (dairy skills rotation)
- Undergraduates in intro Animal Science lab
- Youth in 4-H groups
Revised for public release

Version 1.0 → Testing, user feedback → New audiences

Version 2.0

- Targeted game completion in ≤ 30 minutes
- Streamlined character movement function
- Optimized for both Android & Apple devices

Revised for public release

Version 1.0 → Testing, user feedback → New audiences

Version 2.0 → Public release into app stores
Ideas for additional future scenarios

- Maternity/calving pen
- Sorting cows
- Fresh heifers in the parlor
- Rotary parlor
- Getting cows into headlocks (e.g., for breeding)
- Non-ambulatory (“down”) cow scenario
- Seasonal scenarios (e.g., icy patches)
- Cows getting loose out of a pen
- Foot bath
- Chute loading
- Trailer loading

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