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Hybrid Artificial Insemination Program for Cattle

Abstract

To address a critical gap in artificial insemination (AI) training caused by shifts in AI company services, the University of Wisconsin–Madison Division of Extension developed an AI course for dairy and beef cattle producers. The course aims to improve producer independence and genetic progress by teaching hands-on AI techniques and enhancing understanding of estrous synchronization, bull selection, and pregnancy detection. Since its launch in 2015, the program has trained 248 participants using either a fully in-person or hybrid model combining virtual instruction with in-person practice. The hybrid model was adopted after the COVID-19 pandemic. Evaluation data from 2016 to 2024 showed an average 22% increase in knowledge based on pre- and post-course quiz scores (73% to 95%), and 95% of participants demonstrated adequate practical skills to receive certification. Long-term follow-up revealed that participants AI bred 3,760 animals, saving an estimated $100,242 in breeding fees and increasing herd genetic quality. The program's adaptable delivery model and measurable impact on producer skill and cost savings highlight its relevance and scalability for other U.S. states facing similar service gaps in AI training.

Abbreviations: Artificial Insemination – AI

Keywords: artificial insemination, cattle, genetic improvement

Introduction

In 2012, artificial insemination (AI) companies in Wisconsin stopped offering farmers AI training. During this time, the AI companies also concentrated their services to areas with more significant concentrations of dairy cattle. These changes in business practices created voids in AI services. AI, the first great biotechnology applied to improve the reproduction and genetics of farm animals (Foote, 2002), is essential for the continued genetic improvement of dairy and beef cattle herds. As a result of this unmet need for AI services, and to gain access to AI sires for continual genetic improvement, the University of Wisconsin Madison Division of Extension developed an AI program for beef and dairy producers.

Purpose and Activities

The Wisconsin AI training aims to increase beef and dairy cattle producers' knowledge and understanding of AI and provides hands-on practice with AI techniques so they can AI-breed their cattle. This results in increased conception rates and rapidly improved genetics. The AI course was developed so participants could practice new skills through experiential opportunities (Richardson, 1994). However, due to COVID, it was necessary to change the format from a two-day hands-on workshop for small groups (fewer than 20) to a hybrid delivery format of two evening virtual sessions followed by two in-person hands-on practice days. Since COVID, this format has been adopted as the course participants indicated they preferred the hybrid format because it required fewer in-person hours and less time away from the farm. During the online sessions, we cover reproductive anatomy and physiology, estrus detection and estrus detection aids, estrous synchronization protocols, bull selection, AI technique, and pregnancy detection. During the in-person sessions, we cover AI equipment, liquid nitrogen tank and semen handling procedures, practice with excised cattle reproductive tracts, and practice breeding live animals.

The first course was offered in April 2015. Due to the high demand for the course (N = 18), an interest list was created. Producers on the interest list are given precedence to sign up. The course has been held twice a year, typically in April/ May and October, since 2015.

The registration fee for the course includes the cost of a student manual, the use of the AI equipment and reproductive tracts, and snacks for the in-person days. Participants must show sufficient skill at removing a frozen straw of semen from a liquid nitrogen tank, proper semen straw thawing, and loading an AI gun. Participants must also show sufficient skill in passing the AI gun through the cervix of a cow. All participants who demonstrate sufficient skill in handling semen and breeding cattle (95% student success rate) receive a course completion certificate.

Evidence of Impact

Starting with the 2016 classes, participants were given an eleven-question quiz prior to starting the class and again at the end of the class to demonstrate their change in knowledge. Quiz questions focused on female anatomy and physiology, signs of estrus, tools for estrus detection, reason and methods for pregnancy detection, and questions on synchronization protocols.

Pre-quiz and post-quiz scores have been collected from 207 course participants. The average pre-quiz score was 73% while the average post-quiz score was 95%. The average change in pre-quiz and post-quiz scores was 22%. Table 1 shows the overall mean scores for participants completing the pre-quiz and post-quiz from the 2016 – 2024 classes.

Table 1. Average test scores of participants from the 2016 – 2024 classes.

Course Date	Students, No.	Average of Pre - Quiz Score, %	Average of Post - Quiz Score, %	Difference (Post - Quiz - Pre - Quiz), %
2016 April	13	68%	94%	26%
2016 Dec	17	80%	96%	17%
2017 April	12	60%	95%	35%
2017 Oct	12	78%	99%	21%
2018 April	16	84%	99%	15%
2018 Oct	14	60%	96%	36%
2019 April	22	53%	99%	46%
2019 May	7	79%	99%	20%
2021 Sept-Oct	14	75%	93%	18%
2022 May-June	6	76%	95%	19%
2022 Sept-Oct	14	75%	87%	12%
2023 April	13	70%	86%	16%
2023 October	13	72%	98%	26%
2024 April	17	82%	95%	13%
2024 May	17	79%	91%	12%
Average		73%	95%	22%

Self-reported post-session paper evaluations from the 2015-2024 programs (n = 228) indicated that, on average, participants increased their knowledge by 1.4 points on a 4-point Likert scale. Testimonials from the 2015-2024 classes included, "The class is great; Worth every penny and greatly enjoyed it!" and "[This course] gives me [the] information I need to make decisions on what I want to do with my farm."

To determine the long-term impact of our program, past program participants from the 2015 – Sept 2021 classes (N = 144) were mailed paper copies of the survey. Past participants with email addresses on file (n = 110) were emailed electronic copies of the survey. Follow-up emails were sent on a weekly basis for 4 weeks. Results (n=13) indicated one respondent decreased the number of bulls on their farm by one animal.

According to Karisch (2020), an owner spends $350/ year on ownership costs, $640 per year on maintenance costs, and $445 on "risk of bull loss" for an average cost of $1,445 per year to own a bull. Therefore, the producer who decreased the number of bulls on their farm by one animal saved themselves on average $1,445/ year in bull ownership costs (Karisch, 2020). Eleven of the thirteen respondents (85%) reported having animals available to breed since taking the AI course. Eight of the eleven respondents (73%) indicated they bred these animals themselves. Respondents AI bred 3,760 animals, saving them $100,242 in breeding fees. This value was calculated based on the average reported breeding fee of $19 and the number of breedings reported by the farm to establish a pregnancy. Written testimonials include, "The calves and heifers that come out of cows with AI's superior genetics have been AMAZING! My husband was not convinced we should take the extra time and money to do AI. After the last few years and then, the first calf of this season completely changed his mind." "The course was great help in timing breeding. We have done much better than before." "Was a really great course! Helped us move our [breeding] program forward." We did not ask respondents to identify their pregnancy rate.

Additional Course Logistics

We depend upon host dairy farms to provide practice animals for our course and have fostered relationships with multiple farms over the years. To help maintain these relationships, host farms are provided free training for up to two employees. If the farm does not have any employees, they are provided with a gift card. Since many dairy farms' employees are Hispanic, we needed to have the AI course manual, pre-quiz, and post-quiz translated into Spanish and to provide interpretation during the course for them. Relationships developed during the AI course have resulted in the farms participating in various surveys and research projects conducted by these educators.

Conclusions

Dalton et al. (2013) describe a similar program they conducted for Ross University veterinary students. In Wisconsin and many parts of the United States, veterinarians do not perform routine duties like AI, leaving individual farmers or AI breeding technicians to perform the task. Partnerships between the University of Wisconsin-Madison Division of Extension and local farms have been created and nurtured to host AI trainings for farmers since 2015. Course delivery changes due to COVID minimized the in-person contact time without sacrificing the course content. The delivery of this course, either fully in-person or in a hybrid format, can be replicated anywhere in the United States or abroad if relationships with producers and content expertise exist. Since 2015, 248 people have participated in this course, learning how to breed cattle. As a result of this course, dairy and beef producers are less dependent on AI technicians and have become more self-sufficient in breeding their cattle.

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