PEER-REVIEWED RESEARCH OF SHORTENED TRIAL DURATION UTILIZING IN-PEN WEIGHING POSITIONS

INTRODUCTION

The Vytelle SENSE™ system, featuring In-Pen Weighing Positions, can be used in feed efficiency trials to collect daily weights from individual animals. The technology collects front-end partial body weights and converts them to full body weights using Vytelle's proprietary algorithms. Collecting daily weights during a feed efficiency trial, through use of the In-Pen Weighing Positions not only reduces the labor and stress associated with collecting chute weights, but it increases the accuracy of body weight collection and has the potential to reduce the trial lengths. When using chute weights to calculate average daily gain (ADG) for residual feed intake (RFI) evaluation, trials are traditionally a minimum of 70 days in length to accurately calculate ADG (Basarab et al. 2003). A study by MacNeil et al. (2021) validated 50-day trials using In-Pen Weighing Positions to provide daily full body weights and to calculate ADG.

METHODS AND MATERIALS

Partial body weight and chute weight data was collected using In-Pen Weighing Positions and fixed chutes. The standardized data was collected from 35 contemporary groups across 10 customer sites between 2016 and 2020, inclusive, achieving a total of 8,972 records. The dataset comprised of chute weights at the start and end of the trial period, and sporadically in between, along with partial body weights on 1,473 animals, breeds represented were Afrikaner, Angus, Akaushi, Brahman, Charolais, Hereford, Holstein, Nguni, Red Angus, Salers, Simmental and South Devon bulls and heifers. The dataset was from feed efficiency testing facilities in the United States, South Africa, Australia, and the United Kingdom. The external research group who analyzed the dataset was led by Michael MacNeil, Ph.D. (United States), and supported by Donagh Berry, Ph.D. (Ireland), Sam Clark, Ph.D. (Australia), John Crowley, Ph.D. (Canada) and Michiel Scholtz, D.Sc. (South Africa) (MacNeil et al. 2021).

Statistical analyses were carried out to assess the relationships among In-Pen Weighing Position partial body weights, predicted full body weights and chute weights at the start and end of the test period. Additionally, the following measures of ADG were calculated for each animal, by linear regression to determine how they differ from one another:
- Partial body weight ADG,
- Estimated full body weight ADG,
- Chute weight ADG.

The traditional 70-day RFI test period was initially broken down into 35-day periods, and then again into 50-day test periods to determine the appropriate test length required to calculated ADG. Correlations among the three measures of ADG were evaluated by contemporary group.

VYTELLE'S STANDARDIZED FEED EFFICIENCY TRIAL PROTOCOLS ALLOW FOR SHORTENED 49-DAY RFI TRIALS WHEN USING THE VYTELLE SENSE SYSTEM'S IN-PEN WEIGHING POSITIONS.

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RESULTS AND DISCUSSION
UTILITY OF PARTIAL BODY WEIGHTS AND ESTIMATED FULL BODY WEIGHTS

When using partial body weights and estimated full body weights to predict chute weights, partial body weights explained 73.4 - 99.5% of the variation in chute weights while estimated full body weights explained 86.5% - 99.6% of the variation in chute weights; higher percentages indicating greater agreement between the weights. The external research group used Vytelle's proprietary algorithm to convert partial body weights to estimated full body weights. The close alignment between the chute weights and the estimated partial body weights indicates the potential to use the In-Pen Weighing Positions estimated full body weights in place of chute weights. In a comparison of trial start chute weights and estimated full body weights, only 5 of 33 contemporary groups did not see complete agreement between chute and In-Pen Weighing Position weights, indicating that error may have been introduced through either system. Both technologies can experience discrepancies due to human error, scale calibration error, and errors associated with environmental factors or rumen gut fill. MacNeil et al. (2021) recognized the need for separate conversion factors per unique contemporary group to convert partial body weights to estimated full body weights, which contrasted with the Benfield et al. (2017) study that cited the ability to apply a single conversion factor across all animal types, from different locations and within different contemporary groups. Since the Benfield et al. (2017) study, internal conversion factor analyses have been updated to reflect the need for different factors for animals within different contemporary groups.

THE POOLED ANALYSIS FOUND THAT EXTENDING THE TRIAL PERIOD FOR IN-PEN WEIGHING POSITIONS TO 70 DAYS ONLY IMPROVED THE ADG ALIGNMENT BY 2%.

PREDICTING ADG IN A SHORTENED TRIAL PERIOD USING PARTIAL BODY WEIGHTS

A comparison of 35-day In-Pen Weighing Position ADG and 70-day chute weight ADG revealed that a 35-day period was not long enough to accurately calculate ADG, which is why the 35-day periods were extended to 50-day periods. Comparison of 50-day In-Pen Weighing Position ADG and 70-day chute weight ADG in a pooled analysis that included contemporary groups as fixed effects, determined that 80% of the variation in 70-day chute weight ADG could be explained using In-Pen Weighing Positions over a 50-day period. Although 50-day In-Pen Weighing Position and 70-day chute ADGs are not completely aligned for all contemporary groups, the pooled analysis found that extending the trial period for In-Pen Weighing Positions to 70 days only improved the ADG alignment by 2%. As MacNeil et al. (2021) concluded, this indicates that In-Pen Weighing Positions can confidently be used to capture ADG in a 50-day period.

RESULTS FROM THE MACNEIL ET AL. (2021) STUDY INDICATE THAT IN-PEN WEIGHING POSITIONS CAN BE USED TO CONFIDENTLY CALCULATE ADG IN A SHORTENED TEST PERIOD OF 50 DAYS.

CONCLUSION

Results from the MacNeil et al. (2021) study indicate that In-Pen Weighing Positions can be used to confidently calculate ADG in a shortened test period of 50 days, extending the trial to 70 days improved the accuracy in ADG by 2%. A 50-day test period will increase the number of trials run each year, therefore, increasing the total number of animals evaluated. Evaluating a larger number of animals is likely to reduce the test cost per head and is likely to result in greater power of a test for the hypothesis of interest (MacNeil et al. 2021). Vytelle's standardized feed efficiency trial protocols allow for shortened 49-day RFI trials when using the Vytelle SENSE system's In-Pen Weighing Positions. Vytelle's shortened trial protocols are supported with further standardized procedures ensuring quality data collection from the In-Pen Weighing Positions and to confirm that only quality data sets included in feed efficiency and ADG analyses.

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