FAST FACT

ACCURACY, USE AND APPLICABILITY OF THE VYTELLE SENSE™ IN-PEN WEIGHING POSITIONS

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INTRODUCTION

The Vytelle SENSE™ system (formerly GrowSafe Systems), featuring In-Pen Weighing Positions, can be used to collect individual weights from cattle in an automatic and non-intrusive way. The technology allows for continuous monitoring of individual animal weights and growth rates by collecting front-end partial body weights and converting them to full body weights using Vytelle's proprietary algorithms. The use of In-Pen Weighing Positions reduces labor requirements associated with chute weight collection, stress, and injury in animals and handlers. The In-Pen Weighing Positions also collects many weights from each animal every day, which enhances the accuracy of daily weights and provides a daily empty body weight. The challenge is that, although chute weights may be correct, they are not accurate since there can be large variations between consecutive weights of the same animal. Weights collected from the In-Pen Weighing Positions are very accurate, due to the large volume of weights collected, but their accuracy may be affected if the conversion factor used is not appropriate for the specific genotype. The purpose of this study was to evaluate the accuracy of estimated full body weights collected from the In-Pen Weighing Positions for native South African breeds of cattle.

METHODS AND MATERIALS

Data was collected at the Agriculture Research Council (ARC) Animal Production facility in Pretoria, South Africa, from October 2017 to December 2020 over several different trials. Data was collected on bulls from 18 different breeds, including purebred and crossbred animals of the following breeds: Afrikaner, Angus, Bonsmara, Brahman, Holstein, Nguni, Simbrah and Simmentaler with an average weight of 342 kg (Std Dev = 86 kg), and a minimum and maximum weight of 142 kg and 630 kg, respectively. Animals were on trial for at least 70 days, with a maximum trial length of 203 days. On average, animals were chute weighed every 11 days during the trial period and on average each animal had 12 chute weights collected.

Throughout the trials, animals had continuous access to the In-Pen Weighing Positions, which were positioned in front of the only water source within each pen. Estimated full body weights, derived from the In-Pen Weighing Positions, were compared directly to the chute weights collected for the same animals on the same days. Data from the In-Pen Weighing Positions was only included in the analysis for days that the data was deemed valid by the standardized auditing routines and by Vytelle technical service representatives. Direct comparison ratios of daily in-pen weights and chute weights were calculated to identify outlier chute weights. Ratio values outside 3 standard deviations from the mean were omitted from further analysis.

A total of 4109 records were included in the final analysis while 29 records were omitted. Mean squared errors (MSEs), root mean squared errors (RMSE) and percent differences were calculated for all daily animal pairings of chute weights and daily estimated in-pen weights. Daily animal estimated in-pen weights were plotted against daily animal chute weights to demonstrate the correlation between the two weight measurement methods.

RESULTS AND DISCUSSION

Table 1 shows the average weight differences between estimated full body in-pen weights and chute weights by breed classification and shows the number of records per breed group. The average weight difference among chute and in-pen weights for all records was 0.26 kg (Std Dev = 10.46 kg) with a range in average weight differences from a minimum of -0.10 kg in Bonsmara x Simmentaler bulls and a maximum of 0.43 kg in Afrikaner x Simmentaler and Bonsmara x Afrikaner bulls.

TABLE 1. AVERAGE WEIGHT DIFFERENCES AMONG ESTIMATED FULL BODY IN-PEN WEIGHTS AND CHUTE WEIGHTS FOR SOUTH AFRICAN BREEDS OF CATTLE.

BREED (DAM BREED MENTIONED FIRST)	SEX	# RECORDS	AVERAGE DIFFERENCE BETWEEN CHUTE AND IN-PEN WEIGH-ING POSITIONS (KG; STD. DEV)
Afrikaner	Bull	449	0.12 (7.24)
Afrikaner x Angus	Bull	91	0.34 (8.70)
Afrikaner x Bonsmara	Bull	144	0.26 (8.25)
Afrikaner x Nguni	Bull	264	0.34 (9.24)
Afrikaner x Simmentaler	Bull	34	-0.43 (9.88)
Bonsmara	Bull	326	0.37 (10.59)
Bonsmara x Angus	Bull	281	0.28 (9.86)
Bonsmara x Afrikaner	Bull	216	0.43 (11.42)
Bonsmara x Nguni	Bull	300	0.38 (11.53)
Bonsmara x Simmentaler	Bull	184	-0.10 (11.71)
Nguni	Bull	607	0.34 (11.12)
Nguni x Angus	Bull	299	0.11 (10.99)
Nguni x Afrikaner	Bull	157	0.30 (11.08)
Nguni x Bonsmara	Bull	226	0.37 (12.47)
Nguni x Simmentaler	Bull	330	0.16 (11.01)
Brahman	Bull	55	0.25 (9.45)
Holstein	Bull	36	0.21 (8.62)
Simbrah	Bull	110	0.31 (11.73)

Overall MSE and RMSE values for comparisons between daily predicted fully body weights and chute weights are shown in Table 2. For all records included in the analysis, the RMSE was 10.47 kg, indicating that on average estimated fully body weights collected from the In-Pen Weighing Positions differed by 10.47 kg. This is highly significant considering that the error associated with consecutive day chute weights is on average 19 kg.

TABLE 2. RMSE, MSE AND AVERAGE PERCENT DIFFERENCES BETWEEN CHUTE AND IN-PEN WEIGHING POSITION WEIGHTS.

MSE (KG)	RMSE (KG)	AVERAGE % DIFFERENCE
109.52	10.47	0.10%

Figure 1 shows the relationship between estimated full body weights and chute weights, demonstrating that chute weights and estimated weights collected by the In-Pen Weighing Positions, are very closely related.

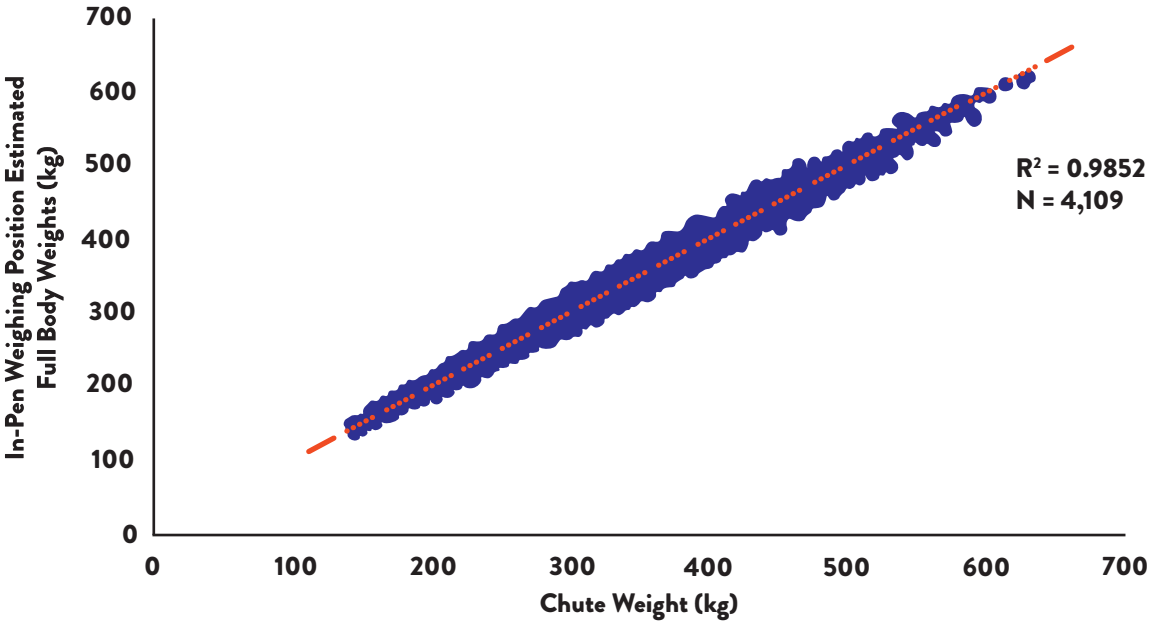

Figure 1. Relationship between In-Pen Weighing Position estimated full body weights and chute weights.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results, it is evident that In-Pen Weighing Positions accurately and reliably measure body weights of cattle from South African breeds, when the appropriate conversion factors are used. Using the Vytelle SENSE system's In-Pen Weighing Positions to collect body weight measurements of cattle should be favored over chute weight collection, considering that the In-Pen Weighing Positions collect weights continuously, automatically, accurately and in a low-stress manner. The In-Pen Weighing Positions can collect hundreds of weights daily without the need for manual labor and the weights are more accurate given that there are hundreds of weights collected every day.

Vytelle

Vytelle is a precision livestock company reshaping how cattle producers worldwide optimize their herds. Through Vytelle's integrated technology platform, generations of genetic gains can be made in just a few years. This allows producers to sustainably deliver more protein with fewer inputs, helping to ensure meat and milk are viable, competitive food choices for future generations.

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