Evaluation of Feed Efficiency Testing Angus Bulls on a New Feed Intake Monitoring System

A.S. Leaflet R2278

Daryl Strohbehn, Garland Dahlke, and Darrell Busby, Iowa Beef Center; Perry Beedle, system operator

Summary

A new feed intake monitoring system (FIMS) was developed and utilized to evaluate individual animal feed intakes and conversions. Data from the FIMS was compared to historical data from the same producer which was accumulated via a Pinpointer 4000 system. Lower cost nutrition was accomplished via normal feedlot total mixed rations delivered to feedbunks with using a mixing delivery wagon. Wireless data downloads eliminated data entry errors and no animal training time was needed for individual feed intakes. Bull growth rates, feed intakes, and conversions on the FIMS compared favorably to the older Pinpointer system.

Introduction

Conversion of feed to edible beef product is economically important to the beef industry and the consumer. To achieve genetic improvement, measures of phenotypic differences must be achieved in feeding environments similar to how normal feedlot cattle will be managed. A system for measuring feed intake used in the past had cattle eating from a self-feeder type device and this required either a pelleted or a finely ground ration. Because the feedlot industry utilizes a total mixed ration generally consisting of both dry and high moisture type feedstuffs supplemented with protein, mineral, and vitamin premises, it was imperative that a newer feed intake monitoring system (FIMS) be developed and tested. Details on the FIMS are given in an accompanying paper A.S. Leaflet R2279. This paper deals with how the bulls performed on the FIMS.

Material and Methods

Angus producer Duane Warden of Council Bluffs has been feed efficiency testing his bulls for over 20 years using a Pinpointer 4000 system. This system required bulls be fed a complete pelleted ration. As the years progressed two problems have arisen. One, getting economical pelleted rations formulated has been difficult, and two, securing service and repairs for his aging equipment has been increasingly frustrating. However, records from his past tests serve as a great comparison to measure cattle against the new FIMS.

In years 1987 through 1997, one intake system was used and starting in 1999 through 2004, two systems were utilized. Data was misplaced in 1996 and 1998, therefore, sixteen total years of data was available encompassing a total of 317 Angus bulls. These bulls were offered a pelleted complete ration and three pounds of long stem hay daily during the test period.

For two years starting in 2005 Wardens Angus bulls were feed efficiency tested in the new FIMS discussed in A.S. Leaflet R2279 and pictured in Figure 1. During two years 126 bulls were fed in the eight pen system with either seven or eight bulls per pen. Actual feed intakes were monitored for 64 to 80 days, depending on the year. The average ration utilized during each test year is described in Table 1. All bulls were weighed on and off test and average daily gains calculated.

Actual and adjusted feed conversions were calculated as suggested in the Uniform Guidelines from the Beef Improvement Federation. Residual feed intakes were calculated utilizing procedures outlined by Koch, et al in the 1963 Journal of Animal Science (22L486).

Table 1. Rations utilized in FIMS during 2005 through 2007.

	2005-06	2006-07
	% on dry matter basis	
Dry cracked corn	58.4	45.1
High moisture corn	0.0	15.0
Alfalfa-grass hay	4.5	7.1
Corn silage	8.3	4.4
Corn gluten feed	24.6	24.6
Supplements	4.1	3.8

Results and Discussion

Many positive aspects were discovered with the FIMS system in comparison to the older Pinpointer 4000 system. First, ration formulation was simplified and done at lower cost due to the use of on-farm or home raised feedstuffs. Second, rations could be delivered to the bunk via a normal feedlot mixer wagon making the management of the daily feeding routine easy. Third, the wireless data downloaded

directly into a spreadsheet simplified data handling, reducing errors because of no data entry, and made it easy to spot bulls with appetite problems. And, fourth, because bulls were accustomed to eating at a bunk there was no training necessary to adjust them to eating out of the FIMS bunks. Within two or three days bulls were taken from multiple animal access to the bunk to only one animal eating at a time. On the negative side, one needs to be cognizant of ration formulation with the FIMS system to prevent animals sorting the feed ingredients. Rations consisting of strictly dry feeds are not desirable, thus, the reason for incorporating both corn silage and corn gluten feed along with cracking the dry corn. If this is not done, ingredient sorting by the dominant animals in a pen could lead to feed intake differences that could dramatically influence both gains and conversions. With this said, diet selection with a Pinpointer system can be challenging as well. To maintain healthy rumen function it is almost imperative that long stem hay be offered outside the confines of the Pinpointer equipment. When this is done there is not an accurate way of determining how much hay intake is taking place on an individual by individual basis, which clouds the true feed conversion by a small amount.

Bull daily gains on FIMS were similar (see Table 2) to what was achieved in previous years using the Pinpointer system, 3.72 versus 3.67 pounds. These gains were with bulls with similar average weaning weights at the beginning and slightly heavier off test due to faster gains. Adjusted ultrasound measurers on the FIMS showed more backfat and larger ribeye areas, but percent intramuscular fat was lower. Indeed, these differences could be sire related.

A principal objective in this effort was whether similar phenotypic ranges would be observed relative to feed intake and conversion. Average dry matter intake was higher in the Pinpointer system and there was less variability in feed intake. The decrease intake in the FIMS system may be due to greater effective fiber intake when feeding a total mixed ration that contains long stem hay and whole-plant corn silage. Certainly these feedstuffs could slow down passage rates through the digestive tract, thus decreasing total daily intake when compared to a finely ground, pelleted ration. Figure 2 shows that distribution of daily dry matter intakes on both systems appears normal.

Both actual and adjusted average feed conversions were better on FIMS system. There was more variance in feed conversion with the FIMS system, but the range from low to high was not much different. On a positive note, it appears bulls on the FIMS system have greater variation which may allow better detection of genetic differences. Certainly as one compares the calculated residual feed intakes in Table 3, there is a sizable difference in RFI standard deviation and range from low to high. Figure 3 shows graphically that the distribution of RFI for the 127 bulls tested thus far in the FIMS system are not distributed as normally as the 317 tested over 16 years in the Pinpointer. This may be a function of fewer numbers or, possibly, feed intakes relative to growth and midpoint weight are not being achieved. Certainly as more tests are run through the FIMS system this will be monitored.

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Table 2. Comparison of growth and carcass traits on bulls tested using the Pinpointer and FIMS systems.

	System	Average	Std Dev.	Minimum	Maximum
Adjusted weaning weight	Pinpointer	641.6	56.6	488	834
	FIMS	645.1	61.7	506	774
ADG on test	Pinpointer	3.67	.51	2.37	5.41
	FIMS	3.72	.61	2.24	4.99
Final off test weight	Pinpointer	1139.3	97.1	920	1540
	FIMS	1158.0	106.9	922	1546
Adjusted % IMF	Pinpointer	4.00	.90	2.1	6.7
	FIMS	3.75	.64	2.42	5.67
Adjusted fat cover	Pinpointer	.35	.12	.11	.77
	FIMS	.42	.10	.21	.78
Adjusted ribeye area	Pinpointer	13.44	1.51	10.2	20.9
	FIMS	13.76	1.12	9.6	16.2

Table 3. Comparison of feed intakes, conversions, and residual feed intakes between the Pinpointer and FIMS systems.

	System	Average	Std. Dev.	Minimum	Maximum
Dairy dry matter intakes	Pinpointer	25.7	2.6	18.3	33.9
	FIMS	23.9	4.8	12.3	40.4
Actual feed conversion	Pinpointer	7.12	.96	4.57	12.16
	FIMS	6.25	1.28	3.78	12.02
Adjusted feed conversion	Pinpointer	7.11	1.03	4.65	11.99
	FIMS	6.26	1.34	3.75	12.34
Residual feed intake	Pinpointer	.028	1.548	-5.201	5.732
	FIMS	.188	4.116	-12.246	13.302

Figure 1. FIMS setup in open-fronted partial confinement feedlot facility.

Figure 2. Distribution of average daily dry matter intakes for the FIMS (top) and the Pinpointer (bottom) systems.

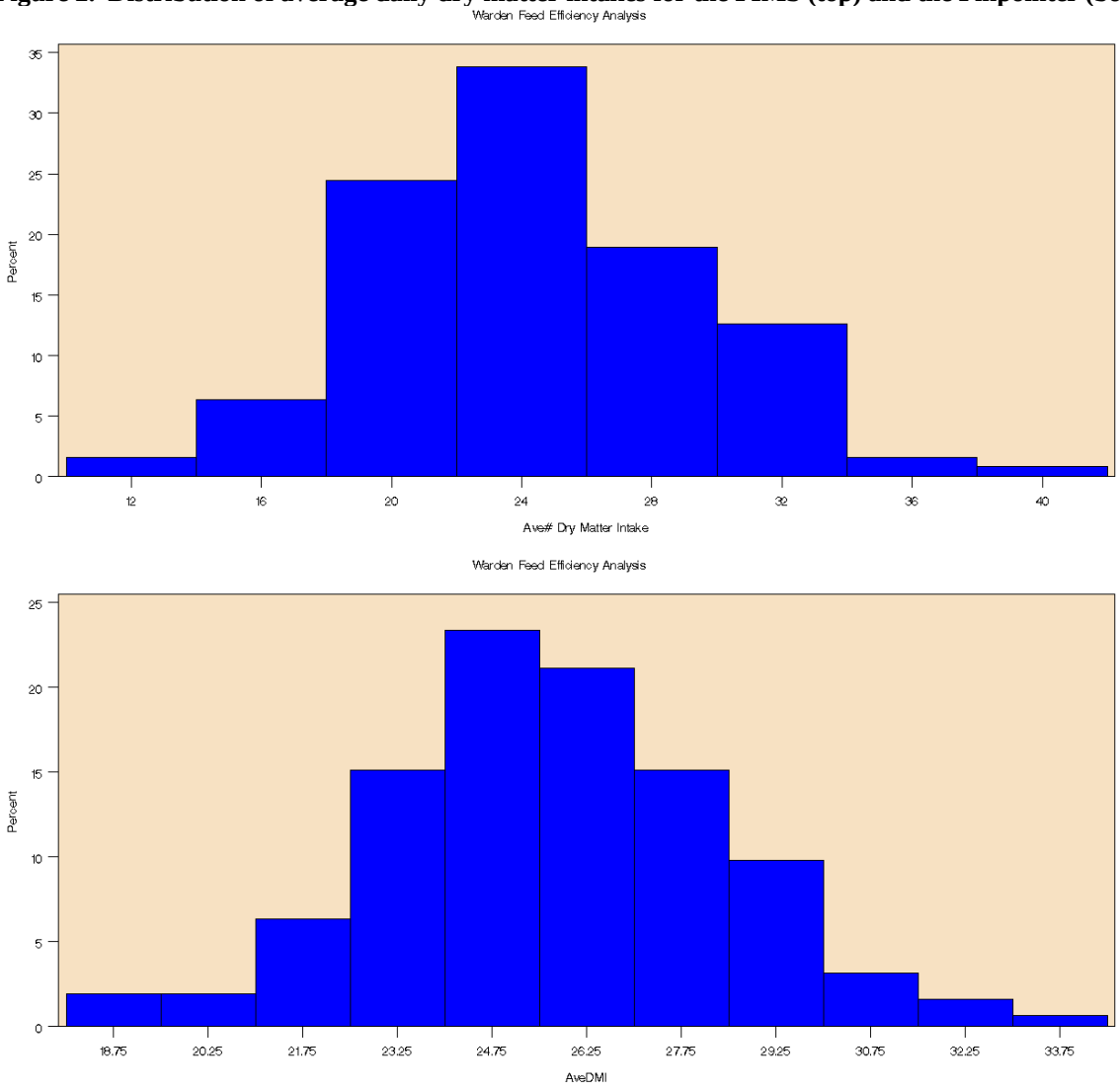

Figure 3. Distribution of residual feed intakes (RFI) with the FIMS (top) and Pinpointer (bottom) systems.