

Impact of Contemporary Group Assignment on Sire Means in Feed Efficiency Testing

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Summary and Implications

Designating correct contemporary groupings is important in reporting performance traits in beef cattle performance programs. An analysis of 166 bulls over a three-year period showed that grouping all cattle into one contemporary group each year lead to major errors in evaluating sires for their average feed intake, feed conversion and residual feed intake (RFI). Under this grouping strategy, sire progeny averages were estimated incorrectly; 58% of sire averages for dry matter intake were off by .5 lbs daily or more, 25% were off by .5 lbs or more in feed conversion and 67% were off by .5 lb or more for RFI. Also 25%, 29% and 33% were estimated with the wrong sign for dry matter intake, feed:gain ratio and RFI, respectively, which means sire progeny averages either received a positive sign for the trait rather than negative, or vice versa.

Introduction

The livestock industry due to higher feedstuff prices has renewed interest in evaluating animals for feed intake and resulting efficiency of growth. Adoption of testing procedures in the beef sector tends to begin with commercial bull testing facilities. Because several producers each consign a relatively small number of bulls to these tests there is a tendency to include all bulls from all producers into one contemporary group. In the end, national cattle genetic evaluation depends on correct animal deviations from their contemporary group average for EPD generation. The following analysis looks at the impact of the weaning contemporary group assignment versus inclusion of all animals into one group.

Material and Methods

Data for this analysis came from feed efficiency tests done by Angus producer Duane Warden, of Council Bluffs, Iowa. A total of 166 bulls born in the spring calf crops of 2005, 2006 and 2007 were evaluated for feed intake and efficiency utilizing the Feed Intake Monitoring System (FIMS) developed by the Iowa Beef Center at Iowa State University as described in AS Leaflet R2279, 2008 ISU Animal Industry Report. Trait averages for the bulls by year are given in Table 1.

Actual and adjusted feed conversions were calculated as suggested in the Uniform Guidelines from the Beef

Improvement Federation. Residual feed intake measures were calculated utilizing procedures outlined by Koch, et al in the 1963 Journal of Animal Science (22:486). However, to study the impact of assigning the correct contemporary groupings, these traits were calculated two ways, (1) once considering the correct weaning contemporary group in which they were raised, and (2), by combining all bulls into one group. Once calculation methods were done for all bulls, the datasets were evaluated for sire averages utilizing the GLM and least squares analysis procedure of SAS 9.1.3 taking into account year and sire effects in the model.

Results and Discussion

Genetic evaluation for feed efficiency will consider a number of traits, but most importantly will include feed or dry matter intake, adjusted feed conversion and residual feed intake (RFI or net feed intake). All of these evaluations will look at differences compared to the contemporary group average and in calculating the latter two traits, the mid-point weight of the bull will be used and compared to the contemporary group average. As one might expect, if bulls are from first calf heifers they most likely will be lighter on average than other bulls on test, providing a sound reason for them being considered a different contemporary group. Additionally, it is important to realize that pre-test environments, such as variation of pasture quality and quantity, creep feeding, and other management differences, can impact average weight and body condition on test as well as gain during the test, ultimately impacting feed intakes and conversions.

Least square means for dry matter intake deviations are shown in Table 2 by Sire ID. Although the average deviation for all sires is not greatly different from zero, there are 14 of 24 sires that have daily dry matter intake progeny deviation averages off by over one half pound. With the heritability of intake being moderate, this makes for large errors occurring in genetic prediction for intake. Particularly bothersome is the fact that 25 percent of the sire progeny deviations are opposite in sign to what they should be. In other words, signs are positive when they should have been negative and negative when they should have been positive.

Adjusted feed to gain ratio as calculated by the standards set forth by the Beef Improvement Federation showed similar results. Table 3 shows that the feed:gain deviation average was only in error by -.092; however, 6 of 24 sires were in error by .5 lbs or more, and 7 of 24 of the sire progeny deviations are opposite in sign to what they should be.

It appears that the livestock industry is trending toward reporting residual (RFI) or net feed intake, with a negative

Iowa State University Animal Industry Report 2009

number indicating animals that consume less feed than what is predicted based on their average mid-point weight and ADG during the feeding period. Table 4 shows the comparison of RFI by sire progeny group averages under

the two grouping scenarios. Two-thirds of the sire group averages are in error by over .5 lbs. Additionally, one third of the sire progeny average deviations are opposite in sign to what they should be.

Table 1. Performance Trait and EPD averages for bulls in analysis by year.

Trait	Year			Average
	2006	2007	2008	
Birth Weight, lb	80.8	80.8	80.6	80.8
Adjusted Wean Weight, lb	627	660	641	643
On Test Weight, lb	647	676	689	668
Off Test Weight, lb	1213	1096	1187	1163
Days on Test	91	56	110	83
On Test ADG	3.82	3.63	4.29	3.87
Average Dry Matter Intake	26.7	21.7	22.9	23.9
Ultrasound Data				
Adjusted % Intramuscular Fat	3.6	3.9	4.6	4.0
Adjusted Rib eye Area, sq in	13.5	14.0	15.1	14.1
Adjusted Rib Fat, in	0.41	0.43	0.45	0.43
EPDs				
Calving Ease Direct, %	6.3	6.7	8.1	6.9
Birth Weight, lb	0.7	1.1	0.8	0.9
Weaning Weight, lb	37	40	45	40
Yearling Weight, lb	70	69	75	71
Maternal Milk, lb	20	21	24	21
Intramuscular Fat, %	0.13	0.11	0.11	0.12
Rib eye Area, sq in	0.27	0.25	0.29	0.27
Fat Cover, in	0.001	0.001	0.000	0.001

Table 2. Differences in dry matter intake (DMI) deviations by contemporary group designation.

Sire ID	Within Contemporary	Within Whole	Difference in Methods
	Group DMI Deviation	Test DMI Deviation	
1	-0.827	-1.446	0.619
2	0.154	0.342	-0.189
3	0.053	-1.444	1.497
4	-2.198	-0.924	-1.274
5	2.324	1.360	0.964
6	-0.818	-0.503	-0.315
7	0.227	0.228	-0.001
8	0.524	0.219	0.305
9	2.987	2.662	0.325
10	-0.280	0.554	-0.834
11	3.209	3.022	0.187
12	-0.067	0.613	-0.680
13	-0.465	0.328	-0.793
14	-1.475	-2.439	0.964
15	4.489	5.254	-0.764

Iowa State University Animal Industry Report 2009

16	2.010	2.484	-0.473
17	-0.051	0.317	-0.368
18	-1.125	-2.089	0.964
19	-0.119	0.509	-0.628
20	-0.498	-0.036	-0.462
21	0.087	0.766	-0.680
22	-0.904	-1.868	0.964
23	2.204	3.021	-0.816
24	-0.210	-0.366	0.157
		Average difference	-0.055
		Minimum difference	-1.274
		Maximum difference	1.497

Table 3. Differences in adjusted feed:gain ratio (F:G) deviations by contemporary group designation.

Sire ID	Within Contemporary Group F:G Deviation	Within Whole Test F:G Deviation	Difference in Methods
1	-0.173	-0.333	0.161
2	-0.277	0.160	-0.437
3	0.132	0.246	-0.114
4	-0.265	0.151	-0.416
5	1.067	2.009	-0.942
6	0.071	0.390	-0.319
7	-0.221	-0.291	0.070
8	0.432	0.511	-0.079
9	0.239	0.974	-0.736
10	-0.221	-0.381	0.160
11	0.288	-0.117	0.405
12	0.110	-0.099	0.209
13	0.013	0.213	-0.201
14	0.703	1.480	-0.778
15	-0.137	-0.442	0.305
16	0.412	0.095	0.317
17	0.468	0.694	-0.226
18	-0.670	0.162	-0.832
19	0.190	-0.317	0.507
20	0.026	-0.256	0.282
21	-0.935	-1.027	0.092
22	-1.055	-0.380	-0.675
23	0.330	-0.124	0.455
24	-0.026	-0.599	0.573
		Average difference	-0.092
		Minimum difference	-0.942
		Maximum difference	0.573

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Table 4. Differences in residual feed intake (RFI) deviations by contemporary group designation.

Sire ID	Within Contemporary Group RFI???	Within Whole Test RFI Deviation	Difference in Methods
	Deviation		
1	-0.558	-1.399	0.841
2	0.022	0.085	-0.063
3	0.234	-0.531	0.765
4	-0.600	0.957	-1.557
5	4.264	3.396	0.868
6	-0.849	-0.070	-0.779
7	-0.224	0.294	-0.518
8	0.625	0.613	0.012
9	3.471	3.350	0.122
10	-0.529	0.699	-1.228
11	-0.662	0.330	-0.992
12	0.139	0.952	-0.814
13	1.095	0.605	0.490
14	-0.710	-0.202	-0.508
15	3.079	2.195	0.884
16	1.818	1.201	0.617
17	0.599	0.167	0.433
18	-2.180	-1.121	-1.059
19	0.758	-0.097	0.855
20	-0.266	-0.548	0.283
21	-0.060	0.262	-0.322
22	-1.858	-1.440	-0.419
23	2.499	1.707	0.792
24	0.029	-0.757	0.786
		Average difference	-0.021
		Minimum difference	-1.557
		Maximum difference	0.884