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W. Darrell Busby
Iowa State University

Daryl R. Strohbehn
Iowa State University

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A Historical Summary of Iowa 4H Beef Carcass Data – 1971-2005

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Darrell Busby, extension livestock specialist;
Daryl Strohhahn, extension beef specialist

Summary

A total of 10,518 head of 4H project beef calves had both growth and carcass data collected on them from 1971 through 2005. Iowa's 4H projects have beginning weights measured around January 1 and then all cattle are weighed at the county or state fair so ADGs can be calculated. In addition, many projects are terminated in conjunction with a carcass contest and standard carcass data collected. From the middle 1970s until 2005 live weights have increased by over 200 pounds with a corresponding 133 pound increase in hot carcass weight. During this same time period average daily gains have increased from 2.3 to 3.0 pounds daily. 4H project cattle trended leaner from the 1970s to the 1980s, but during the 1990s and into the new millennium have trended fatter. Rib eye area increased by about 1 square inch, however, due to an increase in carcass weight the rib eye area per hundred pounds of carcass weight has decreased. Quality grade from the 1970s decreased from over 70% Choice and higher down to 55%, but in the last decade has returned to over 75% Choice and better. Percent yield grade 1 and 2 increased to over 70% in the 1980s, however, with the emphasis on higher quality grade has decreased back to 55% yield grade 1 and 2s. 4H beef projects are placed in contests with a formula called retail value per day on feed. Factors found that significantly impact this placing were final weight, ADG, dressing percent, hot carcass weight, rib eye area, quality grade and carcass price as impacted by quality and yield grade.

Implications

This data analysis will allow 4H beef project members, their parents and leaders to benchmark their beef project against others in the state of Iowa.

Introduction

The objective of the 4H beef carcass data collection program is to provide 4Hers, leaders, county beef superintendents and parents with information about beef quality and profitable beef production practices and to encourage practical marketing based off of science based information. This summary was conducted to provide information so clientele can compare cattle at the county level to state averages and better reflect on their level of accomplishment.

Material and Methods

Over the past several years beef carcass measurements have been collected under the supervision of the Southwest and West Central Iowa extension livestock production specialists, Precision Beef Alliance and the Tri-County Steer Carcass Futurity Cooperative. Measures included in this process have been hot carcass weight, ribeye area, fat thickness and an estimate of percent kidney, pelvic and heart fat. The USDA federal graders evaluated the carcasses on quality grade to the nearest one-third. Each year beginning weights were recorded for the calves in late December or early January during county weigh ins. From these data, yield grade, percent retail product, average daily gain and retail value per day on feed were calculated. Yield grade was calculated with the following USDA equation: $2.5 + (2.5 \times \text{fat thickness}) + (.2 \times \% \text{KPH}) + (.0038 \times \text{hot carcass weight}) - (.32 \times \text{ribeye area})$. Percent retail product was calculated with following equation: $74.9 - (17.78 \times \text{fat thickness}) + (.548 \times \text{ribeye area}) - (1.47 \times \% \text{KPH})$. Retail value per day on feed (RVDPF) was calculated as: $((\text{hot carcass weight}) - (.55 \times \text{beginning weight})) \times (\% \text{ retail product}) \times (\text{carcass price, } \$\text{.lb} / .7) / \text{days on feed}$. Carcasses were valued using prices with the premiums and discounts for quality grade, yield grade, and off carcass weights as shown in table 1.

Data from a previous analysis of Southwest Iowa 4H carcass competitions will serve as a means of comparison. This analysis was conducted in 1987 and appeared in the 1989 Beef – Sheep Research Report as Leaflet R599. That data set consisted of cattle harvested from 1971 through 1987.

Results and Discussion

Live weight at harvest and average daily gain have increased dramatically since the inception of the carcass data collection program in Iowa. When one compares the last nine years, 1997 to 2005, with prior years one finds that live weight has gone up over 200 pounds since the early 1970's and by 100 pounds since the mid 1980's. At the same time average daily gain and increased from 2.28 and 2.38 in the 1970s to nearly 3 pounds daily in the last 5 years.

Although average daily gain has increased significantly over the years there remain several cattle with inadequate gain as shown in table 3. Over 18 percent of the cattle gained less than 2.5 pounds daily. On the positive side, however, almost 14 percent of the cattle gained over 3.5 pounds daily and over 31 percent gained from 3.0 to 3.5.

From the early 1970s to the new millennium hot carcass weight has increased 133 pounds (see table 4). Mid to upper 600 pound carcasses were the norm in the 1970s, while 750 to 850 pound carcasses are the rule from 1997 through 2005. As shown in table 5, the carcass weight range with the highest frequency is 750 to 799 pounds, but it is followed very closely by 800 to 849 pound carcasses. On the negative side, some of the cattle are getting too large; 2 percent have carcass weights over 950 pounds and 7.2 percent are from 900 to 949 pounds. Dressing percent appears to have declined about .8 percent since the early 1970s.

Carcass composition has changed since the early 1970s with less fat thickness. There was a dramatic decrease from the 1970s through the mid 1980s, but now fat thickness has increased back to where it now is less than one-tenth of an inch of where it was in the early 1970s. This largely has been due to the emphasis on making cattle grade a higher percent Choice. Ribeye areas appear to have increased in size over the years and then leveled out to where the average is slightly over 13 square inches. However, when one expresses the ribeye area in relationship to the hot carcass weight, the ratio has gone from about 1.9 square inches per hundred pounds of carcass weight to less than 1.7 square inches. As a result the calculated yield grade of the cattle has risen to within .14 units of where it was in the early 1970s. As table 7 shows, the percent yield grade 1s and 2s was over 70 percent during the middle 1990s, however, from 2002 to 2005 this has dropped back to less than 55 percent 1s and 2s. Yield grade 4s and 5s have tripled.

USDA quality grade averaged strongly into the low Choice category in the early 1970s, but then decreased into the mid 1980s to where it averaged in high part of the Select grade. This was likely due to the heavy influx of new breeds which were utilized to address the lack of red meat yield and growth rate. Starting in the 1990s a renewed emphasis on producing Choice beef emerged and influenced selection routines for beef cattle. The response to that has been an increase in quality grade. The average quality grade in the 4H cattle during the late 1990s is back to where it was in the early 1970s. Just over 75 percent graded Choice- and better in the early 1970s and today's 4H cattle are achieving over 77 percent Choice

Variability still exists in our cattle populations. Table 5 shows that 4.9 percent of the cattle have less than 11 square inches of ribeye and 11.8 percent have over 15 square inches of ribeye. Further shown in table 5 is the variation in fat thickness. Over 38 percent of the cattle had fat thickness

at .5 inches or greater. Over 4 percent had greater than .8 inches of fat thickness.

The last two National Beef Quality Audits indicated a need to increase the percent of cattle making it into the USDA Prime grade and the upper part of the Choice grade. The percent grading Prime from 1997 to 2005 was 2.6 percent, twice the national average (see table 6). Additionally, almost 28 percent of the cattle made it into the top two-thirds of the Choice grade. On the negative side is the percent of cattle with poor yield grades (see table 7). Over 5 percent of the cattle had calculated yield grades of 4 and 5.

As stated earlier, the objective of this program is to educate youth and adults on performance and carcass traits of economic importance. Growth rate, red meat yield (% retail product) and quality grade are combined into a composite index of retail value per day on feed (RVDOF). The quality aspect is put into the equation by using the current market prices for quality and yield grades, plus any discounts for outlier carcass weights.

In this data set traits that appear to have a significant bearing on RVDOF (see table 8) are final weight, average daily gain, dressing percent, hot carcass weight, ribeye area, USDA quality grade and carcass price. Average daily gain had the highest correlation to RVDOF at .76, followed closely by hot carcass weight. Knowing the hot carcass weight correlation is important because it assists rule guidelines. For instance, rules at the Iowa State Fair do not allow an over 900 pound carcass to compete in one division, while the high quality grid market division does not allow any carcass weighing over 850 pounds to compete. While some may think average daily gain contributes too much to final evaluation, it is imperative to realize how important it is to efficiency and overall profit in the cattle industry. Encouraging 4-Her's and their parents to notice in the data set is the moderate to high correlations of ribeye area, quality grade and carcass price to RVDOF. Many would say that controlling beginning weight is a large part of placing well with the RVDOF equation. This analysis would not prove that out as the correlation is much less at -.16. The RVDPF equation when used in cattle fed in commercial feedlots has a very high correlation to feedlot profitability.

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Table 1. Carcass prices, premiums and discounts				
used to determine carcass value added per day on feed.				
				\$/cwt
Based price for Low Choice, Yield Grade 3				\$125.00
Premiums				
Prime				\$25.00
Average & High Choice (if CAB)				\$4.00
Average & High Choice (if not CAB)				\$3.00
Yield Grade 1				\$6.00
Yield Grade 2				\$3.00
Discounts				
Select				-\$10.00
Standard				-\$12.00
Yield Grade 4 & 5				-\$20.00
Off grades				-\$35.00

Table 2. Iowa 4H beef live trait averages by year groupings.				
Year Groups	No. of Head	Begin Weight	Live Weight	Average Daily Gain
1971-1974	452	na	1048	na
1975-1978	409	612	1084	2.28
1979-1982	390	625	1118	2.38
1983-1986	820	626	1162	2.59
1997-2000	2380	645	1251	2.93
2001-2005	6067	663	1273	2.96
1997	297	630	1233	2.90
1998	644	652	1237	2.79
1999	601	646	1251	2.99
2000	838	651	1267	2.99
2001	1223	689	1236	2.76
2002	1202	654	1280	3.05
2003	1203	650	1268	2.94
2004	1033	647	1276	2.96
2005	1406	669	1303	3.07

Table 3. Distribution of average daily gains 1997-2005.		
ADG Groups	Number	Percent
less than 1.5	17	0.23%
1.5-1.99	178	2.36%
2.0-2.49	1203	15.93%
2.5-2.99	2743	36.32%
3.0-3.49	2372	31.41%
3.5-3.99	839	11.11%
4.0-4.49	177	2.34%
4.5 & over	23	0.30%
Total count	7552	

