

Iowa 4-H Beef Carcass Summary – 1997-2000

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Introduction

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

Materials and Methods

Beef carcass measurements collected under the supervision of the Southwest and West Central Iowa extension livestock production specialists and Precision Beef Alliance included hot carcass weight, ribeye area, fat thickness and an estimate of percent kidney, pelvic and heart fat. The USDA federal grader evaluated the carcasses on quality grade to the nearest one-third. In all years beginning weights were recorded for the calves in late December or early January. 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 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 the 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: $((\text{hot carcass weight}) - (.55 \times \text{beginning weight})) \times (\% \text{ retail product}) \times (\text{carcass price, } \$/\text{lb} / .68) / \text{days on feed}$. Carcass prices with the premiums and discounts for quality grade, yield grade, and off carcass weights are shown in Table 1.

Data from a previous analysis of Southwest Iowa 4-H 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

Data in Table 2 show that 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 four years, 1997 to 2000, with prior years one finds that live weight has gone up over 200

pounds since the early 1970s and by 89 pounds since the mid 1980s. At the same time average daily gain has increased from 2.28 and 2.38 in the 1970s to nearly 3 pounds daily in the last 2 years.

Although average daily gain has increased significantly some cattle continue to have inadequate gain, as shown in Table 3. Almost 19 percent of the cattle gained less than 2.5 pounds daily. On the positive side, however, over 12 percent of the cattle gained over 3.5 pounds daily and 30 percent gained from 3.0 to 3.5.

Hot carcass weight has jumped over 110 pounds in the last 30 years in the beef carcass program as shown in Table 4. Mid to upper 600 pound carcasses were the norm in the 1970s, and mid to upper 700 pound carcasses were the rule in the late 1990s. As shown in Table 5, the carcass weight range with the highest frequency is 750 to 799 pounds, and there are as many carcasses in the 800 to 849 pound range as there are in the 700 to 749 pound range. On the negative side, there are over 6% of the cattle with carcass weights over 900 pounds.

Dressing percentage has declined about 1.25% since the early 1970s. Fat thickness decreased dramatically from the 1970s through the mid 1980s and now has increased back to where it was in the late 1970s. This is largely due to the emphasis on making a higher percentage of cattle grade Choice. Ribeye areas seem to have increased in size over the years and then have leveled out to where the average is about 13 square inches. However, when one expresses the ribeye area in relationship to the hot carcass weight, the ratio has gone from about 1.89 to less than 1.7 square inches.

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 the low part of the Select grade. This was likely due to the heavy influx of new breeds that were utilized to address the lack of red meat yield and growth rate. Since the mid and late 1980s a renewed emphasis on producing Choice beef has emerged and influenced selection routines for beef cattle. This has resulted in an increase in quality grade. The average quality grade in these cattle during the late 1990s was back to where it was in the early 1970s, 75.7% grading Choice and better in the early 1970s and 74.2% in the late 1990s.

The average calculated yield grade has gone from the low part of yield grade 2 in the mid 1980s to the middle part of yield grade 2 in the late 1990s. This is due to an increased amount of fat thickness and less ribeye area per hundred pounds of hot carcass weight.

A high degree of variability still exists in our cattle populations. Table 5 shows that nearly 4% of the cattle have less than 11 square inches of ribeye and 12.5% have over 15 square inches of ribeye. Further shown in Table 5 is

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the variation in fat thickness. Over 30% of the cattle had fat thicknesses of .5 inches or greater. Over 3% had greater than .8 inches of fat thickness.

One objective stated in the last two National Beef Quality Audits was to increase the percentage of cattle making it into the USDA Prime grade and the upper part of the Choice grade. The percentage grading Prime from 1997 to 2000 was almost 2.7%, twice the national average (see Table 6). Additionally, over 25% of the cattle made it into the top two-thirds of the Choice grade. On the negative side is the percentage of cattle with poor yield grades (see Table 7). Over 4% of the cattle were calculated with yield grades of 4 and 5.

As stated earlier, the objective of this program is help 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 percentage, hot carcass weight, ribeye area, USDA quality grade and carcass price. Average daily gain had the highest correlation to RVDOF at .75, followed

Table 1. Carcass prices, premiums and discounts used to determine carcass value added per day on feed.

	\$/cwt
Base price for Low Choice, Yield Grade 3	\$106.00
Premiums	
Prime	\$13.00
Average & High Choice (if CAB)	\$4.50
Average & High Choice (if not CAB)	\$3.00
Yield Grade 1	\$6.50
Yield Grade 2	\$2.50
Discounts	
Select	-\$10.00
Standard	-\$12.00
Yield Grade 4 & 5	-\$16.50
Off grades	-\$31.00

Table 3. Distribution of average daily gains.

ADG Groups	Number	Percent
less than 1.5	4	0.17
1.5-1.99	44	1.90
2.0-2.49	391	16.90
2.5-2.99	901	38.94
3.0-3.49	695	30.03
3.5-3.99	222	9.59
4.0-4.49	46	1.99
4.5 & over	11	0.48

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, whereas the high quality grid market division does not allow any carcass weighing over 850 pounds to compete. Although 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 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. However, this analysis would not prove that because the correlation is at an insignificant -.03 level.

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.

Acknowledgments

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Table 2. Iowa 4-H 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
1997	297	633	1234	2.90
1998	644	657	1237	2.80
1999	601	632	1250	2.99
2000	838	649	1267	2.99

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Table 4. Iowa 4-H beef carcass trait averages by year groupings.

Year Groups	Hot Carcass Weight	Percent Dressing	Fat Thickness, in.	Ribeye area, sq.in.	REA/cwt. HCW	USDA Quality Grade*	% Grading Choice or Better	USDA Yield Grade	Percent Retail Product
1971-1974	665	63.4	0.53	12.58	1.89	10.13	75.71	3.01	67.38
1975-1978	679	62.7	0.41	12.65	1.86	9.95	69.05	2.67	70.19
1979-1982	700	62.6	0.36	13.24	1.89	9.34	60.79	2.33	72.05
1983-1986	722	62.2	0.32	13.45	1.86	9.33	53.95	2.17	73.42
1997-2000	777	62.1	0.40	13.14	1.69	10.11	74.20	2.66	71.98
1997	763	61.8%	0.38	13.15	1.72	10.00	71.72	2.58	72.10
1998	767	62.0%	0.35	13.32	1.74	9.96	71.75	2.43	73.01
1999	775	62.0%	0.39	12.81	1.65	10.22	78.04	2.71	72.17
2000	791	62.4%	0.45	13.24	1.67	10.19	74.22	2.82	71.02

* 9=Select, 10=Low Choice, 11=Average Choice

Table 5. Carcass trait distribution analysis for cattle from 1997 to 2000.

Hot Carcass			Ribeye			Fat		
Weight	Number	Percent	Area	Number	Percent	Thickness	Number	Percent
<600	40	1.7%	<11	93	3.9%	<.1"	1	0.0%
601/649	100	4.2%	11-11.9	363	15.3%	.1"- .19"	167	7.0%
650/699	239	10.0%	12-12.9	730	30.7%	.2"- .29"	410	17.2%
700/749	489	20.5%	13-13.9	570	23.9%	.3"- .3.9"	588	24.7%
750/799	576	24.2%	14-14.9	326	13.7%	.4"- .49"	492	20.7%
800/849	495	20.8%	15-15.9	186	7.8%	.5"- .59"	350	14.7%
850/899	293	12.3%	16-16.9	85	3.6%	.6"- .69"	199	8.4%
900/949	117	4.9%	17-17.9	19	0.8%	.7"- .79"	100	4.2%
>950	31	1.3%	>18	8	0.3%	>.8"	73	3.1%
Totals	2380	100%	Totals	2380	100%	Totals	2380	100%
Average	777.1		Average	13.14		Average	0.40	

Table 6. Quality grade distribution by years.

	1997	1998	1999	2000	All Years
No. of Head	297	644	601	838	2380
Prime	1.35%	2.95%	3.16%	2.63%	2.69%
Choice+	6.40%	5.28%	7.32%	11.46%	8.11%
Choice	14.48%	10.87%	22.80%	19.33%	17.31%
Choice-	49.49%	52.64%	44.76%	40.81%	46.09%
Select	25.25%	21.58%	19.30%	20.41%	21.05%
Standard	0.00%	2.48%	1.50%	1.55%	1.60%
Off Grades	3.03%	4.19%	1.16%	3.82%	3.15%
	100%	100%	100%	100%	100%

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Table 7. Yield grade distribution by years

	1997	1998	1999	2000	All Years
No. of Head	297	644	601	838	2380
1	22.56%	29.81%	18.14%	13.13%	20.08%
2A	26.94%	25.16%	22.30%	22.43%	23.70%
2B	22.22%	20.81%	24.46%	25.89%	23.70%
3A	14.81%	16.61%	20.47%	20.76%	18.82%
3B	11.11%	6.06%	9.15%	11.81%	9.50%
4	2.02%	1.24%	5.16%	5.37%	3.78%
5	0.34%	0.31%	0.33%	0.60%	0.42%
	100%	100%	100%	100%	100%

Table 8. Correlations between various live and carcass trait measurements.

	Beginning weight	Final Weight	Average Daily Gain	Hot carcass weight	Dress percent	Fat thickness	Ribeye area	RREA/c wt HCW	Yield grade	% Retail product	Quality grade	Carcass price	Retail Value/Day on Feed
Days on feed	-0.23	0.02	-0.16	0.04	0.07	-0.03	0.06	0.02	-0.03	0.03	-0.06	-0.08	-0.20
Beginning weight		0.51	-0.19	0.52	0.15	0.14	0.20	-0.27	0.17	-0.10	0.12	0.02	-0.03
Final Weight			0.68	0.93	0.08	0.29	0.34	-0.50	0.34	-0.20	0.15	-0.04	0.57
Average daily gain				0.60	-0.07	0.22	0.19	-0.35	0.25	-0.16	0.09	-0.03	0.75
Hot carcass weight					0.43	0.35	0.41	-0.49	0.36	-0.25	0.19	-0.03	0.62
Dress percent						0.25	0.29	-0.11	0.16	-0.19	0.16	0.03	0.29
Fat thickness							-0.22	-0.51	0.86	-0.97	0.39	-0.10	-0.04
Ribeye area								0.58	-0.56	0.41	-0.18	0.09	0.44
RREA/cwt HCW									-0.85	0.61	-0.34	0.09	-0.14
Yield grade										-0.93	0.43	-0.11	-0.04
% Retail product											-0.42	0.10	0.12
Quality grade												0.57	0.28
Carcass price													0.45