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A Historical Review of the 4-H Beef of Merit Carcass Contest at the Iowa State Fair

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Abstract
A total of 1,033 head of steers competing in the Iowa State Fair Beef of Merit class from 1975 through 2000 were summarized. Those grading low Choice and higher averaged 55.4 percent, and the average yield grade was 2.44. Due to rule changes over time the quality grade and cutability shifted. In recent years with the emphasis placed on acceptable quality grade and carcass weight, the BOM cattle have improved dramatically in the percent grading Prime and upper Choice. However, with this change has been a reduction in the percent of cattle making yield grade 1 and 2. Growth rate increased through the late 1980s, but has remained static since that time.

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Summary

A total of 1,033 head of steers competing in the Iowa State Fair Beef of Merit class from 1975 through 2000 were summarized. Those grading low Choice and higher averaged 55.4 percent, and the average yield grade was 2.44. Due to rule changes over time the quality grade and cutability shifted. In recent years with the emphasis placed on acceptable quality grade and carcass weight, the BOM cattle have improved dramatically in the percent grading Prime and upper Choice. However, with this change has been a reduction in the percent of cattle making yield grade 1 and 2. Growth rate increased through the late 1980s, but has remained static since that time.

Introduction

In the early 1970s the 4-H Beef of Merit (BOM) contest was initiated at the Iowa State Fair. As stated in the 1975 Iowa State Fair premium book, "The purpose of this division is to provide exhibitors an opportunity to participate in a live show and at the same time, one in which the economically important elements of the beef industry are quite objectively evaluated in meaningful, scientific ways." To this day, the objective remains the same, but the ways in which cattle are placed has changed to stay in tune with the industry as it evolves.

Materials and Methods

Steers shown in the 4-H BOM contest were harvested at a cooperating facility where beef carcass measurements were collected under the supervision of state extension beef specialists. Measures included hot carcass weight, rib eye area, fat thickness, and an estimate of the percent of kidney, pelvic and heart fat. Quality grade determination was done by the USDA federal grader.

All cattle entered in this contest have beginning test weights taken in late December or early January for the calculation of average daily gain at the Iowa State Fair. From these data, values calculated include yield grade, percent retail product and carcass value added per day on feed. Yield grade was calculated using that following USDA equation: 2.5 + (2.5 x fat thickness) + (.2 x %KPH) + (.0038 x hot carcass weight) – (.32 x ribeye area). Percent retail product was calculated using an equation developed by M. Dikeman at Kansas State University: 74.9 – (17.78 x fat thickness) + (.548 x ribeye area) – (1.47 x %KPH).

Methods of placing started with an index methodology used in 1975 and 1976, which included USDA percent cutability, quality grade adjustment and carcass weight per day of age. The index equation used was: percent cutability (from USDA yield grade formula) + quality grade adjustment + (10 x carcass weight per day of age) + 88. Quality grade adjustments were: high choice and above, +2; average choice, +1; low choice, no adjustment; high good, –2; and average good or below, disqualified.

From 1977 through 1980, a new method of evaluating and placing the cattle was used, lean yield value per day of age. Percent lean yield was estimated using the following formula: 71.88 + (.618 x ribeye area in sq. in.) – (7.89 x fat thickness in in.) – (1.79 x % KPH) – (.7 x carcass weight in cwt). Lean yield value per day of age was then calculated as: % lean yield x hot carcass weight x yellow sheet price/age in days. Two discussion points moved the contest away from this methodology: 1) a lack of known birth date steers in the 4-H beef project area, and 2) a general distrust among exhibitors of the reported birth dates.

From 1981 through 1992 the BOM contest used an equation that included percent retail product and incorporated weigh in information at the beginning of the market steer project. The equation developed was carcass value added per day on feed and was calculated as: (((hot carcass weight – (55% x beginning weight)) x (% retail product) x (carcass price, $/lb))/days on feed.

This last equation is still used for placing the cattle in the contest; however, an additional set of requirements were put in place. Due to the National Beef Quality Audit and the development of specification markets, it was felt cattle should meet a minimum set of carcass requirements to compete for the championship premiums. Two market windows were established in 1993, "Supermarket Preferred" and "Hotel-Restaurant Preferred." Requirements for the "Supermarket Preferred" window were a hot carcass weight of 600 to 900 pounds, a USDA quality grade of average Select (Slight 50 marbling score) and higher, a calculated yield grade equal to or less than 3.5 and an average daily gain minimum of 2.4 pounds. The "Hotel-Restaurant Preferred" window requirements were a hot carcass weight of 650 to 850 pounds, a USDA quality grade of average Choice or higher, a calculated yield grade equal to or less than 3.99, and an average daily gain minimum of 2.4 pounds. To reflect market differences for high quality cattle in the Hotel-Restaurant window, upper two-thirds Choice and Prime quality grades were given price premiums of $2.50 and $5.00 per cwt., respectively.

Starting in 1999 due to the use of formula and grid markets further refinements occurred in the BOM contest.

The "Supermarket Preferred" was renamed the "High Cutability Grid Market" window. Specifications for qualification remained the same, but the following set of price premiums were used: yield grade 1 and 2 carcasses received premiums of $7 and $4 per cwt., and high Choice and Prime carcasses received premiums of $2 and $4 per cwt., respectively. The "Hotel-Restaurant Preferred" window was renamed the "High Quality Grid Market." Specifications for qualifying remained the same here also, but a new set of price premiums was used. Yield grade 1 and 2 carcasses received premiums of $5 and $3 per cwt. and upper two-thirds Choice and Prime carcasses received premiums of $5 and $9 per cwt., respectively.

For the window contests, although the 4-H member can only show live in one window, their animal competes in both windows following harvest. Therefore, it is possible for one animal to win both windows. Added premium money is rewarded to a 4-H member that nominates their animal and successfully qualifies in a window.

Results and Discussion

Data in Table 1 show that final weight and hot carcass weight have increased from the 750 to 800 lb. area in the late 1970s to weights in excess of 850 lbs. during the late 1980s. Ribeye averages fluctuated around 14 square inches most years with 1978 and 1980 being the exception. It seems that during the late 70s and early 80s a great deal of emphasis was placed on red meat yield with little regard to quality grade. As shown in table 2, percent retail product went from below 70 percent to a high of 75 percent, and the percentage grading Choice or higher remained at or below 55 percent in most years.

Average daily gain trended upward during the 1980s, but has remained static during the 1990s. This is likely due to keeping cattle at acceptable final harvest and carcass weights. Markets dictate large discounts for carcasses weighing over 950 pounds, and it seems 4-H members and their parents have learned that lesson. The average percentage of cattle over 900 pounds is 11.2 percent for the 26 years; however, since 1993 this average is 5.9 percent.

Major contest changes in the Beef of Merit show were initiated in 1993. Of interest is whether those changes caused participants to alter their selection and feeding practices and ultimately the final product averages. To partially analyze this carcass data were summarized in time groups: 1989 through 1993 as base data, 1994 through 1996, and 1997 through 2000. Tables 3, 4 and 5 show quality grade, yield grade and hot carcass weight distribution analyses.

Changes in the Beef of Merit contest results seem to have had a dramatic impact on USDA quality grade distribution over the years. The percentage of cattle grading Prime and in the upper two-thirds of Choice jumped from a total of 7.7 percent in the base years of 1989 through 1993 to 33.3 percent in 1997 through 2000. The percentage of cattle grading standard went up in 1994 through 1996, but dropped to 0.5 percent in the 1997 through 2000 time period.

From a red meat yield standpoint it would seem going to the specification windows did have an impact. Although the yield grade 1 percentage remained static, the percentage of 2As and 2Bs declined from 59.3 in 1989 through 1993 to 45.0 in 1997 through 2000. Both yield grade 3A and 3B had an increase in number, whereas the percentage of cattle falling in yield grade 4 remained static.

Putting market specifications in place had some effect on final weight, hot carcass weight and distribution of hot carcass weights. Cattle over the 900 pound carcass weight went from 17.3 percent during the 1989 through 1993 time period to 6.5 percent in 1994 through 1996 and 6.9 percent in 1997 through 2000. Average carcass weights declined by about 25 pounds, and the percent of carcasses weighing from 700 to 900 pounds increased from 81.6 percent in the 1989 through 1993 period to 90.4 percent in the 1997 through 2000 time period.

Is the contest ending up with the right type of cattle winning? That likely could be debated at length. Table 6 contains the trait averages of the champion and reserves for the cutability grid window versus the quality grid window. The level of feedlot growth is outstanding for the cutability window, but some would say the average weight at harvest and the ensuing carcass weights are too large. However, carcass cutability and quality grade is very acceptable with 85 percent grading low Choice or better and an average yield grade of 2.41. The champions and reserves in the quality grid window did not grow as fast, but 100 percent graded average Choice or higher and had an average yield grade of 2.56. All traits are quite acceptable in this group of champions.

Implications

A historical review of this 4-H project area documents change over time and captures trends in a program. Additionally, 4H beef project members, their parents and leaders are interested in benchmarking their projects against the best in the state.

Table 1. Averages for performance traits from 1975 to 2000 in the Beef of Merit contest at the Iowa State Fair.

Year	Number of Cattle	Final Weight	Average Daily Gain	Hot Carcass Weight	Rib Eye Area	Fat Cover	Calculated Yield Grade	% Retail Product	% Choice and Higher	% Select	% Off Grades
1975	21	1220	2.39*	778	14.2	0.35	2.55	71.90	0.0%	100.0%	0.0%
1976	31	1229	2.53*	784	13.6	0.45	3.00	69.65	32.3%	32.3%	35.5%
1977	35	1208	2.49*	762	13.8	0.44	2.72	69.94	51.4%	48.6%	0.0%
1978	20	1242	2.66*	766	15.2	0.32	1.81	74.16	50.0%	40.0%	10.0%
1979	18	1225	NA	776	14.4	0.29	2.20	73.23	33.3%	38.9%	27.8%
1980	15	1277	2.66*	808	15.6	0.33	1.90	74.05	46.7%	53.3%	0.0%
1981	35	1282	2.80	805	14.3	0.30	2.10	75.00	57.1%	34.3%	8.6%
1982	27	1281	2.80	808	14.3	0.30	2.10	74.40	44.4%	55.6%	0.0%
1983	38	1274	2.83	795	13.7	0.30	2.30	74.00	39.5%	55.3%	5.3%
1984	39	1348	2.90	853	14.7	0.38	2.34	73.62	59.0%	41.0%	0.0%
1985	45	1300	2.90	824	14.0	0.41	2.62	72.54	75.6%	26.7%	0.0%
1986	26	1312	3.00	822	13.6	0.37	2.50	73.52	38.5%	57.7%	3.8%
1987	22	1352	3.07	854	14.4	0.33	2.39	73.85	68.2%	31.8%	0.0%
1988	27	1351	3.01	862	14.3	0.42	2.67	72.13	74.1%	25.9%	0.0%
1989	65	1333	2.83	855	14.3	0.39	2.56	72.93	69.2%	26.2%	4.6%
1990	49	1323	2.91	840	13.8	0.38	2.66	72.62	55.1%	40.8%	4.1%
1991	43	1287	2.92	810	13.5	0.39	2.55	72.86	51.2%	46.5%	2.3%
1992	54	1325	3.20	842	13.9	0.36	2.50	73.76	66.7%	31.5%	1.9%
1993	49	1281	3.07	815	14.3	0.33	2.16	74.59	49.0%	51.0%	0.0%
1994	64	1277	3.15	807	13.8	0.37	2.44	73.15	65.6%	31.3%	3.1%
1995	49	1284	2.91	809	13.6	0.37	2.58	72.64	26.5%	63.3%	10.2%
1996	57	1266	3.16	813	13.7	0.41	2.63	72.10	77.2%	22.8%	0.0%
1997	50	1256	3.03	798	13.5	0.41	2.70	71.50	80.0%	20.0%	0.0%
1998	48	1299	3.09	822	14.3	0.36	2.33	73.50	77.1%	20.8%	2.1%
1999	51	1284	3.05	822	13.4	0.35	2.58	73.40	86.3%	7.8%	5.9%
2000	55	1295	3.13	820	14.2	0.40	2.49	72.50	67.3%	30.9%	1.8%
26 Year Averages		**1285**	**2.99**	**813**	**14.1**	**0.37**	**2.44**	**72.98**	**55.4%**	**39.8%**	**4.9%**

*Weight per day of age

Table 2. Quality and yield grade percentages in the Beef of Merit contest: 1975 through 2000.

Year	Number of Cattle	% over 900 lb Hot Carcass Weight	% Yield Grade 1's & 2's	%Yield Grade 4's	% Upper 2/3 Choice & Higher	% Choice-	% Select	% Off Grades
1975	21	0.0%	71.4%	4.8%	NA	0.0%	100.0%	0.0%
1976	31	9.7%	54.8%	19.4%	NA	32.3%	32.3%	35.5%
1977	35	2.9%	NA	NA	NA	51.4%	48.6%	0.0%
1978	20	5.0%	NA	NA	10.0%	40.0%	40.0%	10.0%
1979	18	0.0%	NA	NA	0.0%	33.3%	38.9%	27.8%
1980	15	13.3%	86.7%	0.0%	0.0%	46.7%	53.3%	0.0%
1981	35	11.4%	97.1%	0.0%	0.0%	57.1%	34.3%	8.6%
1982	27	18.5%	85.2%	0.0%	0.0%	44.4%	55.6%	0.0%
1983	38	7.9%	84.2%	0.0%	2.6%	36.8%	55.3%	5.3%
1984	39	25.6%	79.5%	5.1%	0.0%	59.0%	41.0%	0.0%
1985	45	8.9%	71.1%	6.7%	8.9%	66.7%	26.7%	0.0%
1986	26	15.4%	80.8%	0.0%	0.0%	38.5%	57.7%	3.8%
1987	22	31.8%	72.7%	0.0%	4.5%	63.6%	31.8%	0.0%
1988	27	29.6%	66.7%	7.4%	0.0%	74.1%	25.9%	0.0%
1989	65	26.2%	80.0%	4.6%	15.4%	53.8%	26.2%	4.6%
1990	49	14.3%	67.3%	2.0%	28.6%	26.5%	40.8%	4.1%
1991	43	7.0%	81.4%	2.3%	11.6%	39.5%	46.5%	2.3%
1992	54	16.7%	87.0%	0.0%	7.4%	59.3%	31.5%	1.9%
1993	49	6.1%	87.8%	0.0%	12.2%	36.7%	51.0%	0.0%
1994	64	6.3%	79.7%	1.6%	25.0%	40.6%	31.3%	3.1%
1995	49	4.1%	73.5%	6.1%	12.2%	14.3%	63.3%	10.2%
1996	57	8.8%	71.9%	7.0%	29.8%	47.4%	22.8%	0.0%
1997	50	2.0%	70.0%	2.0%	22.0%	58.0%	20.0%	0.0%
1998	48	12.5%	79.2%	0.0%	29.2%	47.9%	20.8%	2.1%
1999	51	5.9%	66.7%	2.0%	39.2%	47.1%	7.8%	5.9%
2000	55	1.8%	67.3%	5.5%	43.6%	23.6%	30.9%	1.8%
26 Year Averages		**11.2%**	**76.6%**	**3.3%**	**13.1%**	**43.8%**	**39.8%**	**4.9%**

Table 3. Quality grade distribution by year periods from 1989 to 2000 in the Beef of Merit contest.

Year	1989 - 1993	1994 - 1996	1997 - 2000	1989 - 2000
Number of Cattle	260	170	204	634
% Prime	0.4	2.9	5.4	2.7
% Upper Two-Thirds Choice	7.3	21.2	28.9	18.0
% Choice-	55.4	33.5	43.1	45.6
% Select	35	37.6	22.1	31.5
% Off Grades	1.9	4.7	0.5	2.2

Table 4. Yield grade distribution by year periods from 1989 to 2000 in the Beef of Merit contest.

Yield Grade	1989 - 1993	1994 - 1996	1997 - 2000	1989 - 2000
Number of Cattle	260	170	204	634
1	24.2	21.2	25.5	23.8
2A	28.1	28.2	22.5	26.3
2B	31.2	25.9	22.5	27
3A	10.8	14.1	20.1	14.7
3B	3.8	5.9	6.9	5.4
4	1.9	4.1	2.5	2.7
5	0.0	0.6	0.0	0.2

Table 5. Hot carcass weight distribution by year periods from 1989 to 2000 in the Beef of Merit contest.

Yield Grade	1989 - 1993	1994 - 1996	1997 - 2000	1989 - 2000
Number of Cattle	260	170	204	634
<600	0	0	0.0	0
600 - 699	1.2	6.5	2.9	3.2
700 - 799	26.6	36.5	33.8	31.5
800 - 899	55	50.6	56.4	54.3
900 - 949	13.5	5.3	6.9	9.1
>950	3.8	1.2	0.0	1.9
Average	839.0	809.5	815.6	823.6

Table 6. Average performance and carcass traits of champion and reserve steers by BOM division from 1997 to 2000.

Trait	High Quality Grid Window	High Cutability Grid Window
Number of cattle	16	16
Weight at harvest	1328	1263
ADG	4.09	3.22
Hot carcass weight	850	800
Dressing %	64.1%	63.4%
Rib eye area	14.0 sq.in.	13.4 sq.in.
Fat thickness	.32 inches	.37 inches
% KPH	1.75%	1.88%
Quality Grade	85% Ch- or better	100% Ch or better
Calculated Yield Grade	2.41	2.56
% Retail product	74.30%	72.81%