

"Positioning the Hereford Product as Lean and Palatable"

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INTRODUCTION

In August, 1990, American Hereford Association entered into an agreement with Colorado State University and Monfort-Con-Agra to conduct a research project with Hereford cattle. Meat scientists at CSU were asked to design a study that would provide information on the position of the Hereford breed in today's industry. Purpose of the study was:

1. determine the extent to which the USDA quality grading system accurately evaluates palatability of beef produced by straightbred and crossbred Hereford cattle.
2. identify specific live, carcass and/or palatability traits to which intensified selection pressure could be applied to improve desirability/marketability of Hereford cattle.
3. ascertain the feasibility of implementing a niche-marketing program for lean beef that meets acceptable palatability ratings.

DESIGN OF STUDY (PHASE I)

Phase I of the study was initiated August, 1990. Straightbred Hereford steers (402) from 13 producers representing seven midwest, southwest, and northwestern states were assembled at the Monfort/Con-Agra Kuner feedlot near Kelsey, Colorado. The steers were stratified by weight, within producer group, and assigned randomly to one of five time-on-feed groups - 70, 84, 98, 112, and 126 days on feed. Methods used to assign steers to these times on

feed groups resulted in equal producer representation and a uniform distribution of initial weights within each group.

At slaughter time, the steers were weighed and data computed for average daily gain, feed conversion and cost of gain. Steers are individually measured by ultrasound to estimate fat and ribeye. Each side of the carcass would undergo electrical stimulation and evaluation by a USDA grader for quality grade and yield grade factors.

At 48-hour postmortem, a shortloin section was obtained from each side of each of the 400 steers. In addition, the USDA grader selected 200 beef steer sides from the Monfort/Con-Agra cooler - half of those sides were from carcasses qualifying for the Choice grade and half for the Select grade.

Rib or shortloin sections from 800 Hereford sides and 200 sides of mine-run Choice or Select involved sensory evaluation by a trained taste panel. Panelists assign scores to each sample for juiciness, tenderness, flavor and overall palatability.

When sensory panel evaluation for all 1,000 steaks in Phase I was completed, statistical analysis was conducted to identify Hereford steaks that were equal to those from the mine-run Choice population. Carcass characteristics, period of time on feed and electrical stimulation status were used to describe a set of characteristics/conditions to serve as standards for a potential niche-market lean beef product.

FEEDLOT PERFORMANCE

The 400 Hereford steers started the finishing period on September 6. Following is

the results by time on feed groups.

Feedlot gains were impressive as the entire group of 400 steers averaged better than 4.0 lbs. per day. As expected, average daily gain decreased as time on feed increased but even the 112- and 126-day groups exhibited better than normal gains. Feed conversion was excellent with 5:1 dry matter ratios throughout the feed periods. Cost of gain is indicative of the overall efficiency as Groups 1, 2, and 3 produced the cheapest cost of gains in the feedlot during this time period.

The steers were managed under normal and on-going feedlot conditions and were treated in the same manner any group of cattle would be handled.

CARCASS DATA

Percentage Choice did not improve substantially as time on feed increased beyond 84 days. It is noteworthy that very few carcasses graded Standard once the cattle were fed beyond 84 days. Ribeye area remained constant through all five time-on-feed periods (12.5, 12.6, 12.7, 12.7, and 13.1). Preliminary yield grade (fat only) resulted in few YG 4 through 112 days. These results indicate there is little incentive, under practical feeding regimes, to feed Hereford steers beyond 100 days or to weights in excess of 1,250 - 1,300 pounds. Daily gains, feed conversion, quality grade, yield grade and carcass weight are most common at 84 to 100 days on feed for yearling Hereford steers.

A more indepth analysis of the carcass data reveals that finished weight is a major criteria in eliminating YG 4 cattle. At 105 days on feed, only two animals under 1,250 lbs. live weight resulted in YG 4 carcasses. Less than 3 percent of the cattle under 1,300 lbs. were YG 4.

Consistency of marbling (Quality Grade) was a very positive result of this group of Hereford steers. Across all feed periods approximately 99 percent of the carcasses were

Select or Choice. Some 68 percent of the cattle fell in the upper third of Select (SL 66-99) to Low Choice (Small 0-99) category. Some 87 percent of all cattle fell in the upper half of Select (SL 50-99) through Low and middle Choice (Small & Modest). Following 105 days on feed, an even more concentrated marbling score was evident and is discussed later.

PALATABILITY RESULTS

The National Beef Tenderness Survey conducted by Texas A & M University in 1990 showed that as much as 20 percent of the rib and loin producers offered was considered to be slightly tough to tough. Up to 40 percent or 50 percent of the chuck and round fell in the tough category. These results indicate a need for beef products that will meet acceptable eating standards.

Table 3 provides results of sensory panel ratings for Hereford beef steaks. Ratings below 4.50 would be considered unacceptable (tough, etc.).

This table indicates there was little or no statistical differences in components related to palatability across all marbling scores for steers across all time-on-feed periods. More specifically, marbling scores above SL⁵⁰ revealed no eating quality differences for Hereford steaks.

Analysis of Hereford steaks meeting "Very Desirable" or "Acceptable" ratings for overall palatability showed that 92 percent to 99 percent of the cattle met these standards regardless of degree of marbling. The highest percent of "unacceptable" carcasses was 8 percent found in the S1⁴⁹ and under category.

POSITIONING A HEREFORD PRODUCT

In an effort to position the Hereford product as a lean yet highly palatable beef product, dietary guidelines presented by American Heart Association were used as a standard for leanness. The AHA Dietary Guideline states that less than 30 percent of caloric intake from a single serving can be

derived from the fat content of that serving. This 30 percent figure equates to less than 4.2 percent fat for a given product.

A rib steak with zero outside fat trim must exhibit a minimum amount of intra muscular fat (marbling) to meet these dietary guidelines. The table below describes the percent fat and caloric intake from fat from five different marbling scores.

Combining the American Heart Association's Dietary requirements with minimum palatability scores, the standards for a "Lean and Palatable" beef product must have:

1. Less than 30 percent of calories from fat.
2. Palatability equivalent to that of mine run choice.

A major concern for the potential of any niche market product is supply - incidence of cattle within the phenotypically identified population that meets the parameters for the product. An analysis of Hereford steers after a minimum of 100 days on feed shows the following:

COMPARISON OF HEREFORD "LEAN & PALATABLE" WITH MINE RUN CHOICE BEEF (PALATABILITY RATINGS)

Steaks from Hereford steers meeting the constraints (Table 5) were compared with Mine Run Choice steaks. Mine Run Choice included beef from the entire classification of the Choice

grade (Low, middle and upper Choice) selected by a USDA grader using USDA consist percentage for the Choice grade.

Meat scientists at Colorado State University concluded there were little or no statistical difference in panel ratings for Hereford "Lean and Palatable" vs. Mine Run Choice. However, Hereford "Lean and Palatable" meets the dietary guidelines for caloric intake while mine run Choice exceeds the fat level parameters.

CONCLUSION

Based on results from yearling straight Hereford steers, there is potential for a niche-market Hereford product. Meeting leanness requirements by falling within the Dietary Guidelines for caloric intake from fat appears to be a breed positive in that some 82 percent of the carcasses met this standard. Meeting palatability requirements is documented by sensory panel ratings which equate Hereford with mine run Choice palatability.

It is not difficult for cattle of any breed or type to meet leanness requirements if slaughtered early enough. It is also possible to meet palatability requirements if fed long enough and if marbling exceeds slight⁵⁰. However, it requires testing and unbiased documentation to position a breed product as both "lean and palatable". This is the findings of Phase I of the CSU-Monfort Hereford study for Hereford beef.

Table 1. Live Weights and Feedlot Performance of the Five Groups of Hereford Cattle

	N	Time-on-feed (days)	Initial live wt. (lb)	Off-test live wt. (lb)	Average daily gain (lb)	Cost/lb of gain (\$)	Dry matter feed conv. (lb)
Group 1	80	70	895.8 ^a	1214.7 ^a	4.55 ^a	.4652	5.21
Group 2	80	84	891.5 ^a	1239.4 ^b	4.14 ^b	.4525	5.65
Group 3	79	98	896.7 ^a	1297.8 ^c	4.09 ^b	.4521	5.67
Group 4	79	112	895.0 ^a	1329.6 ^d	3.87 ^c	.4719	5.84
Group 5	80	126	889.2 ^a	1372.5 ^e	3.83 ^c	.4754	5.89

^{abcde} Means followed by the same superscript letter are not ($P > .05$) different.

Table 2. USDA Quality/Yield Grade by Time on Feed

Percent by Quality Grade						
Time-on-feed (days)	N	Avg. qual. grade	Choice	Select	Standard	Avg. yield grade
70	80	SE ^{70a}	28.8	68.7	2.5	2.92 ^a
84	80	SE ^{92b}	53.8	46.2	0	3.16 ^b
98	79	SE ^{98b}	57.0	41.8	1.2	3.31 ^b
112	79	SE ^{97b}	54.5	45.6	0	3.53 ^c
126	80	Ch ^{02b}	60.0	40.0	0	3.64 ^c

^{abc} Means followed by the same superscript letter are not ($P > .05$) different.

Table 3. Palatability Ratings for Hereford

Marbling score	Tenderness	Juiciness	Flavor	Overall palatability	Sheer force
SL ⁴⁹ and lower	5.64	5.61	5.78	5.44	6.28
SL ⁵⁰ to SL ⁹⁹	5.78	5.75	5.81	5.62	6.17
SM ⁰⁰ to SM ⁴⁹	5.69	5.70	5.85	5.57	6.11
SM ⁵⁰ to SM ⁹⁹	5.92	5.85	5.90	5.74	6.03
MT ⁰⁰ and higher	6.06	6.11	6.03	5.97	5.87

Table 4. Fat Content and Caloric Values for Hereford Steaks by Marbling Score

Marbling score	Fat %	Calories	% Calories
SL ⁴⁹ and lower	2.50	22.5	20.2
SL ⁵⁰ to SL ⁹⁹	3.12	28.1	23.9
SM ⁰⁰ to SM ⁴⁹	4.02	36.2	28.8
SM ⁵⁰ to SM ⁹⁹	4.75	42.8	32.4
MT ⁰⁰ and higher	6.11	55.0	38.1

Table 5. Constraints for Hereford "Lean and Palatable"

- . SL⁵⁰ to SM⁵⁰ Marbling
(3.00 to 4.25% intramuscular fat)
- . Minimum time on feed of 100 days
- . Minimum external fat of .30 inch
- . Electrically stimulated

Table 6. Incidence of Hereford Steers Fed A Minimum of 100 Days Meeting Established Standards for "Lean and Palatable"

Marbling Score	Percent
SL ⁰ - SL ⁴⁹ SL ⁵⁰ - SL ⁹⁹ SM ⁰ - SM ⁴⁹ > SM ⁵⁰	$\left[\begin{array}{c} 12 \\ 35 \\ 47 \\ 6 \end{array} \right] = 82\%$

Table 7. Comparison of Sensory Panel Ratings for Hereford with Ratings for Mine Run Choice Beef

Trait	Hereford	Mine run choice
Tenderness	5.81	5.96
Juiciness	5.75	5.65
Flavor	5.73	5.78
Overall Palatability	5.68	5.76

Table 8. Percentage Incidence of "Desirable" Sensory Panel Rating for Hereford "Lean and Palatable" vs. Mine Run Choice

Trait	Hereford	Mine run choice
Tenderness	95%	94%
Juiciness	95%	94%
Flavor	97%	99%
Overall Palatability	98%	99%