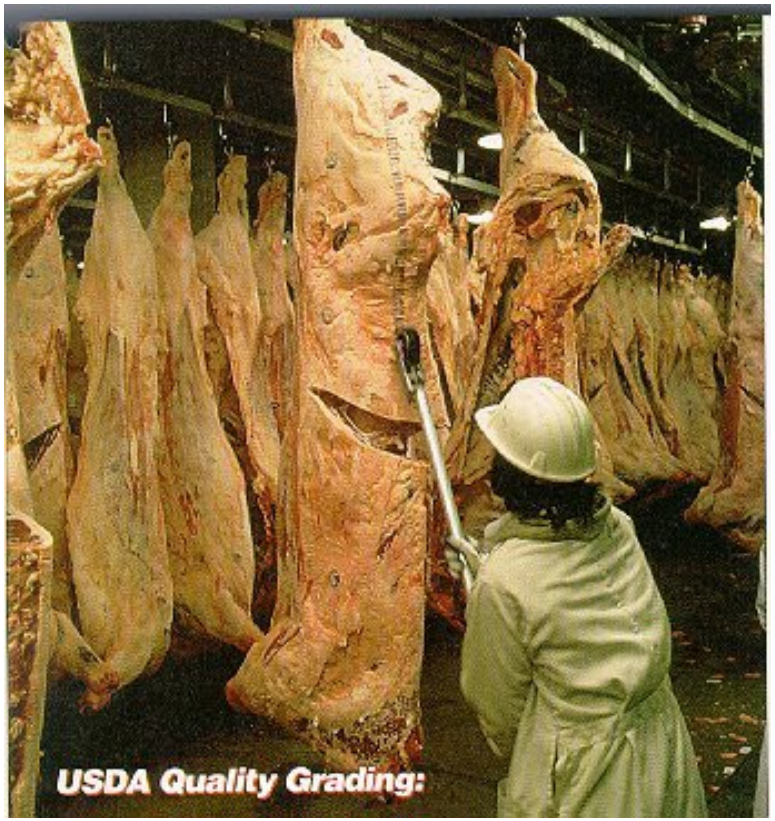
Carcass Endpoints

Rick Funston

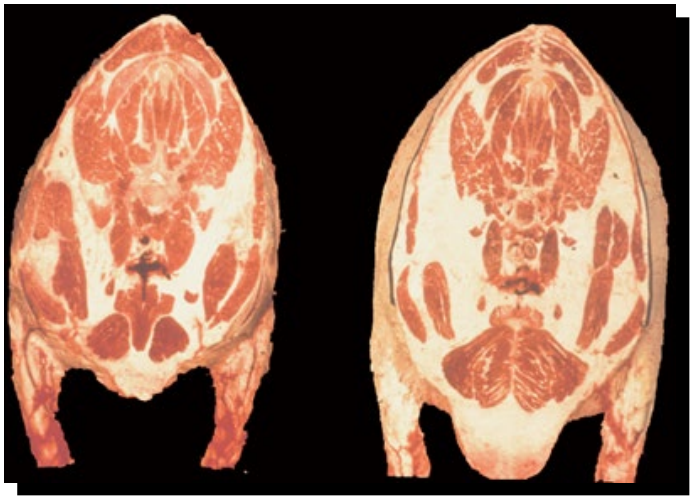


What do you expect in a GOOD steak?

- Juiciness
- Tenderness
- Flavor
- Appearance
- Price
- Healthy

Yield Grade

- Cutability- how much meat
- Range from 1 – 5
  - 1 = Lean 5 = Fat
- Developed in 1965
- National average = 3.5
- Consider amount of fat, bone, muscle thickness



Calculate Yield Grade

YG = 2.50 + (2.50*Adj. FT) + (.2*KPH) + (.0038 * HCWT) – (.32*REA)

Adj. FT- Adjusted Fat Thickness

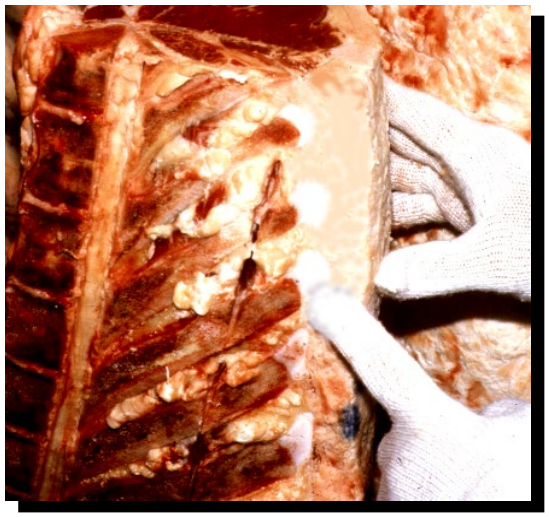
KPH- Kidney, Pelvic, Heart Fat

HCWT- Hot Carcass Weight

REA- Ribeye Area (in inches^2)

Quality Grade

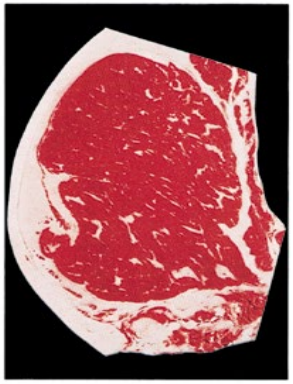
- Palatability = how good will it taste
- Marbling
- Maturity
- Color/firmness of muscle
- Established in 1916, adopted in 1926



Quality Grade

Marbling	Maturity A	B	C	D	E
Abundant	Prime		Commercial		
Mod. Abund.					
Sl. Abund.					
Moderate	Choice				
Modest					
Small	Select		Utility		
Slight					
Traces	Standard				
Pract. Dev.					

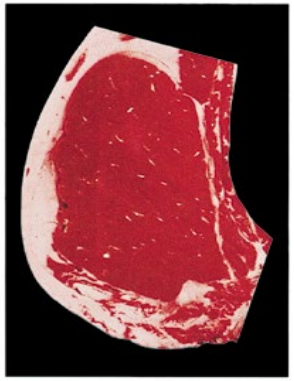
Moderately Abundant



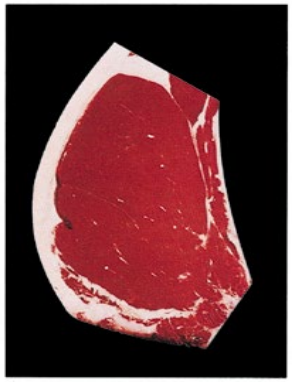
Slightly Abundant

Moderate

Modest



Small

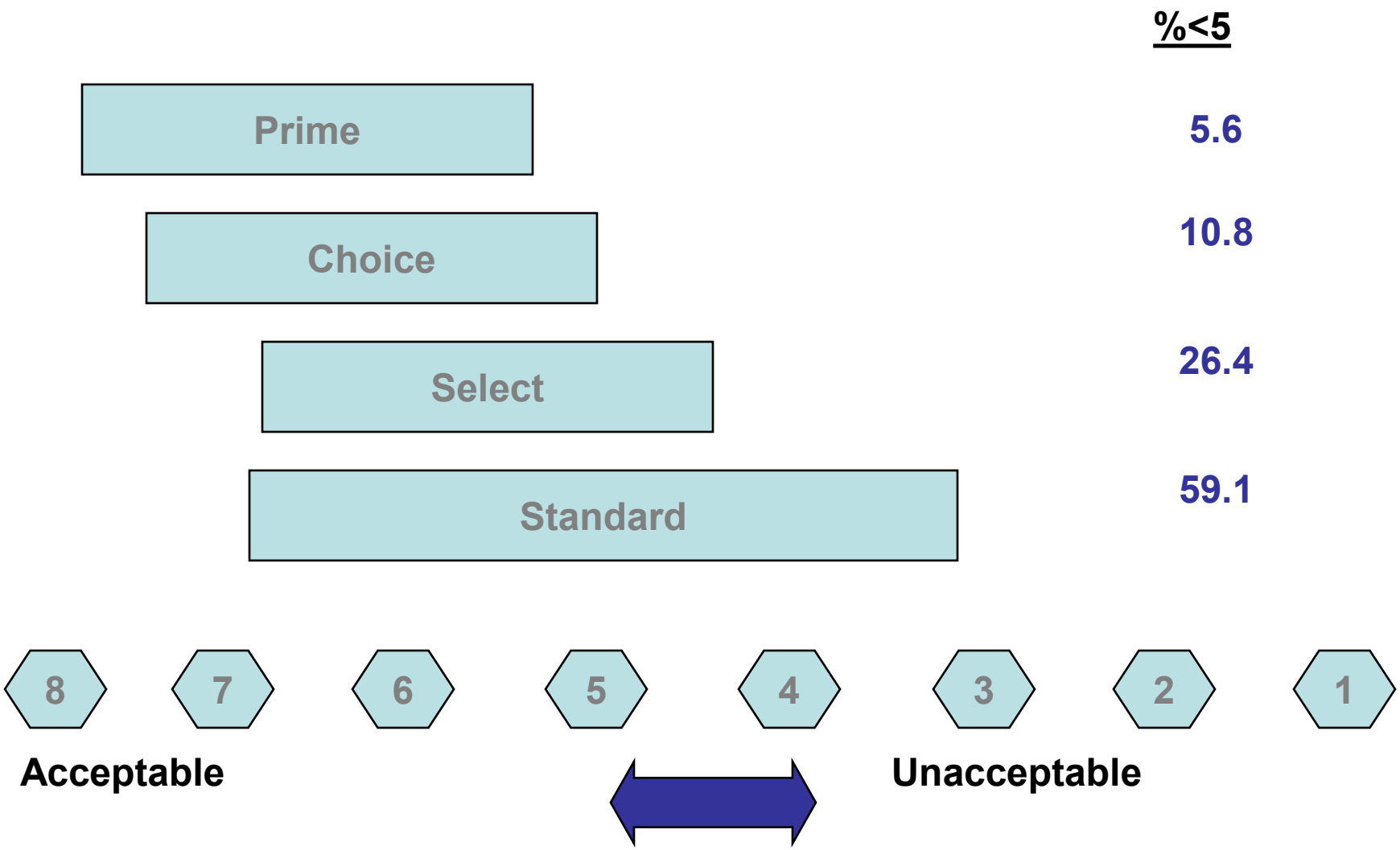


Slight

What Influences Marbling?

- Genetics
- Health
- Implants
- Feedlot management
- Feeds
- Early Wean
- Vitamin A
- Calves vs Yearlings
- Disposition
- Gender

Palatability and USDA Grade



Palatability and USDA Grade

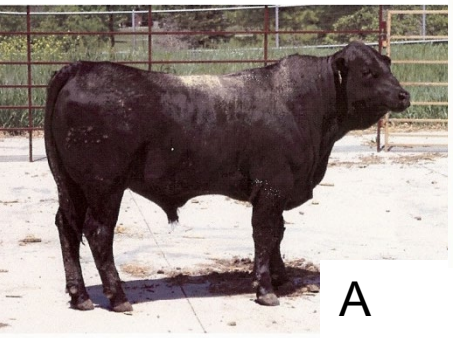
- 11% of Choice eats worse than it grades
- 76% of Select eats better than it grades
- 5% of the variation in eating quality is accounted for by the grading system
- 85% of cattle grade slight or small

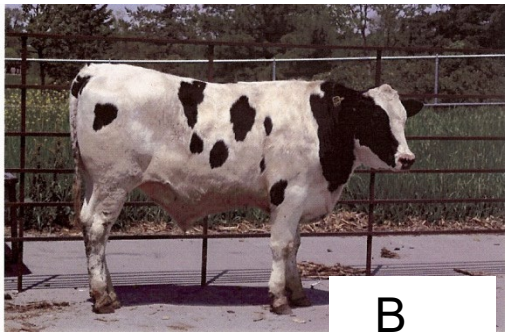
Factors Affecting Tenderness

- Breed
- Age
- Feedlot Gain
- Cooling Rate
- Aging
- Electrical Stimulation
- Marbling
- Location of Cuts
- Cooking

Instrument Grading

Match the Animal to the Steak


A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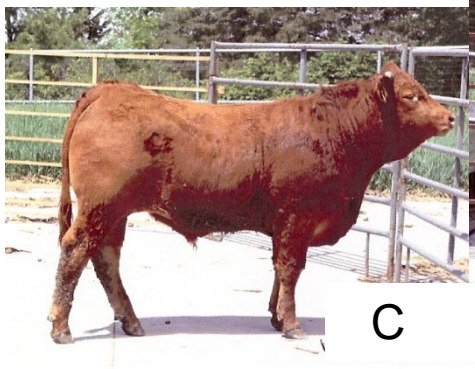
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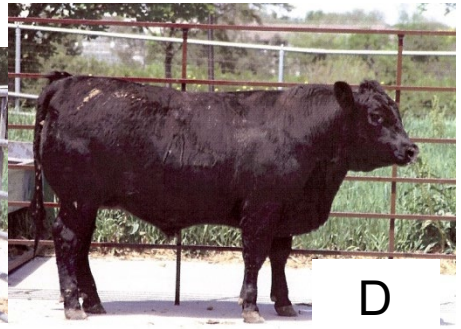
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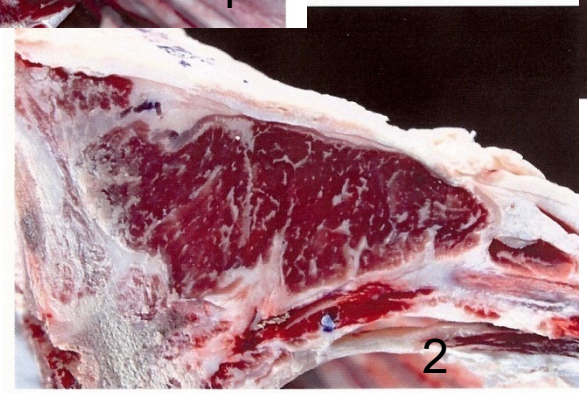
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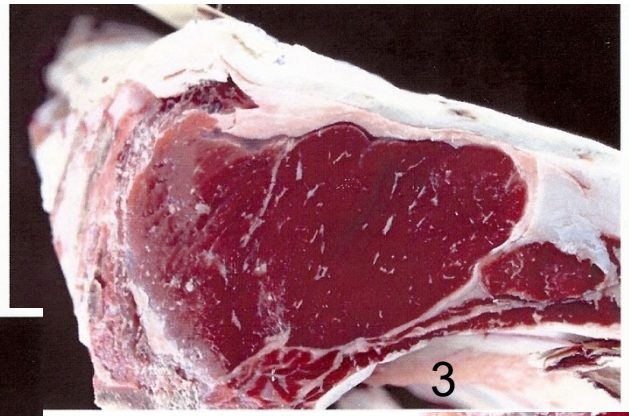
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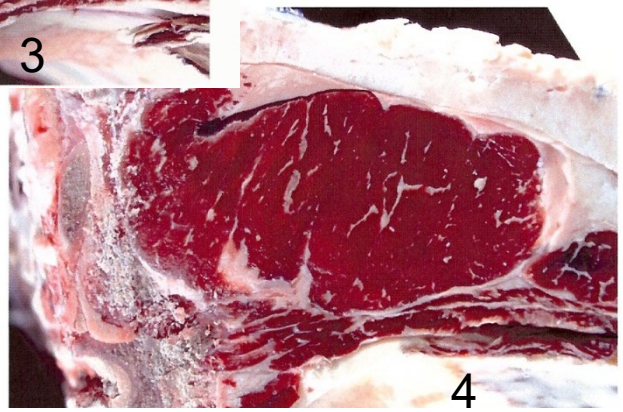
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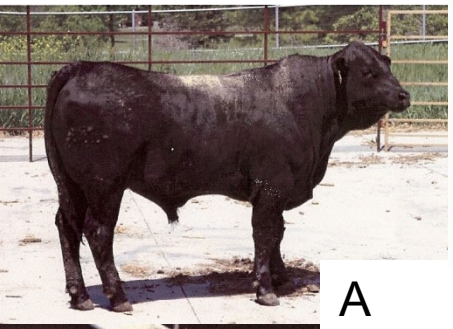
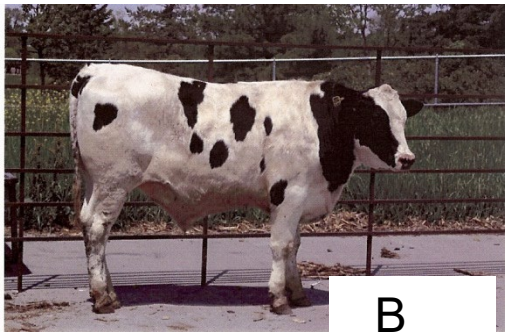
Match the Animal to the Steak



A



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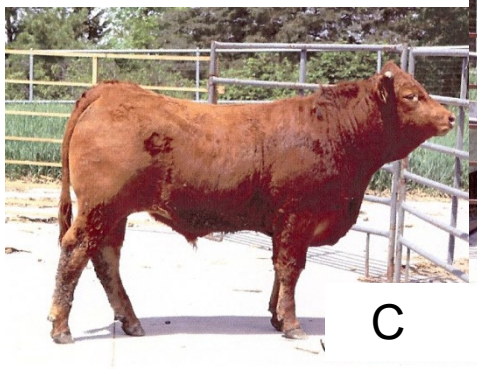
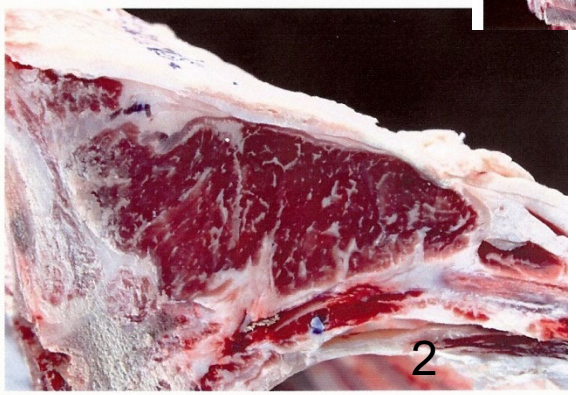


C

D

3

1



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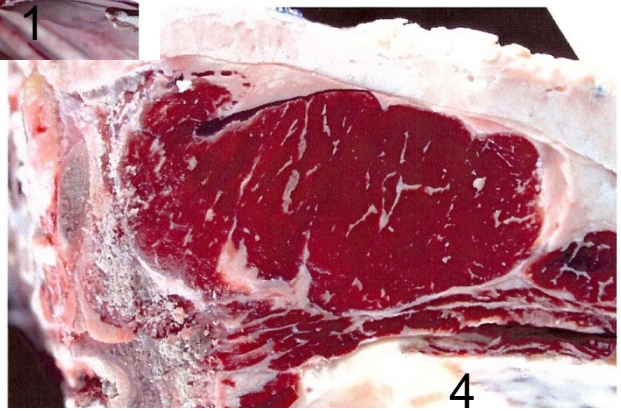


4

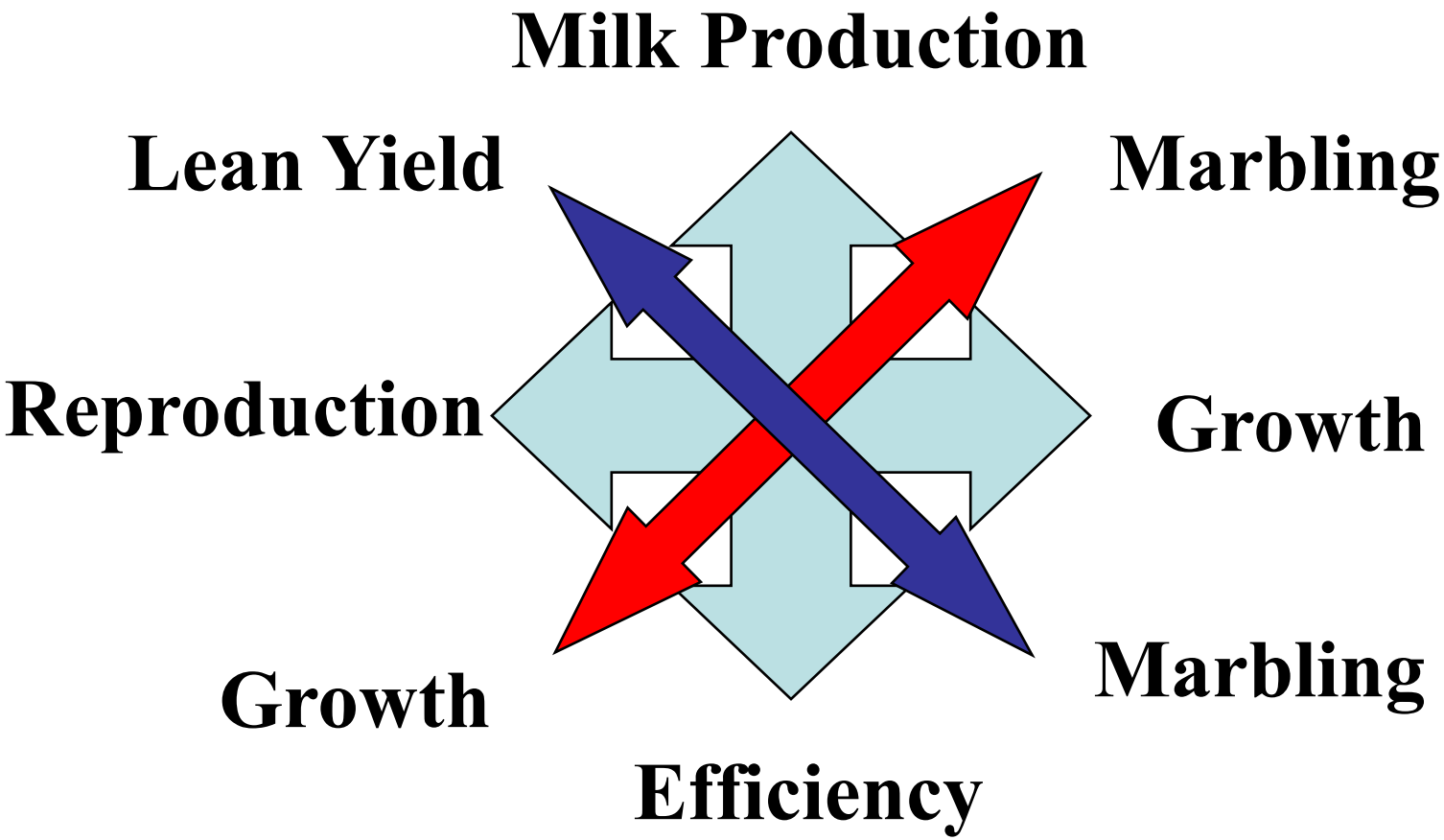
Typical Value Based Grid

	Prime	CAB	Choice	Select	Standard	Other
YG 1	$$$$$	$$$$	$$$	$$	-$$$$$	-$$$$$$
YG 2	$$$$	$$$	$$	$	-$$$$$	-$$$$$$
YG 3	$	$	-$	-$$	-$$$$$	-$$$$$$
YG 4	-$$$$$	-$$$$$	-$$$$$	-$$$$$	-$$$$$	-$$$$$$
YG 5	-$$$$$	-$$$$$$	-$$$$$$	-$$$$$$	-$$$$$$	-$$$$$$

Conformance (fitting the box)

Heavies (>950)	-$25/cwt
Lights (<550)	-$25/cwt
Dark Cutters	-$35/cwt

Which Direction to Go?



Decathlete Bulls ?

2,719 Angus Sires, Fall 2004 Report

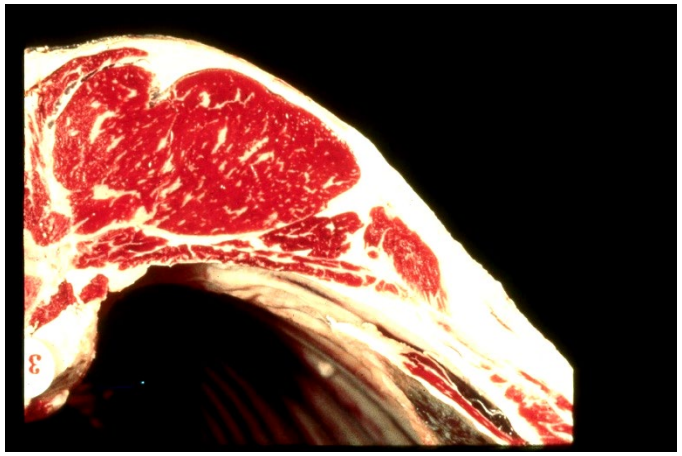
	Average	top 25%
birth wt.	2.6	1.5
wean wt.	36	42
yrlg. wt.	67	77
milk	18	22
Scr. Cir.	.26	.58
%IMF	.03	.12
REA	.09	.23

Decathlete Bulls ?

2,719 Angus Sires, Fall 2004 Report

	Average= 69	**top 25% = 1**
birth wt.	**2.6**	**1.5**
wean wt.	**36**	**42**
yrlg. wt.	**67**	**77**
milk	**18**	**22**
Scr. Cir.	**.26**	**.58**
%IMF	**.03**	**.12**
REA	**.09**	**.23**

Common MYTH



All we need to do is find the _____ gene and all of our problems will be solved…..

Genetic testing has me excited all over again

Tests show what's behind EPDs.

I haven't felt this much excitement for 15 years. Fifteen years ago, seedstock breeders began waking anew to the value potential of their product—in particular, to the carcass traits valued by consumers. Because of this awakening, we now have EPDs for marbling, EPDs for leanness, EPDs for ribeye size, EPDs for fat, EPDs for carcass size, and EPDs for retail yield. Today, these 15-year-old visions are paying big dividends through value-based marketing. But we may have just "scratched the surface."

Fred Knop

I'm excited again because we seem to be at the base of a whole new wave of technology—genetic tests that show why EPDs are what they are. This is technology that may lift our breeding programs and our product to even greater heights.

I'm excited, for example, because of the excitement of John and Mary Ellen Wozney of Coolville, Ohio, who are figuratively seeing double these days. John and Mary Ellen are Murray Grey breeders and they're excited about a bull named Katuna Courageous. Corey, as the bull is popularly known, was imported from Australia in 2001. Corey turned out to be a special bovine. In technical terms, Corey was found earlier this year to be double homozygous for the carcass traits of marbling and tenderness. This means that Corey carries two copies of the favorable form of the marbling gene plus two copies of the favorable form of the tenderness gene. It is estimated that fewer than 5 percent of all cattle on earth are double-double for these traits.

This double-double characteristic means that each of Corey's sons or daughters is guaranteed to inherit one copy of the marbling gene and one copy of the tenderness gene. If mated to a double-double female, Corey's offspring, too, will be double-double for these traits.

I'm excited because of the excitement of Jim Gibb, an old hand in this country's performance breeding program. Dr. Gibb, who once headed the performance program of the American Polled Hereford Association, is now managing partner of Frontier Beef Systems of Lafayette, Colo. Frontier recently announced the marketing of *Tender*GENE, a new tenderness test developed by scientists at the U.S. Meat Animal Research Center (MARC) in Nebraska.

*Tender*GENE is a Calpain tenderness test. Calpain is a naturally occurring enzyme that plays a major role in beef tenderness by weakening muscle fibers. This weakening increases tenderization during the post-mortem aging process. The *Tender*GENE test can be conducted on hair, blood or semen to find breeding bulls, cows and replacement heifers that possess favorable tenderness genes. Two Calpain SNPs (Single Nucleotide Polymorphisms) have been identified. Animals carrying genes for both SNPs have been found to be 20 percent more tender in populations of Simmental and Angus-cross fed cattle.

I am excited, too, about the discovery of a DNA test for marbling that is awaiting a marketing arrangement.

The big question now is whether it will take us 15 years again to weave new technology into our breeding programs. How long will it be before we see offerings of double-double bulls, or even single-single bulls? How long will it be before pedigrees of breeding stock will carry both EPDs and carcass genes?

There is already considerable activity afoot. I understand that DNA testing is being conducted by major seedstock producers in this country and abroad. Scientists at MARC are busily recharacterizing the numerous breeds in their decades-old germplasm evaluation program, including their genetic makeup. A three-day workshop on DNA technology will be held at the Embassy Suites hotel in Kansas City beginning Dec. 4 (check the Beef Improvement Association's Web site for details).

I felt both excitement and confidence back in 1988 when, as editor of this publication, I saw the convergence of elements and attitudes that led us into the EPD era and the era of value-based marketing. I see this convergence occurring again and I feel the same excitement and confidence that this new wave will carry our breeding programs and our product to even more exciting levels.

READY FOR THE RAIL TEST

Genetic testing of parent stock will greatly increase the chances of progeny to grade at high rates for important carcass traits.

To contact Fred Knop, write Drovers *or send e-mail to fredlyn@aol.com.*

NEW DESIGN 9150

29AN1593

B/R **NEW DESIGN** 323-**9150** AAA 13286230 CAA 1218074 TATTOO #9150

B/R NEW DESIGN 323 — B/R NEW DESIGN 036 / B/R RUBY OF TIFFANY 155

B/R RUBY OF TIFFANY 4117 — RITO 9M9 OF 2036 SCOTCH CAP / B/R RUBY OF TIFFANY

The Breed's #1 All Time Marbling Sire

- ✔ The 2000 Angus Sire Alliance winner due to his outstanding combination of calving ease and overall carcass merit
- ✔ $46.89 Sire Alliance profitability value and top 10% feed efficiency rank
- ✔ Ranks in the top 2% of the breed for BW EPD
- ✔ #1 for Beef Value among bulls with a -1.0 BW EPD or less

AMERICAN ANGUS SIRE SUMMARY FALL 2004 — ○ TOP 25%

TRAIT	BW	WW	MILK	DTS	YW	SC	IMF	uRE	uFAT	u%RP	GRP/PRG
EPD	-1.3	+33	+26	0	+58	+.57	+.19	+.36	-.017	+.74	11
ACC	.73	.73	.28		.61	.28	.54	.54	.55	.55	20

TRAIT	CW	MARB	REA	FAT	%RP	GRP/PRG
EPD	+7	+.99	+.44	-.001	+.43	6
ACC	.83	.85	.82	.81	.81	23

BORN 02/13/99

INDEXES	$F	+5.26	$G	+38.12	$B	+46.27

Angus Sire Alliance	
Profitability Value	$46.89
Feed Efficiency Rank	Top 10%

Calving Ease: ★★★★

Carcass Merit: 🥩🥩🥩🥩

Owned By: Circle A Ranch, MO
Angus Sire Alliance, MO; Rishel Angus, NE

EXT

29AN1413

N BAR EMULATION EXT AAA 10776479 CAA 849773 TATTOO #U23
Owned By: Sinclair Cattle Co., Warfordsburg, PA
Green Garden Angus, Ellsworth, KS

EMULATION N BAR 5522 — EMULATION 31 / ANKONY 8F78 LASS 8F275

N BAR PRIMROSE 2424 — EMULATION 31 / PRIMROSE N BAR 9962

The Original Curve Bender

- ■ Still one of the breed's best for transmitting moderate birth weight, high growth and reduced mature size
- ■ Outstanding functional phenotype and longevity
- ■ His daughters are the most complete and productive mature cows in most herds today
- ■ Many breeders are taking this last opportunity to make one more crop of foundation EXT daughters

TRAIT	BW	WW	MILK	DTS	YW	CW	MARB	REA	FAT	%RP	PROG./HERDS	SC
EPD	+2.0	+43	+21	10561	+81	+21	+.01	+.21	+.028	-.33	1091	-.49
ACC	.99	.99	.99		.99	.99	.99	.99	.98	.98	250	.99

○ TOP 25% — AMERICAN ANGUS SIRE SUMMARY FALL 2002

TRAIT	%IMF	RE	FAT	%RP	PROG/HDS
EPD	+.08	+.33	+.041	-.08	4494
ACC	.94	.94	.94	.94	1767

ANGUS ULTRASOUND BODY COMPOSITION FALL 2002

2002 GTS Data	STA	#HEAD
Stature	-0.6	1221
Capacity	+0.8	1221
Body Length	+0.7	1221
Muscling	+0.9	1221
Rear Legs	-0.2	1221
Feet & Pasterns	+0.8	1221
Femininity	+1.1	760
Udder Attachment	+3.1	243
Udder Depth	+2.2	243
Teat Size	+3.9	243

Comment: Added capacity, body length, muscling; Feminine daughters; Outstanding teat & udder quality.

Calving Ease: ★★★

Carcass Merit: 🥩🥩🥩

ROCK SOLID ACCURACY — BIRTH WEIGHT PERFORMANCE MATERNAL CARCASS

	GeneSTAR®			Frontier Beef Systems		
	Marbling	Tenderness One	Tenderness Two	TenderGENE SNP 316	TenderGENE SNP 530	TenderGENE Score
ANGUS						
29AN1413 EXT	★★	0	★★	CC	GG	5
29AN1458 PFRED	★	★★		GC	GG	3
29AN1478 SAUGAHATCHEE				GC	GG	3
29AN1501 602C				GC	GG	3
29AN1510 ADVANTAGE				GC	GG	3
29AN1520 N BAR PRIME TIME				CC	GG	5
29AN1523 NEW DESIGN 878	0	★★		GC	GA	3
29AN1524 TRAVELER 234D				GC	GG	3
29AN1530 POWER DESIGN	0	★★	0	GG	GG	3
29AN1531 ROCKN D AMBUSH	0	★★	★★	CC	GG	5
29AN1532 EXT 4137				GC	GA	3
29AN1543 STRATEGY	★	★		GG	GA	2
29AN1549 BUSHWACKER 944				GG	GG	3
29AN1551 DESTINATION 928	0	★★	★★	CC	GG	5
29AN1552 SEVEN PLUS				GC	GG	3
29AN1556 LEAD ON	0	★★	★	GC	GG	3
29AN1564 TRAVELER 8T4				GC	GG	3
29AN1567 MODERN DESIGN				GC	GA	3
29AN1569 BANDWIDTH				GC	GA	3
29AN1570 FORECAST				GC	GG	3
29AN1574 OBJECTIVE				GG	GA	2
29AN1577 EXTRA H6	★	★		GC	GG	3
29AN1578 CLASSIC ROCK	0	★★		GC	GG	3
29AN1582 FACTOR				GC	GA	3
29AN1583 SOUTHERN ROCK				CC	GG	5
29AN1585 SOMETHING SPECIAL				GC	GA	3
29AN1587 EXACTLY	★	★		GG	GG	3
29AN1589 FORESIGHT				GC	GG	3
29AN1591 KING KAHN	0	★	★			
29AN1593 NEW DESIGN 9150	0	★★	★	GC	GG	3
29AN1594 LEVERAGE	0	★	★	GC	GG	3
29AN1596 IDEAL 7451				GC	GG	3
29AN1597 RITO PRIME				GC	GA	3
29AN1598 ACCURATE	0			GC	GA	3
29AN1586 HIGHMARK				CC		
29AN1603 EDITION	★					
29AN1606 EXCEED				GC	GG	3
29AN1609 NEW STANDARD				GC	GG	3
29AN1610 MAJOR DESIGN				GC	GG	3
29AN1616 NEW LEVEL				GG	GG	3
29AN1617 SANDY				GG	GA	2
54AN2157 HIGH PRIME				CC	GA	4
54AN3361 BOOM TIME	★	★	★	GC	GG	3
90AN4738 FOCUS	★	★★		GG	GA	2
90AN5797 CONNECTION				GG	GA	2

INDUSTRY COMMENTARY

Not a silver bullet

Expectations for the future of DNA testing

R. Mark Thallman

Beef cattle breeders have heard for years that DNA testing is coming and that it will change the way they breed cattle. At long last, the time is here when DNA testing for economic traits is available, albeit in a very immature form. Breeders must decide whether to use the technology, and if so, how to use it. DNA testing has a number of potential applications in cattle breeding, including parentage testing, tests for genetic diseases or defects, and tests for qualitatively inherited traits such as color or horns. However, most economically important production and end-product traits are influenced by several or many genes and are known as "quantitative traits."

Several DNA tests for quantitative traits have become commercially available recently and the number of such tests is expected to increase rapidly over the next few years. Considerable information about a DNA test is required in order to decide whether to use it. The National Beef Cattle Evaluation Consortium is developing a process for the independent validation of DNA tests to help cattle breeders decide which DNA tests will be most effective for them. Several tests have already been through the process.

DNA testing can make evaluations available anytime after birth, which is important for traits that can only be measured late in life or postmortem. Although some continued collection of phenotypes will always be required, DNA testing should allow greater information to be extracted from each phenotype that is measured. This is especially important for traits that are expensive to measure or sex-limited.

The availability of DNA testing will bring, along with all of the advantages, misuse of information, especially in the early years when only a few DNA tests are available. We have heard much discussion of the evils of "single-trait selection." Breeders must now face the temptation of "single-gene selection," which may have far greater consequences.

For example, a bull with one of the top (high accuracy) EPDs in his breed for a trait had the least desirable, but most common, genotype (test result) for a DNA test for one of the genes affecting the trait. Semen sales on this bull dropped off sharply following the release of the test result. Apparently, breeders decided that they could not use bulls with the less favorable allele (form) of this gene, a prime example of "single-gene selection."

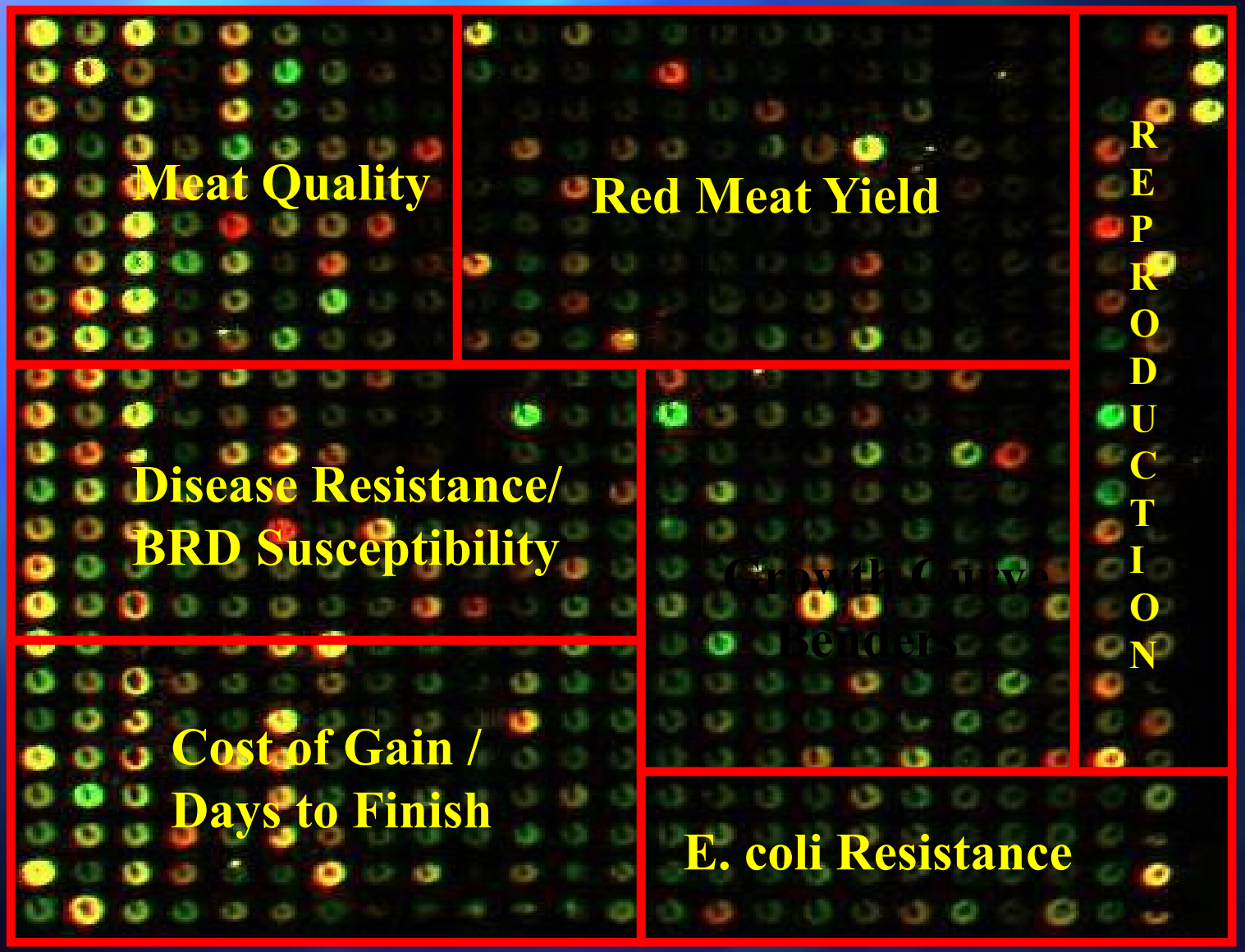
This is understandable, but it is not good use of DNA test information because the DNA test provides information about only one of the genes influencing the trait, whereas the EPD provides an estimate of his total genetic merit at all genes that influence the trait. DNA test results should not greatly influence our estimate of the overall genetic merit of individuals with high-accuracy EPDs. However, DNA testing can contribute substantial information about individuals that would otherwise have low-accuracy genetic evaluations, and this is where it is most useful. Education on the effective use of DNA testing is becoming a priority.

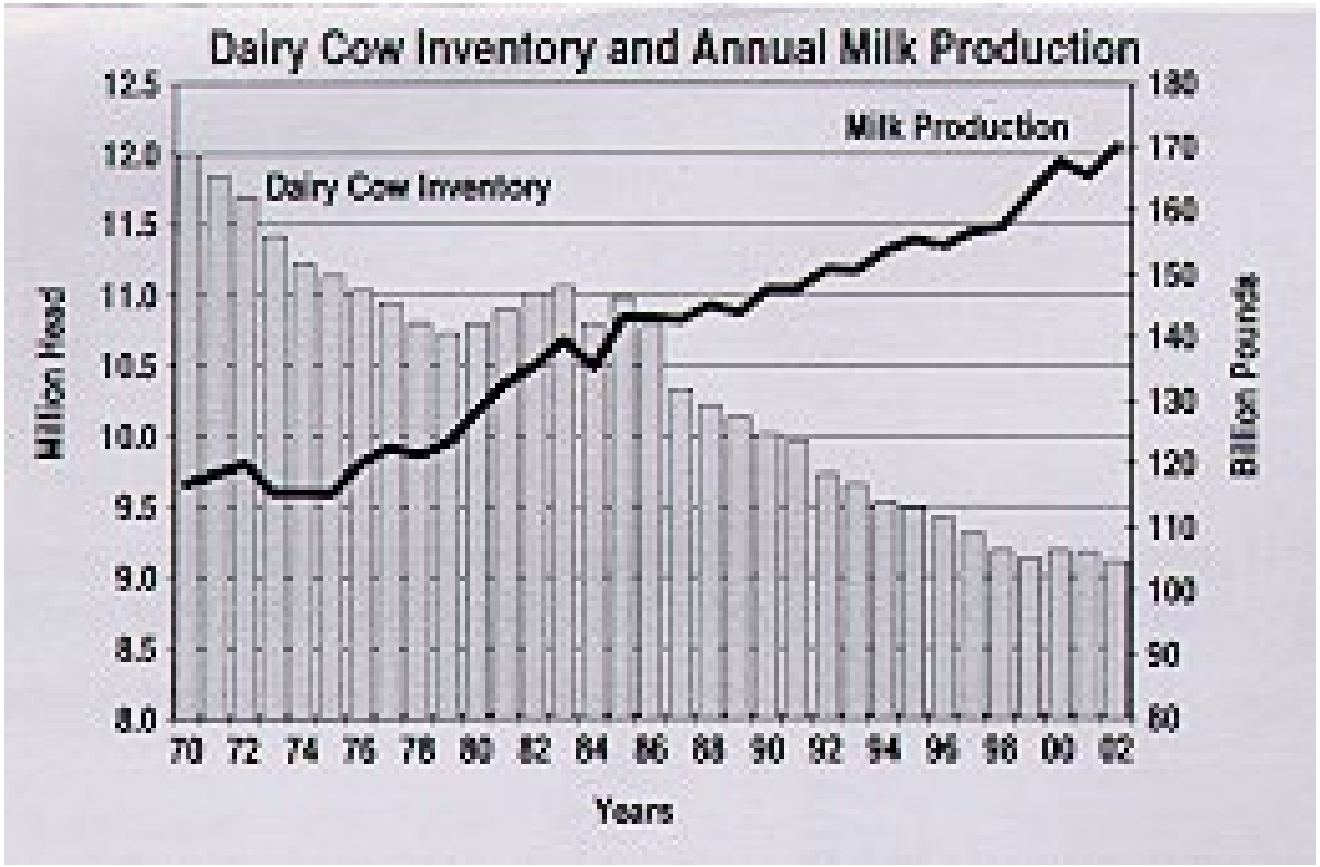
In the short run, DNA testing should not be expected to simplify cattle breeding. Selection decisions will be based on more pieces and types of information and breeders will have to decide which tests to run and which animals to test. It is a real challenge to integrate DNA test results with EPDs to make the most effective selection decisions.

In the longer run, the goal is to integrate DNA test results into the existing national cattle-evaluation process so that selection can be based on the resulting DNA-adjusted EPDs, which will weight the information from each DNA test result, the phenotypes and the pedigree appropriately, to provide the best estimate of genetic merit from the information available. The National Beef Cattle Evaluation Consortium and the Beef Improvement Federation are developing the basic framework for this process. Successful implementation will require the joint cooperation of DNA testing companies, breeders and breed associations. There are challenges in using DNA testing effectively in beef cattle. Nonetheless, cattle breeders are making strides in implementing DNA testing and are making changes in traits, such as tenderness, that have been difficult to select for in the past. Undoubtedly, the way in which DNA testing is used by the beef industry will change over time, but the early adopters of the technology are likely to be in a better position to capitalize on that change.

R. Mark Thallman is a research geneticist, U.S. Meat Animal Research Center ARS-USDA

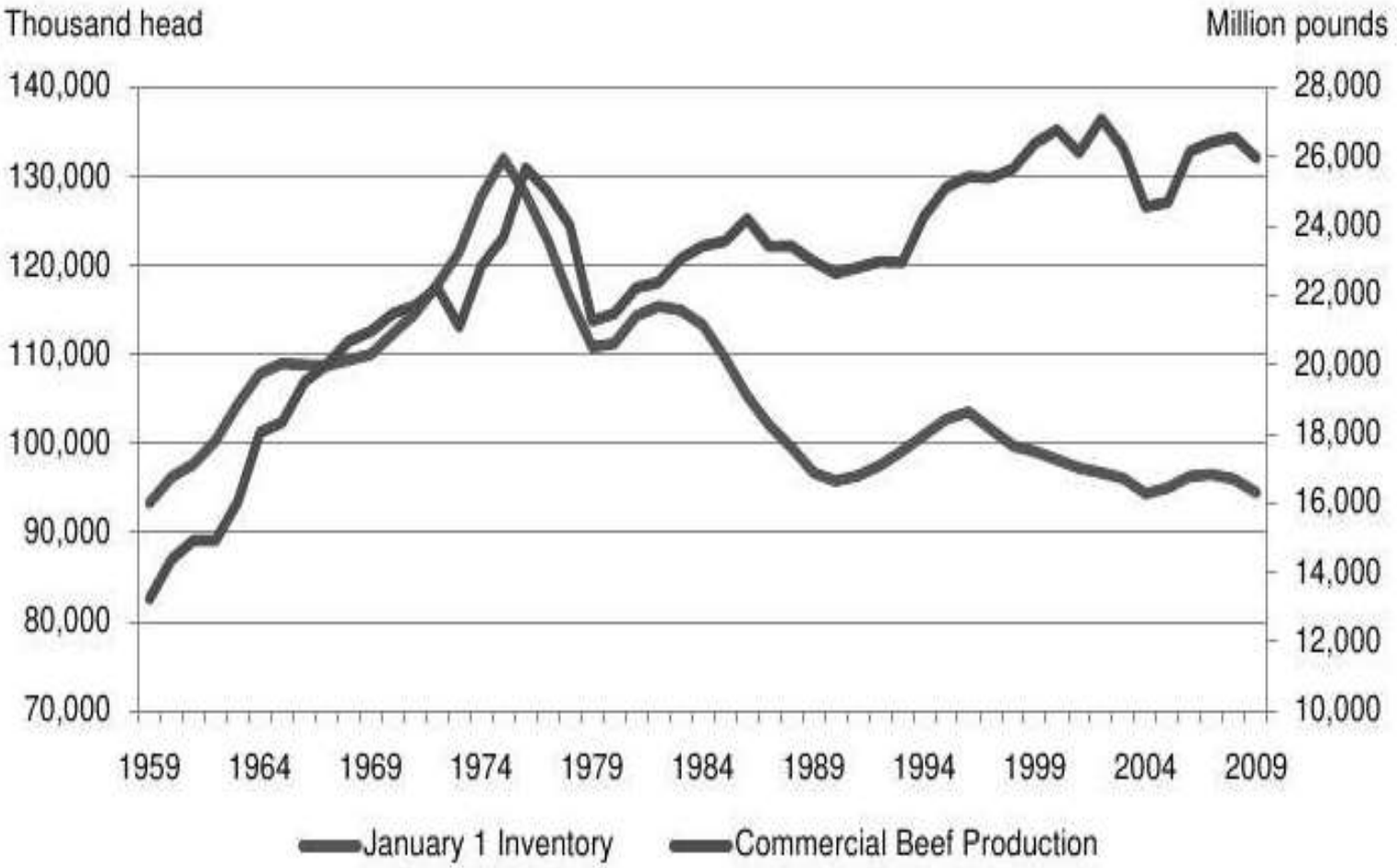
Breeding on a Chip





The effective population size of the US Holstein breed is 36 head.

Graph 13. January 1 Cattle Inventory and Commercial Beef Production - United States



U.S. Beef Cow Operations

Beef Cow Operations, 2009					Beef Cow Inventory 2010
1-49 Head	50-99 Head	100-499 Head	500+ Head	Total	
598,000	82,000	67,200	5,800	753,000	31,375,900
79.1%	11.2%	8.9%	0.8%	100%	% of Ops.
28.7%	17.2%	38.0 %	16.1%	100%	% of Cows

- Average 42 Cows Per Operation
- Large Number Of Small Operations

Source: USDA-NASS

TRUTH

Breed complementarity coupled with heterosis is an extraordinary natural tool for meeting targets.

It is possible that selection could resolve these problems if we had sufficient time. Unfortunately, we do not! Between breed variation must be utilized. "Genetic potential for retail product percentage, marbling and carcass weight are more nearly optimized in cattle with 50:50 ratios of Continental-to-British inheritance."

- Cundiff, Gregory, Koch -- 1994

Final Carcass Data

Cattle harvested 1/12/2024

- 96% Choice
- 875 # HCWT
- 14.5” REA
- .57” BF
- Average YG 3

Crossing Breeds ?


281
SEP 15 2004

Many Traditional Crossbreeding Systems Fail “Management Ease” Test

- **Too many breeding pastures**
- **Difficult to source replacements**
- **Swings in breed composition**

Breeding Program Description?

LOT # 6941A

Blue Creek Land & Cattle
Jerome Craig, Jr.

80 Steer Calves

BASE WT: 600#

CURRENT LOCATION: Range, 40 miles SW of Grand Junction, CO

BREED TYPE: Out of pred. Charolais Hereford cross, few BWF & a few Limousin cross cows by mostly Charolais & a few Gelbvieh & Limousin bulls. Selling the big end sorted from 200 strs.

ORIGIN: Home Raised **IMPLANTED:** No, with certificate

FRAME: Med Lg to Lg **FLESH:** Med

EST. WT. VAR: Uneven **HORNS:** Dehorned, Few Nubs

FEED: On cows, native grass & high Colorado mountain range from 7,000-10,000' elev. **SLIDE:** 8 cents - over 10 lbs. over base weight

Swings in breed composition have led to perception of inconsistency in crossbred herds.

Composite blends of breeds can solve the problem.

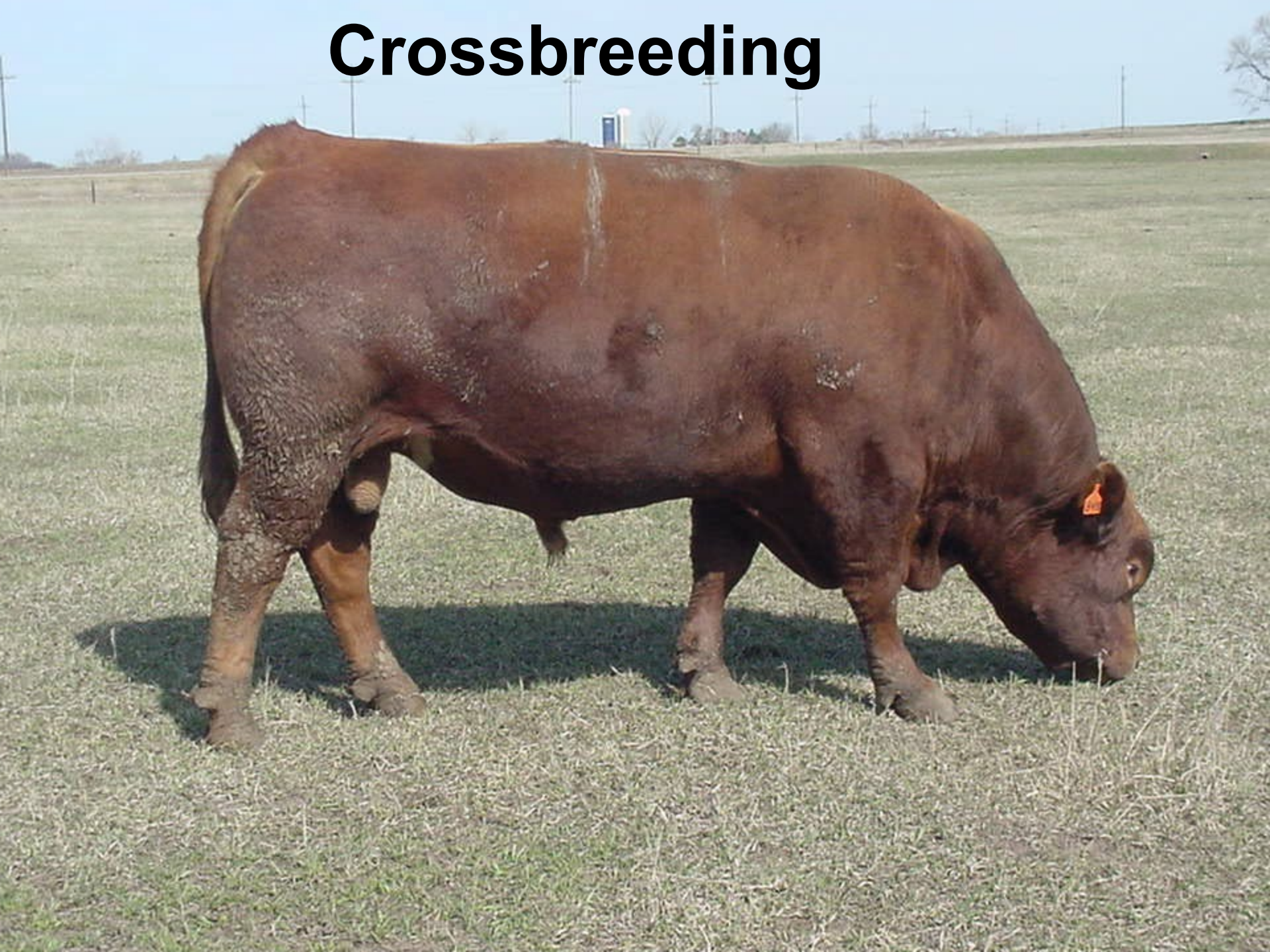
*Variation: Purebreds/ Crossbreds

Trait	Purebred	Composite
Wean Wt.	.10	.11
ADG	.11	.11
Scrotal Cir.	.07	.07
Backfat	.48	.44
Marbling	.27	.29

*** coefficient of variation**

Gregory, USMARC

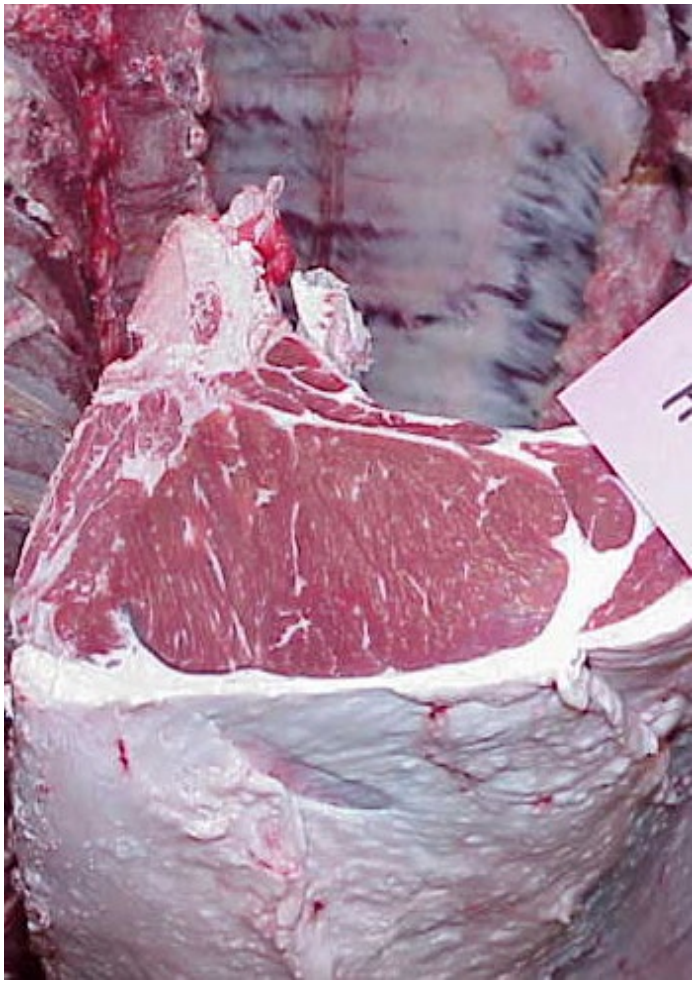
Crossbreeding



British X Continental

Goal

- **70 % Choice & Prime**
- **70% YG 1s & 2s**
- **0 out cattle**



Calves sired by Univ. of Neb. Composite bulls

Date	#	Wt.	Fat	REA	YG	%Y1:2	%Ch
6/05	37	836	.54	13.2	3.19	49	97
5/05	45	823	.57	13.8	3.02	49	84
5/05	89	795	.51	13.5	2.83	62	85
3/05	22	802	.41	14.6	2.34	82	91
3/05	24	729	.49	13.0	2.74	75	96
12/04	53	809	.40	14.5	2.35	89	81
AV.	270	802	.49	13.8	2.77	66	87

Calves sired by Univ. of Neb. Composite bulls

Date	#	Wt.	Fat	REA	YG	%Y1:2	%Ch
6/06	135	813	.50	14.2	2.7	73	70
1/06	45	764	.47	13.0	2.5	62	87
12/05	40	819	.34	14.7	2.3	93	65
12/05	39	822	.34	14.2	2.7	95	49
AV.	259	807	.45	14.2	2.5	77	69
7/07	104	800	.45	14.4	2.1	90	71
11/07	63	820	.53	14.8	2.2	84	65
6/08	103	845	.53	13.5	3.1	27	91
6/09	47	842	.54	13.3	2.9	15	92

A 20% Change In:

- Feed Efficiency 62
- ADG 10
- Quality Grade 7

*Dallas Horton

A Profitable Feeder Calf:

- Comes from a cow that breeds back early in the breeding season
- Has an acceptable weaning weight
- Remains healthy
- Gains well in the feedlot
- Produces an acceptable carcass

Time of Calving Affects Feedlot Performance

	Period of calving, 21 day periods		
Steer calves (n = 661)	**1st**	**2nd**	**3rd**
Weaning weight, lb	**515**	**483**	**435**
Feedlot ADG, lb/day	**3.61**	**3.62**	**3.63**
Carcass weight, lb	**816**	**800**	**771**
Marbling score	**574**	**554**	**527**
Yield grade	**3.0**	**2.8**	**2.6**
Choice, %	**84**	**83**	**73**
≥ Average choice, %	**30**	**17**	**12**
Carcass value	**$1102**	**$1079**	**$1025**