

Agricultural Marketing Service

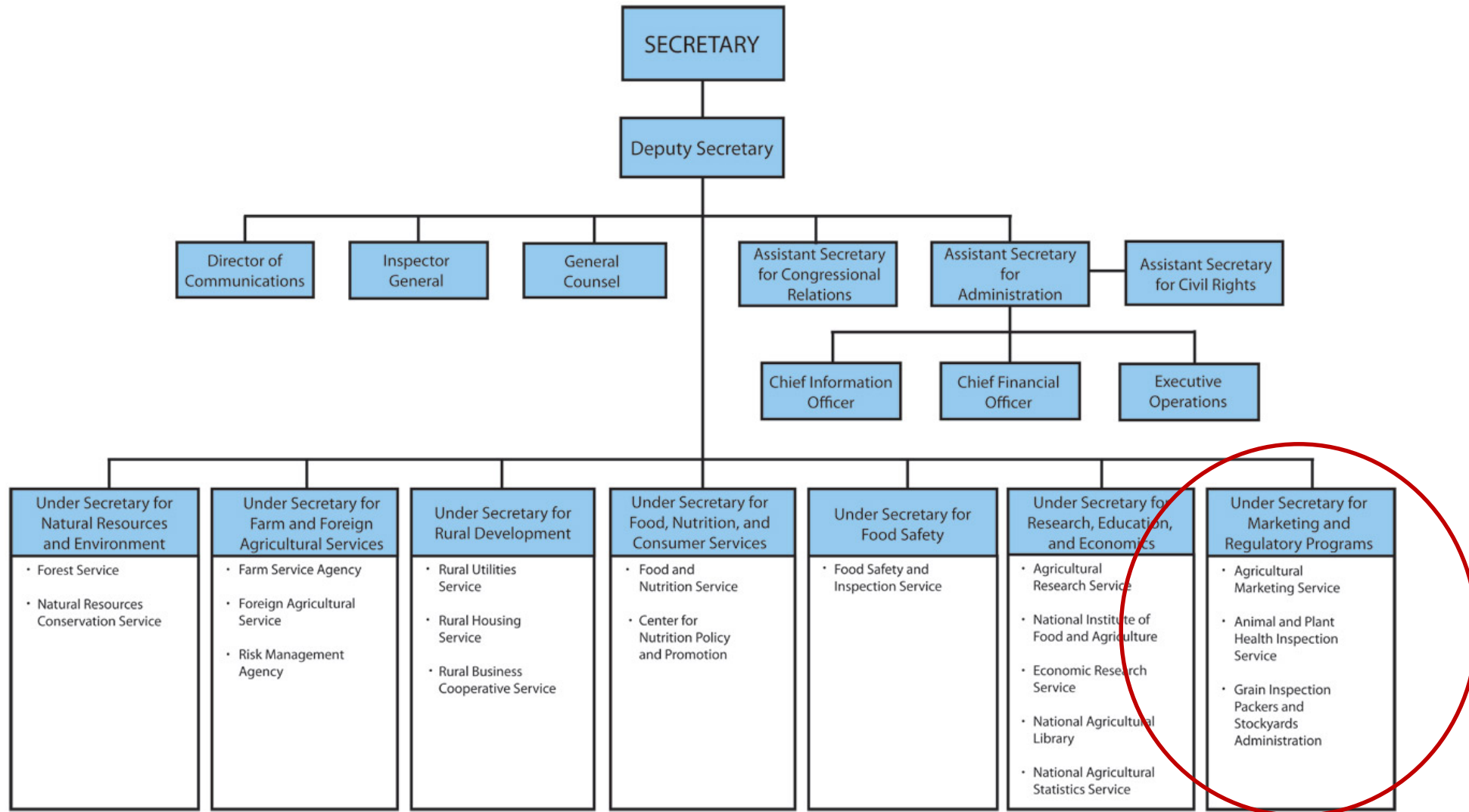
Creating Opportunities for American Farmers and Businesses

USDA Grader and Instrument Evaluation

Dr. Craig Morris, Deputy Administrator
USDA Agricultural Marketing Service
Livestock, Poultry, and Seed Program



USDA Structure



Livestock, Poultry, and Seed Program

- One of the commodity programs in AMS
 - Approximately 1,000 Federal staff members and an additional 1,000 State employees who work for the Program under cooperative agreements with all 50 States
- Wide array of markets covered
 - Cattle/Beef, Hogs/Pork, Sheep/Lamb/Goats, Poultry, Shell Eggs, Aquaculture/Wild Caught Seafood, Grains/Oilseeds/Hay, Bioenergy, Organic, International



Services segment value differences throughout the supply chain



Quality Assessment Division

- Develops and maintains Federal standards for egg, meat, and poultry quality
- Participates in international standard setting organizations
- Provides voluntary, user-fee services for grading, certification, and verification used by industry to market its products



Beef Grading Service

- In 1902 Herbert Mumford from the University of Illinois authored a series of bulletins entitled “Market Classes and Grades of Cattle with Suggestions for Interpreting Market Quotations.” The reasons behind the bulletins were:
 - (1) the necessity to establish classes and grades for cattle in order to report market conditions that would be intelligible through the public press, and
 - (2) the desire to provide feeders and breeders of beef cattle with a thorough knowledge of the classes and grades of cattle as they relate to market and feedlot requirements.
- These bulletins included descriptions, definitions and/or photographs of five market classes of cattle and seven market grades (Prime, Choice, Good, Medium, Common, Cutter and Canner).



Beef Grading Service

- This need for uniform grades and market reporting led Congress, in 1914, to appropriate funds for the United States Department of Agriculture (USDA) to study agricultural marketing and to establish the Office of Markets and Rural Organization.
- As a result of this study, Congress passed a law in 1916 establishing the National Livestock Market News Service.
- This service required some type of classification system to facilitate accurate market reporting. The first tentative standards for grades of dressed beef were formulated in 1916.
- The National Livestock Market News Service would respond to livestock producers' need to have an unbiased, daily livestock market report and the belief among producers that accurate daily market reports by a third-party (the USDA) would aid them in selecting the best markets for their livestock. These daily market reports by the USDA began in 1917.



Beef Grading Service

- The standards were first published in mimeographed form in June, 1923 to facilitate beef grading for the U.S. Shipping Board and Veterans Bureau Hospitals.
- In 1924 Congress passed the United States Agricultural Products Inspection and Grading Act which authorized the federal grading of livestock and meat.
- The tentative standards also were used during World War I in the selection of beef for the Army, Navy and Allies, and they were included in the specifications for purchase of beef by the Emergency Fleet Corporation and incorporated into the purchase specifications by several steamship lines, hospitals, dining-car services, hotels and restaurants.



Beef Grading Service

- In 1925 a series of ten public hearings was held throughout the United States to give producers, packers, purveyors, market reporters, teachers and anyone else who was interested an opportunity to express their opinions about the beef grades and to make suggestions for their improvement.
- As a result of these hearings, the grades were revised and promulgated by the Secretary of Agriculture in June, 1926 as the Official United States Standards for Grades of Carcass Beef.
- The beef carcass grades adopted in 1926 were implemented as a free, voluntary service for a one-year trial period beginning in May, 1927.
- At the end of this one-year trial period the USDA meat grading service was continued on a voluntary, fee basis.



Beef Grading Service

- Today over 95 percent of the U.S. beef supply is officially graded under this voluntary service.

- The consist of those grades is as follows:

- Prime 5%
- Choice 66%
- Select 21%
- Other grades 8%

- Value differential (current)

- Prime carcass: \$1,769
- Choice carcass: \$1,665
- Select carcass: \$1,593
- Ungraded carcass: \$1,413
 - Top to bottom spread: \$365



Beef Grading Standards

- The standards for grades of livestock and meat have changed extensively and frequently during their history.
- A significant change to the way beef is graded in the United States has been the transition to instrument grader augmentation (cameras) from 2009 to present.
- Two main factors determine USDA Quality Grades
 - Marbling
 - Maturity
- Cameras help advise the official USDA Grader on the marbling level.
- Today's presentation about the process we used to implement cameras into our Official USDA beef grading program.



**United States Standards
for Grades of
Carcass Beef**



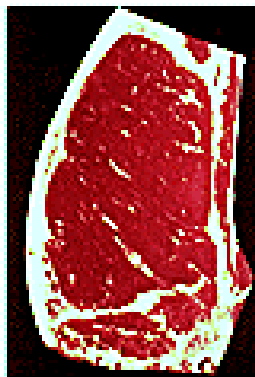
Degrees of Marbling



**Moderately
Abundant**



**Slightly
Abundant**



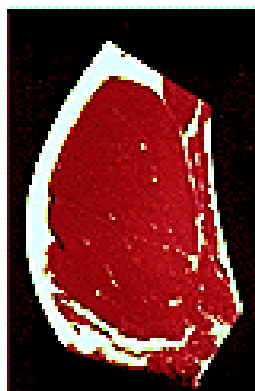
Moderate



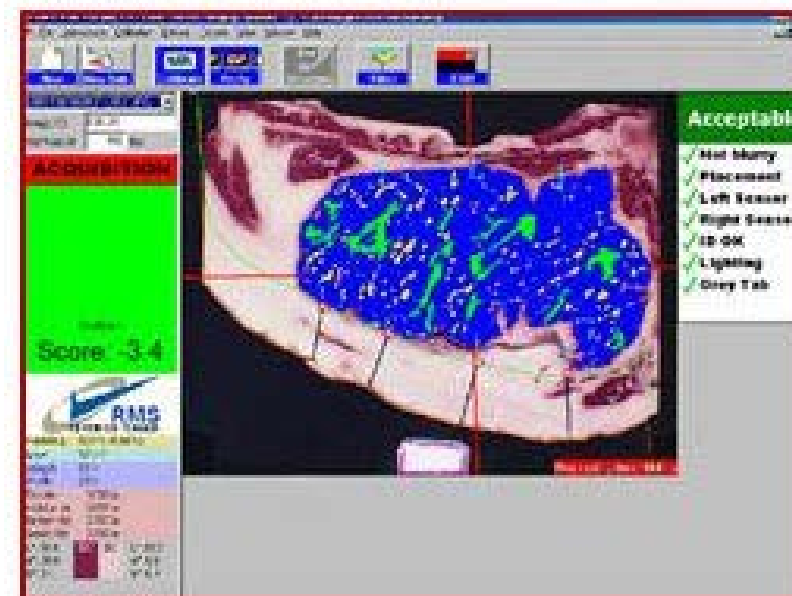
Modest



Small



Slight



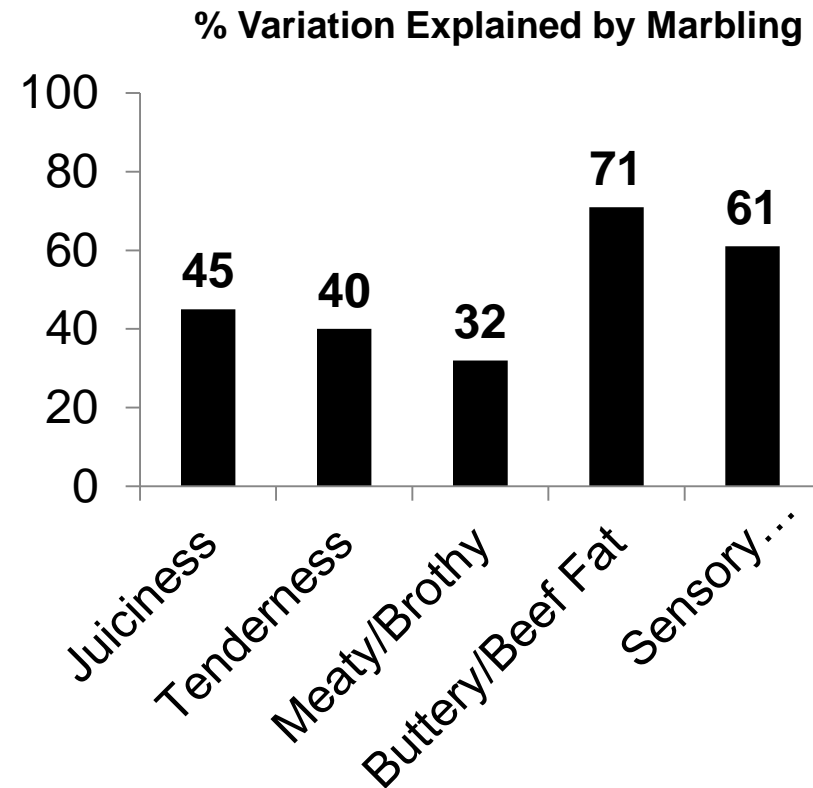
Degrees of Marbling

Degree of Marbling		Marbling Score
Practically Devoid	Pd	100
Traces	Tr	200
Slight	Sl	300
Small	Sm	400
Modest	Mt	500
Moderate	Md	600
Slightly Abundant	Slab	700
Moderately Abundant	Mda	800
Abundant	Ab	900

Agricultural Marketing Service

RELATIONSHIP BETWEEN MARBLING, MATURITY, AND CARCASS QUALITY GRADE					
Degrees of Marbling	Maturity				
	A	B	C	D	E
Slightly Abundant - 700	PRIME				
Moderate - 600			COMMERCIAL		
Modest - 500	CHOICE				
Small - 400					
Slight - 300	SELECT		UTILITY		
Traces - 200					
Practically Devoid - 100	STANDARD			CUTTER	

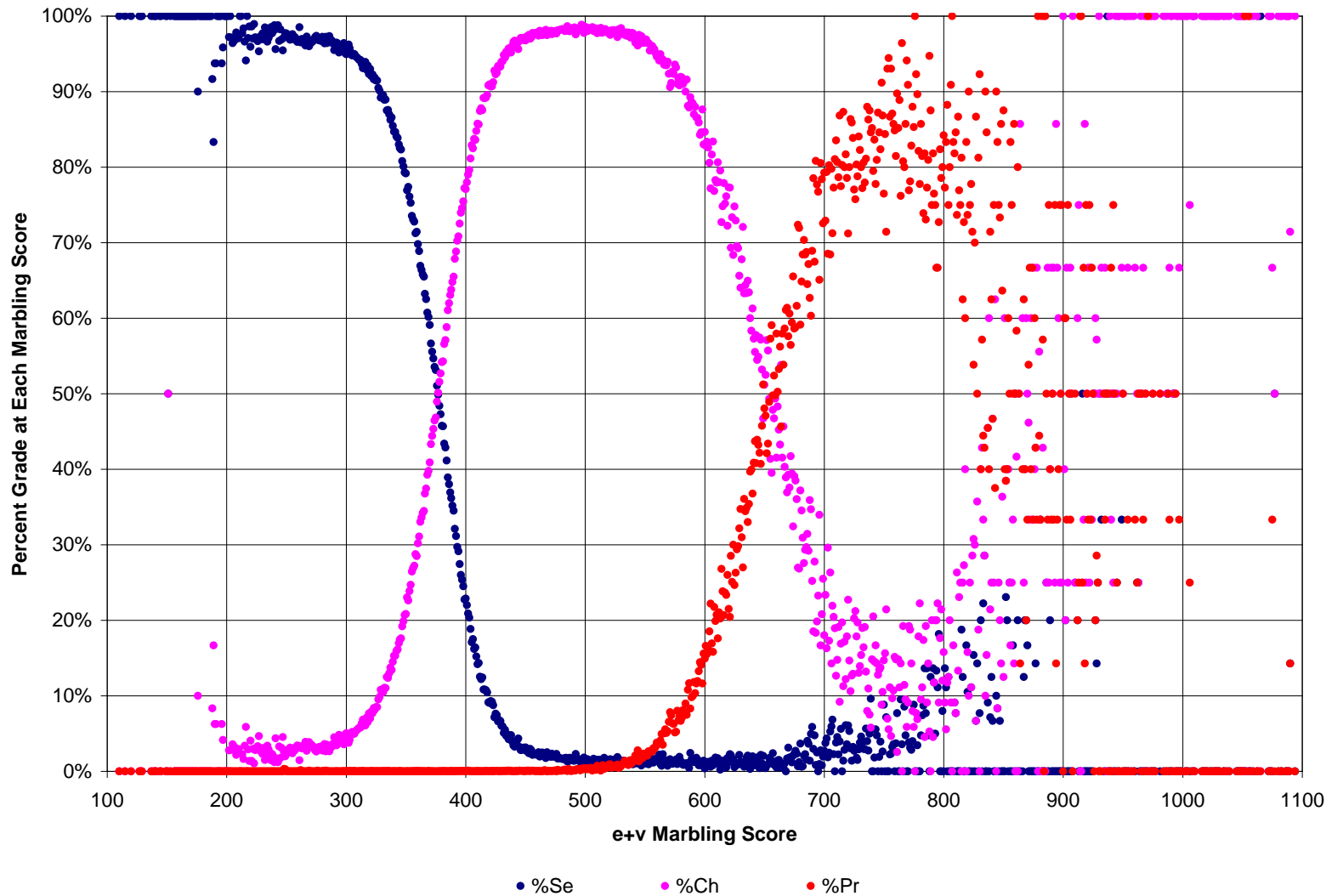
Variation in Beef Sensory Attributes Explained by Differences in Marbling



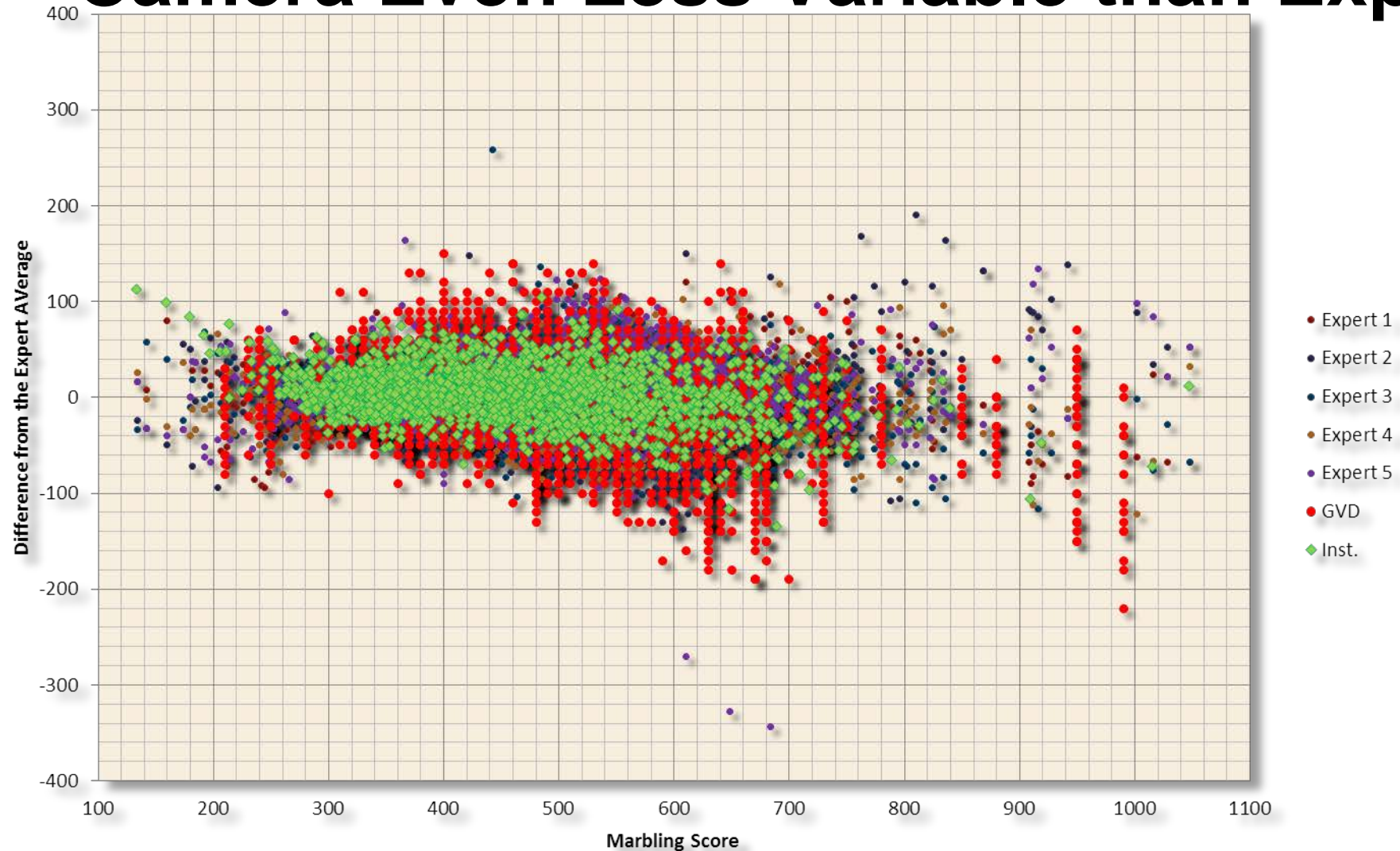
Human Variation



Human Variation



Comparison of the Instrument Variation to Experts – Camera Even Less Variable than Experts



How to Implement Cameras into a Variable Environment?

- We knew that all graders graded the same.
- We recognized that cameras would, in general, call the same ribeye the same.
- In this variable environment, how to you implement cameras without changing the current “consist” of graded beef—E.g., 5% Prime, 66% Choice, 21% Select, and 8% Other grades?
- The answer, set the cameras to grade like the “average” USDA Grader.
- We designed a study to both identify that “average” USDA Grader and then set the cameras at that “average” line.

How to Implement Cameras into a Variable Environment?

- USDA blinded to identity of all plants and grader identifications
- USDA graders and supervisors were unaware that data was being collected

*Hawthorne effect: If graders perceived that they were being observed, then their grading pattern might not reflect their normal day-to-day patterns**



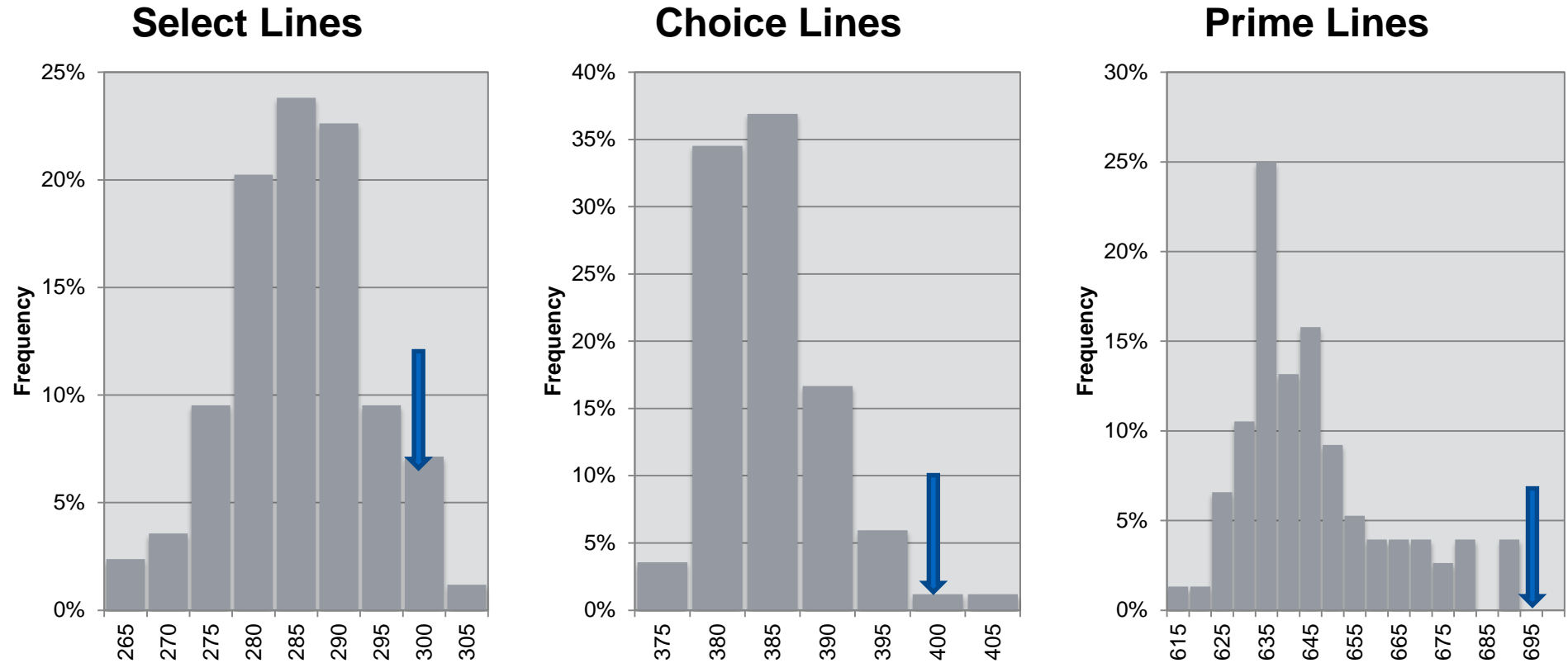
USDA Grader Grade Line Variation Within a Plant

Plant	Grader	Cx Count	Select Grade Line	Choice Grade Line	Prime Grade Line
11	1111	8,528	301	401	641
	1112	11,854	285	394	648
	1114	8,923	291	400	629
	1115	9,750	280	386	634
	1116	8,057	284	394	656
	1117	7,644	263	383	631
	1118	8,454	277	385	633
	1119	8,384	292	395	647
	Grader Average	71,594	284	392	640
	Plant Shift 1	37,431	289	394	644
	Plant Shift 2	34,662	280	390	635

Plant	Grader	Cx Count	Select Grade Line	Choice Grade Line	Prime Grade Line
12	1211	1,889	298	383	647
	1212	4,082	288	385	670
	1213	10,537	279	381	668
	1214	1,866	280	379	644
	1215	5,580	281	382	638
	1216	7,875	278	379	652
	1218	4,384	274	380	665
	1221	2,087	268	389	629
	1224	9,858	280	386	661
	1225	4,789	281	383	677
	1226	7,014	274	374	655
	1231	2,564	288	377	640
	1232	2,605	274	376	675
	Grader Average	65,130	280	381	656
	Plant Shift 1	38,372	278	380	655
	Plant Shift 2	27,427	281	381	656

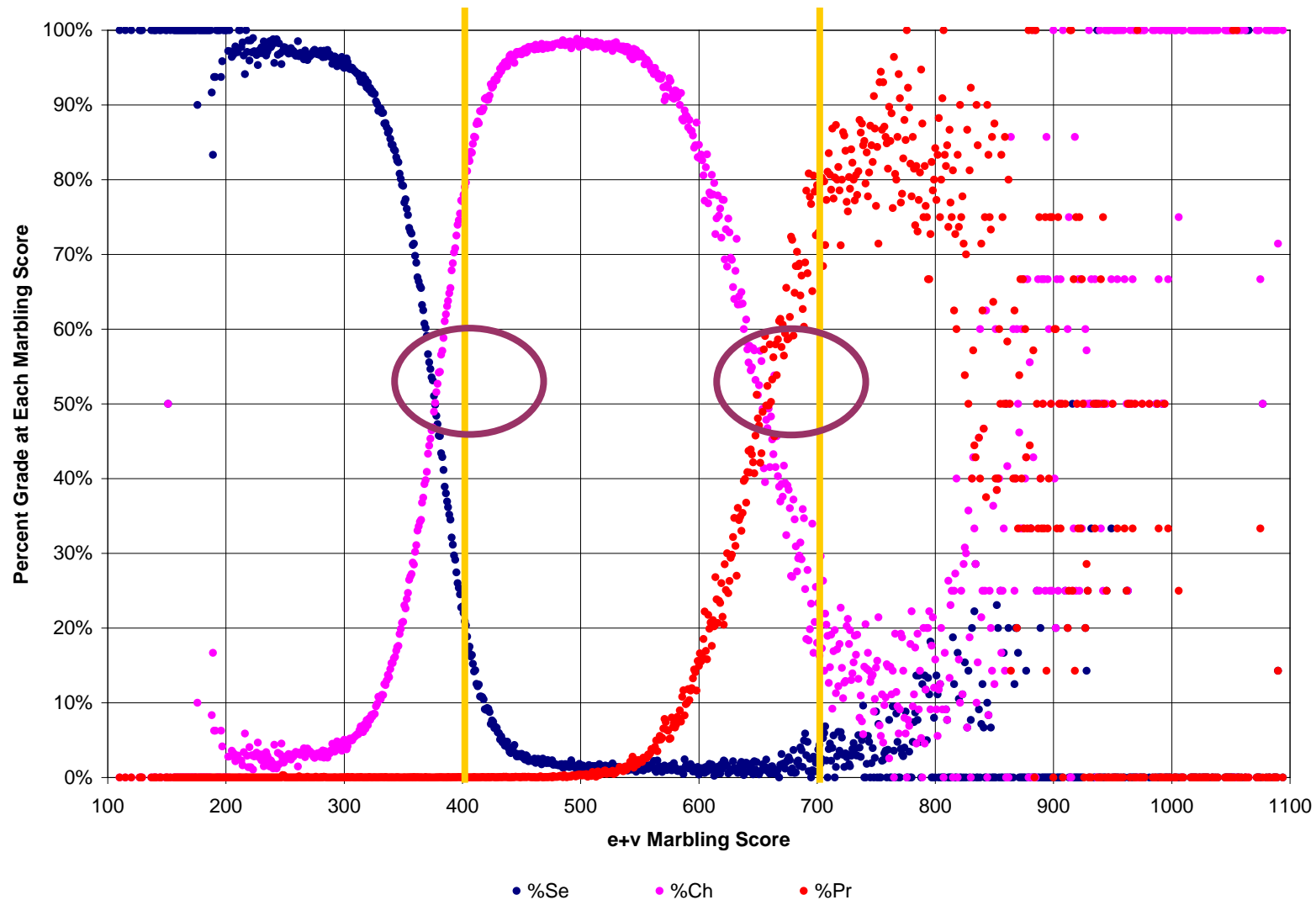
Grade lines should be 300 for Select, 400 for Choice and 700 for Prime.
Within each column, a blue font indicates the highest and the red font the lowest.

Distribution of USDA Grader Grade Lines



Results from 384,805 Carcasses

Grade Probability as a Function of Instrument Marbling Score

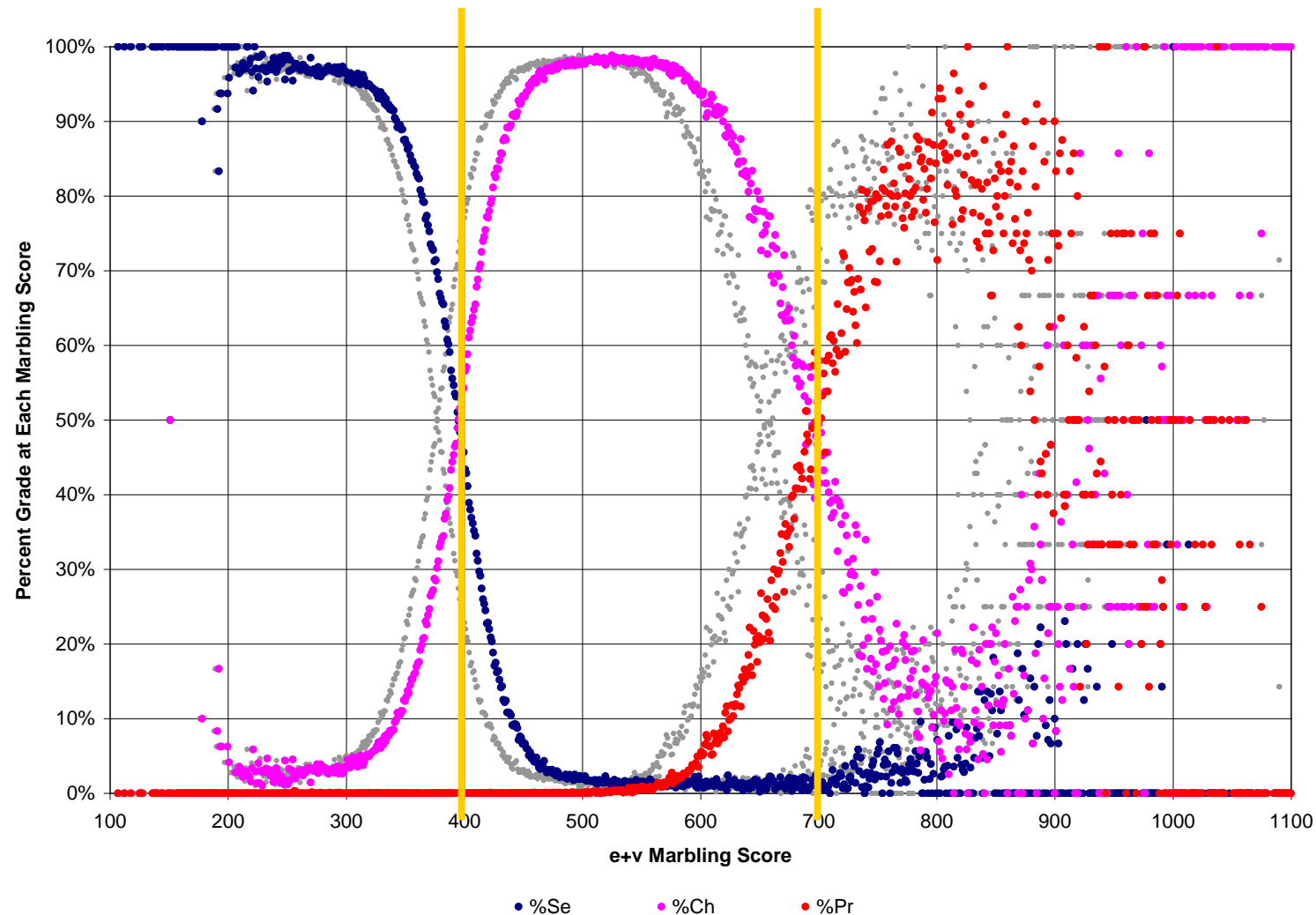


Alignment of Instrument Marbling to National USDA Grade Patterns

- Minimal grading supervision
- USDA grader use of instrument data and input of grade data
 - Eight plants
 - 422,863 carcasses
- Data independently analyzed by LPS and ARS
- Instrument grade lines verified by LPS through reviews of 5,167 images
- Instrument grade lines were adjusted to align with the National USDA grading pattern



USDA Assessment of Field Grade Lines



Alignment of Camera Grade Lines With USDA Field Grader Lines

USDA Grade line	Current camera MS	Change from expert panel MS
PR/CH+	695 (700)	-57 units
CH-/CH ⁰	495 (500)	-28 units
CH-/SE	395 (400)	-14 units
SE/ST	295 (300)	-12 units

- Alignment of grading instruments with the grades of field graders, though necessary to facilitate industry adoption of camera-based quality grading, was viewed by some as a reduction in US beef quality standards.
- To address these concerns, the NCBA commissioned this study to quantify relationships of camera-based QG to sensory attributes of fed steer and heifer beef.



Outcome of Grade Line Adjustments

- Avoided a 375 million dollar CY 2006 loss to the U.S. beef industry that would have incurred from the reduction in grades because of unadjusted instruments
- The transition into the use of adjusted instruments was transparent and uneventful
- Supervisory grade lines ***need to be aligned*** with the national grading patterns and instruments grade lines
- Subjective variation however results in occasional disagreements with instrument assessed grades

Bruce Knight - North/South Analogy

Typically, northern graders feel instruments are too liberal while southern graders feel instruments are too tight.

Conclusion & Industry Impact

- The adoption of camera-based technology to assist in assignment of quality grades to beef carcasses significantly modernizes and improves the US beef grading system.
- The new, objectively determined marbling standards theoretically should remain unchanged (within limits of instrument precision) from plant-to-plant, region-to-region, and year-to-year.
- Results of this study provide strong support for use of instrument-assisted quality grading as implemented in 2009.

Contact

Craig Morris

Deputy Administrator

Agricultural Marketing Service

Livestock, Poultry, and Seed Program

Craig.morris@ams.usda.gov

