ASTM F10 Committee on Livestock, Meat and Poultry Electronic Evaluation Systems

AMSA Reciprocal Meat Conference
June 21, 2006
Leonard Huskey
V.P. Quality Assurance
Swift & Company
Evolution of Quality Grading

**Pork**
USDA Grades
Visual - % Lean Cuts
Ruler
Optic Probe - % Lean
Automated Ultrasound
Handheld Ultrasound
Electromagnetic Scanning
Machine Vision
pH

**Beef**
USDA Grading
Video Augmentation
Machine Vision

**Poultry**
“House” Grades
Machine Vision
Operating Principle

Diagram of Probe

[Diagram with labels: probe point, measuring plate, suspension hook, cable, display, push buttons, handle for activating, aiming plate, model R91 only]
OPERATING PRINCIPLE

The diagram below shows the probe being inserted through the loin eye of a hog carcass and the varying amounts of reflection through the different tissues.

The photo-sensor gives out an analog signal corresponding to the amount of reflection of the surrounding material. Fat and sinews give a higher reflection than meat tissues therefore it is possible to distinguish between these materials.
Hog Evaluation Measures

PERCENT PROBES 3rd AND 4th RIBS
The Case For Standards for Electronic Evaluation Systems

- New Technology, Increased Complexity
- Variations in Instrumentation
- Reliable, Auditable
- Accuracy of Endpoint Prediction
- Transparency & Trust in Value Determination
- Provide Basic Requirements, Continuity of Approach
GIPSA Regulatory Authority

CFR Title 9 Animals and Animal Products
Part 201 – Regulations Under the Packers & Stockyards Act
§201.99 Purchase of livestock by packers on a carcass grade, carcass weight, or carcass grade and weight basis.

(a) Each packer purchasing livestock on a carcass grade, carcass weight, or carcass grade and weight basis shall, prior to such purchase, make known to the seller, or to his duly authorized agent, the details of the purchase contract. Such details shall include, when applicable, expected date and place of slaughter, carcass price, condemnation terms, description of the carcass trim, grading to be used, accounting, and any special conditions.

(b) A true written account of such purchase showing the number, weight, and price of the carcasses of each grade (identifying the grade) and of the upgraded carcasses, an explanation of any condemnations, and any other information affecting final accounting. Packers purchasing livestock on such a basis shall maintain sufficient records to substantiate the settlement of each transaction.

(e) If settlement and final payment are based upon any grades other than official USDA grades, such other grades shall be set forth in detailed written specifications which shall be made available to the seller or his duly authorized agent.
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- Developing Standards for Materials, Products, Systems and Services
- Founded June 16, 1898
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• F10.20  Standard Test Methods
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• F10.40  Developing and Validating Prediction Equations
• F10.50  Terminology
F 10.10 Generic Design Specifications

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- Indicators & Recording Elements
- Units of Measure
- Temperature Range
- Error Message
F10.20 Development of Test Methods

Chairman: Jim Stouffer, AUS

- Reference Materials
- Repeatability
- Method of Audit (Test)
- Tolerance
- Verified by Independent Third Party
F10.30 Development of User Guides for Operators

Chairman: Sheldon Clark, John Morrell & Co.

• Operator Error
• Installation
• Maintenance
• Operator Training
• Calibration (frequency, method, documentation)
• Inspection
F10.40 Predictive Accuracy

Chairman: Bryice Wilke, USDA-GIPSA

- Standardized methods for data collection and analysis
- Repeatability – method for determination
- Sample size and variation assessments
- Statistician recommended
- End Point is not mandated, but utilize a standardized procedure for getting there.
F10.50 Terminology

Chairman: Leonard Huskey
Swift & Company

- Common definition for terms used in more than one standard
- Where term is used differently, it is defined accordingly.
- Understanding is key to useful standards.
Standard Specification for Developing and Validating Prediction Equation(s) or Model(s) Used in Connection with Livestock, Meat, and Poultry Evaluation Device(s) or System(s) to Determine Value

1. Scope

1.1 This specification covers methods to collect and analyze data, document the results, and make predictions by any objective method for any characteristic used to determine value in any species using livestock, meat, and poultry evaluation devices or systems.

1.2 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Terminology

2.1 Definitions:

2.1.1 alfalfa hay: a definition that is commonly used in the animal nutrition literature to describe the quality of hay.

2.2 Symbols:

2.2.1 alfalfa hay: a symbol that is commonly used in the animal nutrition literature to represent the quality of hay.

3. Significance and Use

3.1 The procedures in this specification are used for determining the value of hay based upon its nutritional characteristics. The procedures can be used to determine the value of hay for livestock production, meat production, or poultry production. The procedures can also be used to determine the value of hay for human consumption.

4. Procedure

4.1 Developing the Estimation of the Prediction Equation:

4.1.1 Define the estimation and prediction equation(s) or model(s) to be used.

4.1.2 Collect data for the prediction equation(s) or model(s) to be used.

4.1.3 Test the estimation and prediction equation(s) or model(s) to be used.

4.2 Procedure for Estimating the Prediction Equation:

4.2.1 Collect data for the estimation and prediction equation(s) or model(s) to be used.

4.2.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.3 Procedure for Testing the Prediction Equation:

4.3.1 Collect data for the testing of the prediction equation(s) or model(s) to be used.

4.3.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.4 Procedure for Estimating the Prediction Equation:

4.4.1 Collect data for the estimation and prediction equation(s) or model(s) to be used.

4.4.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.5 Procedure for Testing the Prediction Equation:

4.5.1 Collect data for the testing of the prediction equation(s) or model(s) to be used.

4.5.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.6 Procedure for Estimating the Prediction Equation:

4.6.1 Collect data for the estimation and prediction equation(s) or model(s) to be used.

4.6.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.7 Procedure for Testing the Prediction Equation:

4.7.1 Collect data for the testing of the prediction equation(s) or model(s) to be used.

4.7.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.8 Procedure for Estimating the Prediction Equation:

4.8.1 Collect data for the estimation and prediction equation(s) or model(s) to be used.

4.8.2 Test the estimation and prediction equation(s) or model(s) to be used.

4.9 Procedure for Testing the Prediction Equation:

4.9.1 Collect data for the testing of the prediction equation(s) or model(s) to be used.

4.9.2 Test the estimation and prediction equation(s) or model(s) to be used.

5. Keywords

5.1 coefficient of determination; model; prediction equation; estimation; correlation; mean square error; residual; validation

6. Summary of Changes

6.1 This is a revised edition of F 2490-04, the previous edition. This revision does not have any substantive changes to the contents of the previous edition.
ASTM F10 SUMMARY

- Consensus Standards for **Evaluation Devices or Systems for Traits Used to Determine Value**
- Published by ASTM
- Adoption voluntary but strongly encouraged
- NIST adopting in HB 44, becomes the “Bible” for State W&M
- **Packer/Processor and Vendor strongly encouraged to do gap analysis vs F10 standards.**
- F10 Committee will be ongoing, adapting to technology development.
Committee on Livestock Approves New Standard on Evaluation Devices

According to Patricia A. Keane, principal scientist, sensory technology unit, TIAAX LLC, the new standard will be useful to polymer producers, converters and end-users. "The method can be used as a screening test for assessing the impact of packaging or as part of a total quality assurance program," says Keane. "Information from the tests will also be useful for investigating the origin of transferred tastes or odors."

For further technical information, contact Patricia A. Keane, TIAAX LLC, Cambridge, Mass. (phone: 617/498-5124; keane-pa@tiallc.com). Committee E18 meets Oct. 12-15 in Santa Rosa, Calif. For membership or meeting details, contact Scott Orthei, ASTM International (phone: 610/832-9730; sorthey@astm.org).

Committee on Livestock Approves New Standard on Prediction Equations and Models

Devices that evaluate the variables used to predict carcass composition in pigs and cattle were introduced about 15 years ago, but there has been little standardization regarding how such instruments work or what tolerances are set for each. This lack of standardization made it difficult forgov-