

How did we evaluate and approve UGMA moisture meters for official use?

- National Type Evaluation Program evaluation
- UGMA Compatibility Evaluation

National Type Evaluation Program (NTEP)

- Certifying instruments and calibrations for grain moisture, protein, oil and test weight per bushel used in commercial transactions regulated by the states.

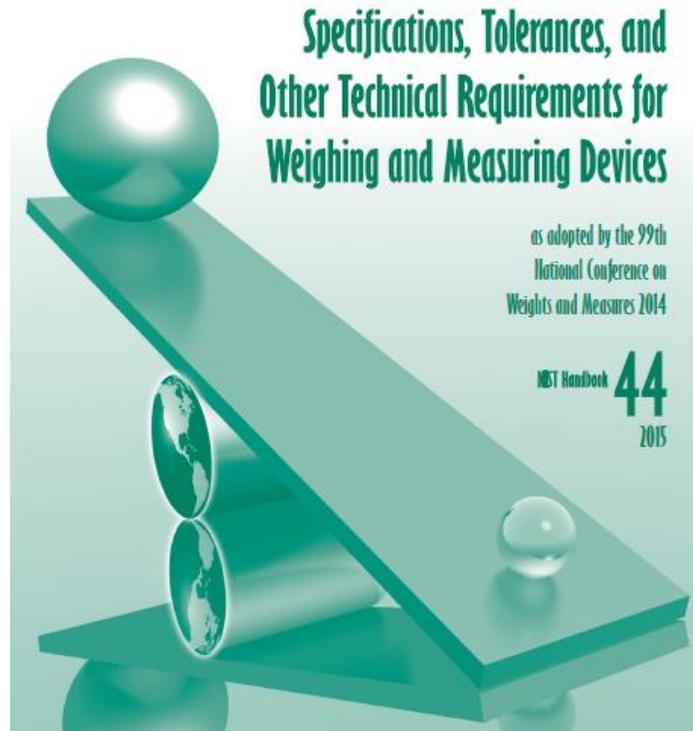


National Conference on Weights and Measures

www.ncwm.net



NIST
National Institute of
Standards and Technology
U.S. Department of Commerce



- Technical Committees develop criteria and evaluation requirements
- NCWM Publication 14 Grain Moisture Meters & Near Infrared Grain Analyzers ©2015
 - Technical Policy
 - Checklists
 - Test Procedures

www.nist.gov/pml/wmd/pubs/hb44.cfm



United States Department of Agriculture

1990 Farm Bill (incorporated into U.S. Grain Standards Act)

- Manufacturer
 - Common specifications and performance criteria
- Elevators
 - Identify devices suitable for commercial trade
 - Confidence in results
- Producers
 - Confidence in results
 - Equitable
- GIPSA
 - Opportunity to review current technology

Promote greater uniformity in commercial grain inspection to address grain quality concerns and enhance competitiveness of U.S. grain exports.



NTEP Grains

- Corn
- Durum Wheat
- Hard Red Spring Wheat
- Hard Red Winter Wheat
- Hard White Wheat
- Soft Red Winter Wheat
- Soft White Wheat
- Soybeans
- Six-Row Barley
- Two-Row Barley
- Grain Sorghum
- Long Grain Rough Rice
- Medium Grain Rough Rice
- Oats
- Sunflower Seed (Oil)



Specifications and Performance Criteria

- Basic Instrument Tests

- Stability
- Level
- Power Supply
- Humidity
- Instrument Temperature Sensitivity
- Sample Volume

- Calibration Performance

- Sample Temperature Sensitivity
- Accuracy, Repeatability and Reproducibility
- Moisture Bias Check

- Check List

- On-going Moisture Calibration

- Moisture and Test Weight per bushel performance requirements



NTEP: 1994 - Present



NTEP: Active Certificates of Conformance

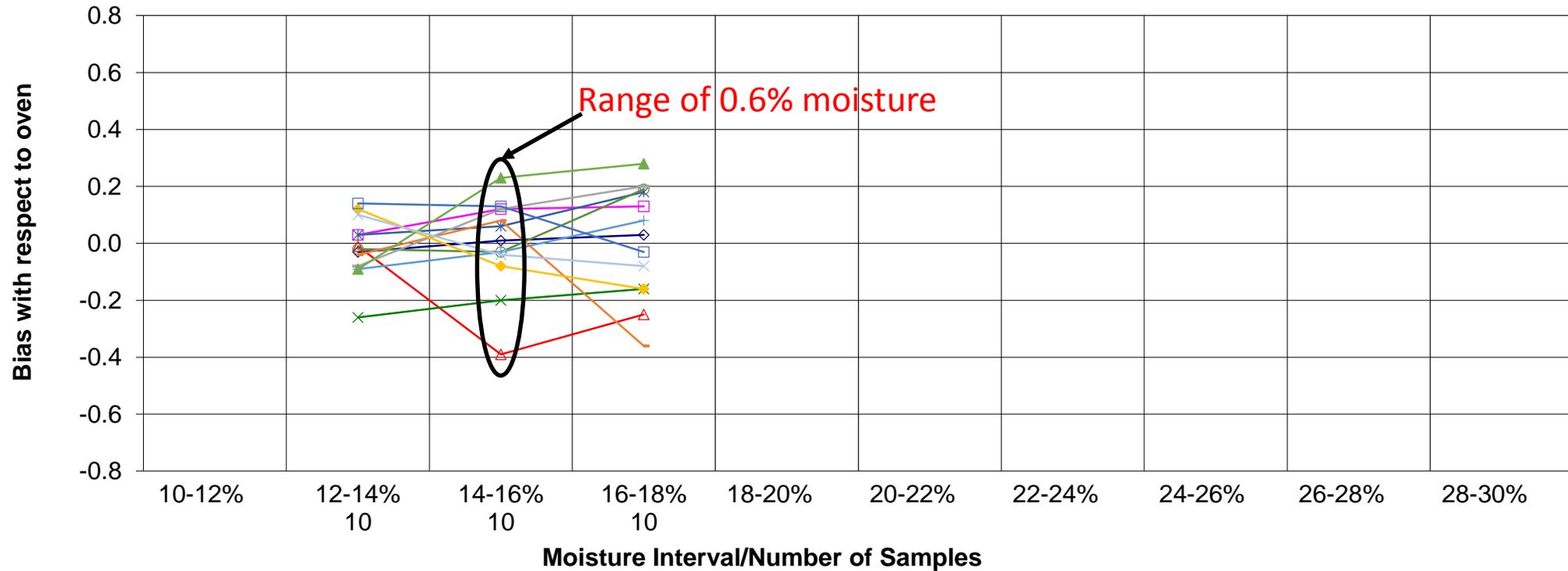


United States Department of Agriculture

Phase I Corn Calibration Accuracy

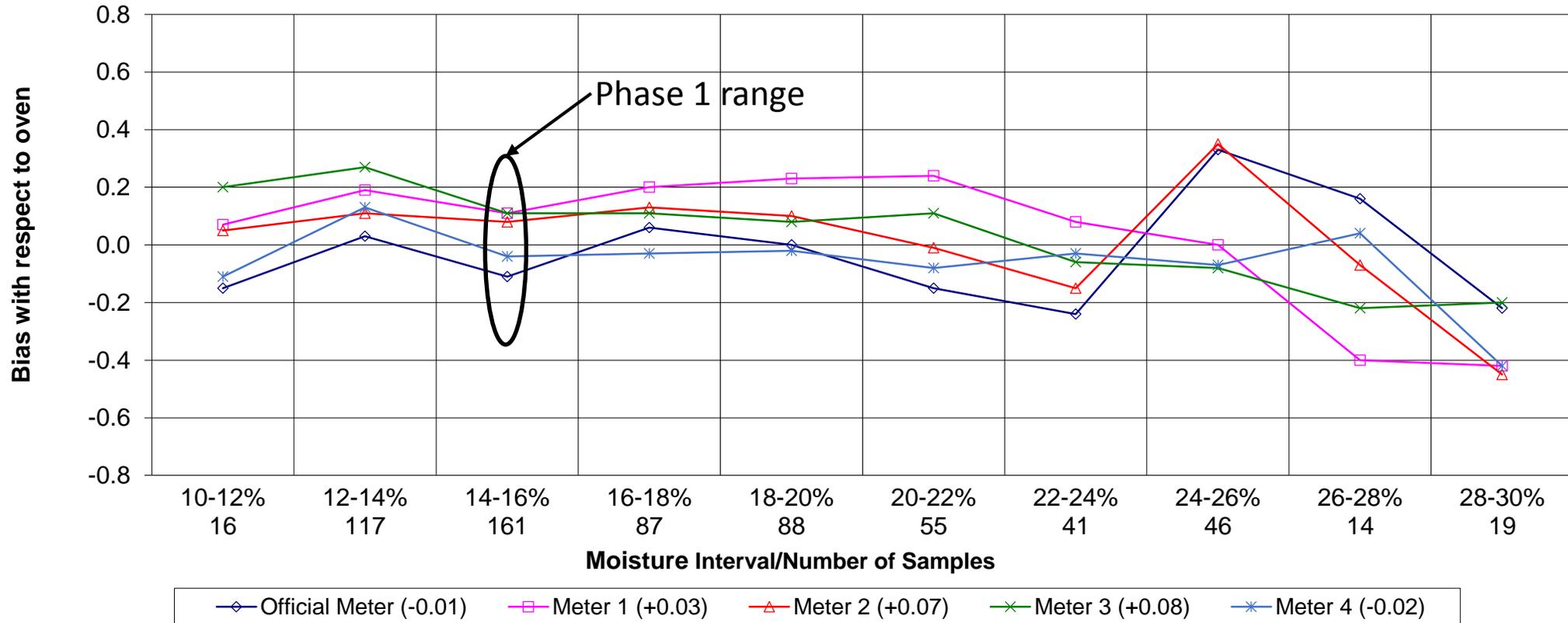
(Data for 30 selected corn samples)

Phase 1 Moisture Accuracy Comparison – Corn



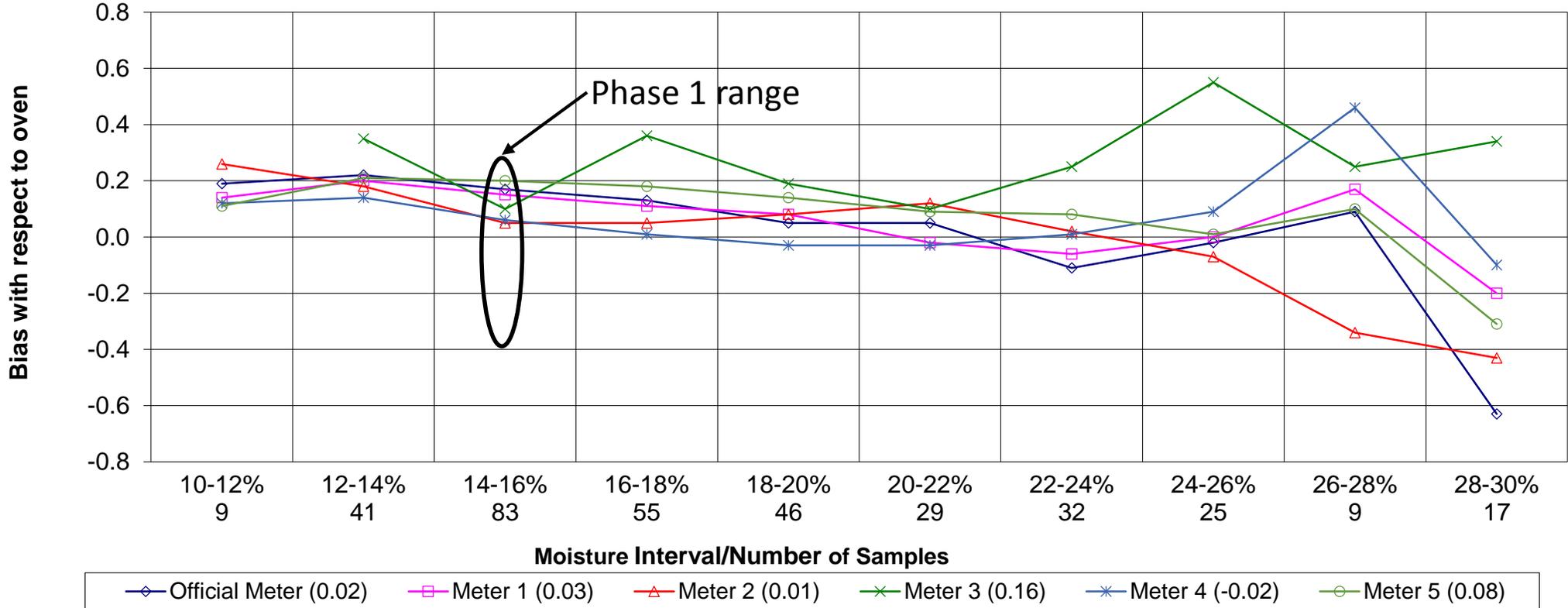
Phase 2 Corn Calibration Accuracy as of 2007

Moisture Meter Comparison - Corn
2004 - 2006 Crop Years

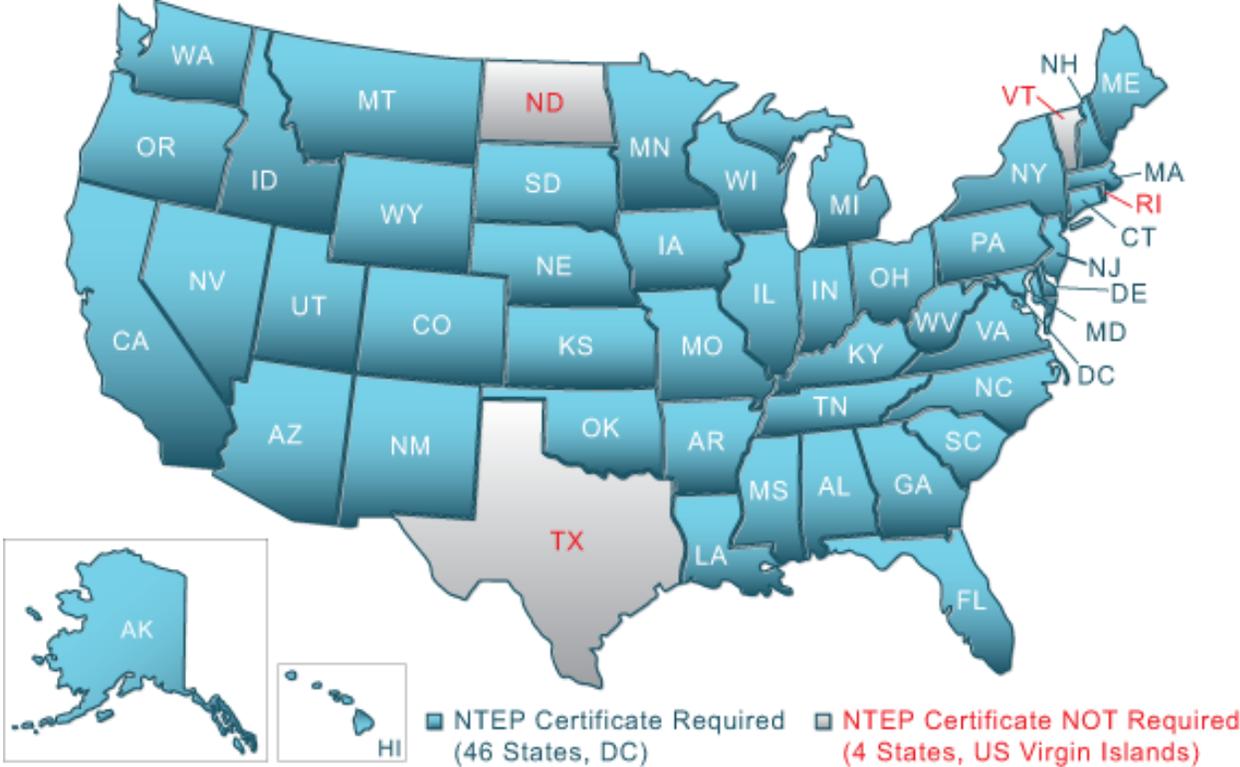


Phase 2 Corn Calibration Accuracy in 2015

Moisture Meter Comparison - Corn
2012 - 2014 Crop Years



NTEP States



* Current as of 2010, provided by Scale Manufacturers Association

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NTEP in Minnesota, North Dakota and South Dakota

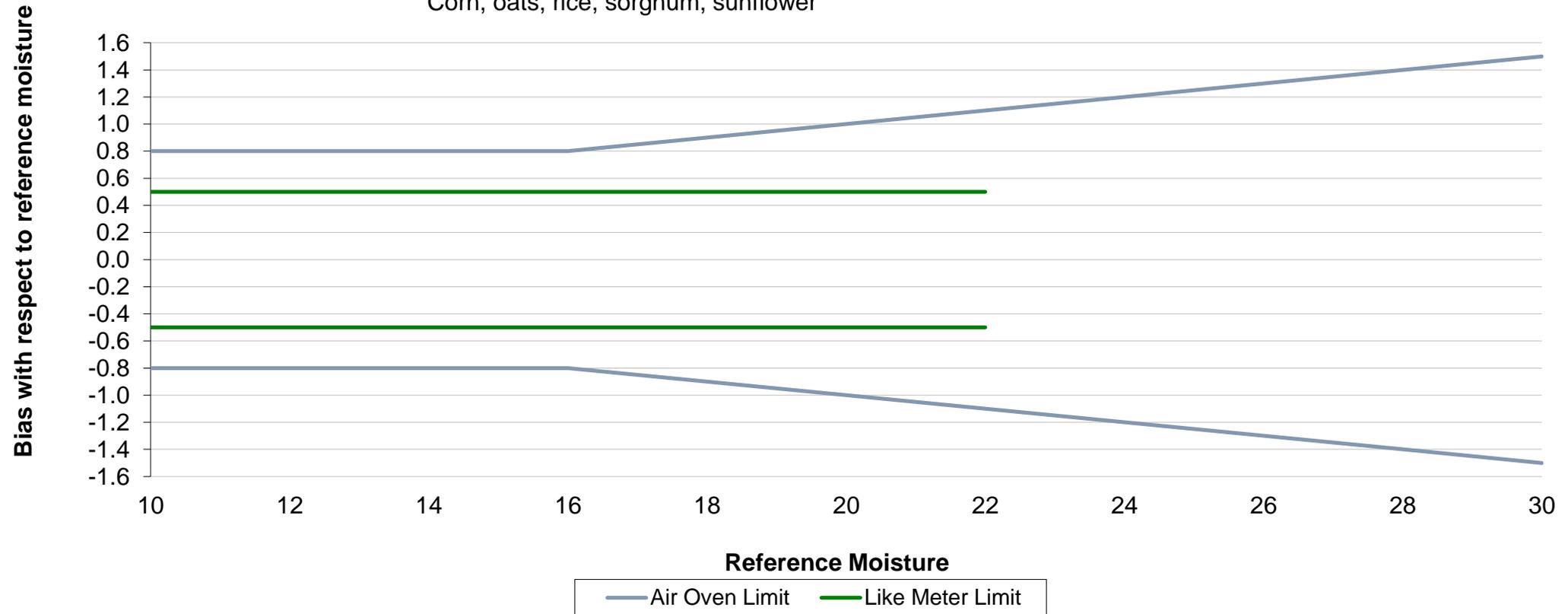
- Minnesota
 - <http://mn.gov/commerce/weights-and-measures/>
 - NTEP Certificate required for vehicle, livestock and track scales
- North Dakota
 - <http://www.psc.nd.gov/jurisdiction/grain/index.php>
 - Moisture or protein disputes tested by federal licensed personnel or 3rd party using USDA inspection rules (NDCC §§ 60-02-05 & 60-02.1-05)
 - Reference NIST Handbook 44 for truck scales
- South Dakota
 - https://dps.sd.gov/licensing/weights_and_measures/
 - NTEP Certificate required for vehicle, livestock and hopper scales
 - May inspect any moisture or protein measuring device (Ch 38-31)



NIST Handbook 44

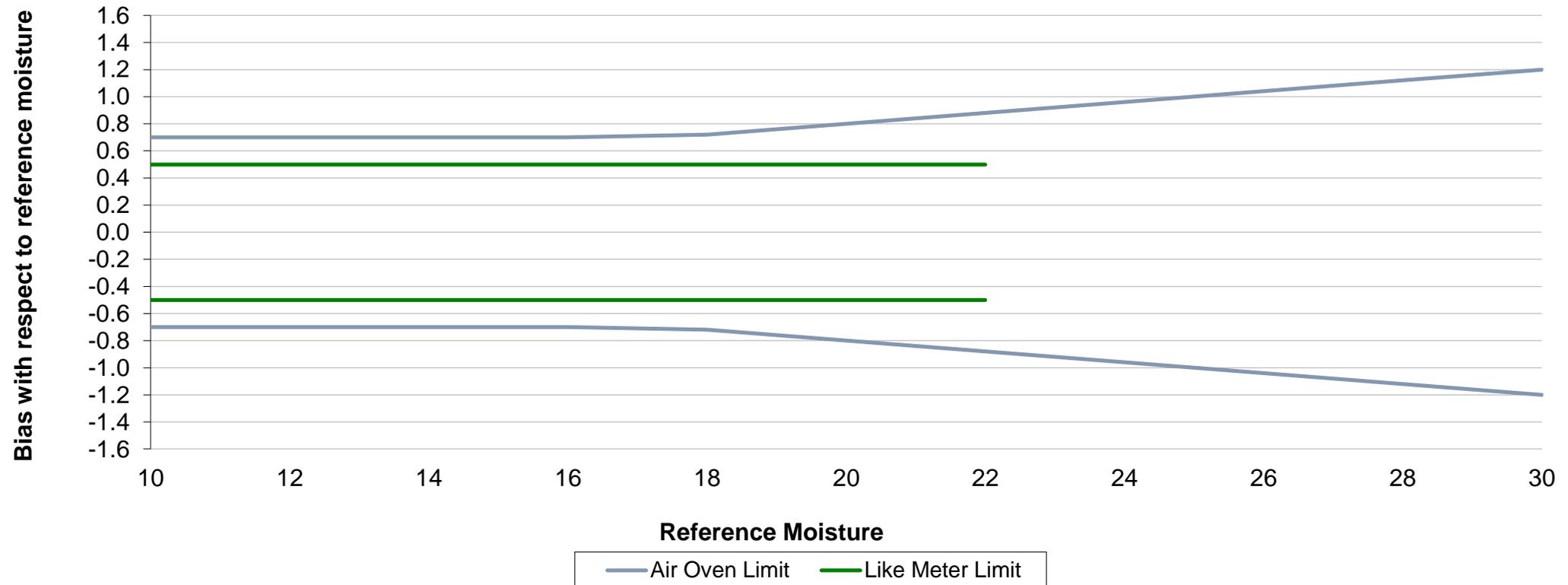
Maintenance Tolerances

Corn, oats, rice, sorghum, sunflower



NIST Handbook 44

Maintenance Tolerances
All other cereal grains and oil seeds



UGMA-Compatibility Criteria (1)

- NTEP Certification
 - Must be proven suitable for commercial use and legal for commercial use in NTEP states
- Documented & stable production processes
- Measurement frequency (149-150 MHz)
- Standardized test cell design
- Standardized loading method
- Standardized measurements
 - Sample dielectric constant
 - Sample mass
 - Sample temperature

UGMA-Compatibility Criteria (2)

- Tight tolerances specified for individual subsystems as well as moisture results
 - Temperature sensor
 - Mass scale
 - Dielectric constant transducer
- Must use specified mathematics
- Units' agreement with FGIS Master system must meet tolerances in FGIS Regulations
 - +/- 0.05% M for Headquarters Standard units
 - +/- 0.15% M for other Official units
 - Mean difference on medium-moisture HRWW

UGMA-Compatibility Criteria (3)

- All UGMA-Compatible models must be able to use the same check testing process.
- A simple check testing process must ensure performance on all grains over full moisture ranges.
- Instruments must provide for efficient means of entering calibrations.
- Instruments must provide standardized output data stream for printing or networking.