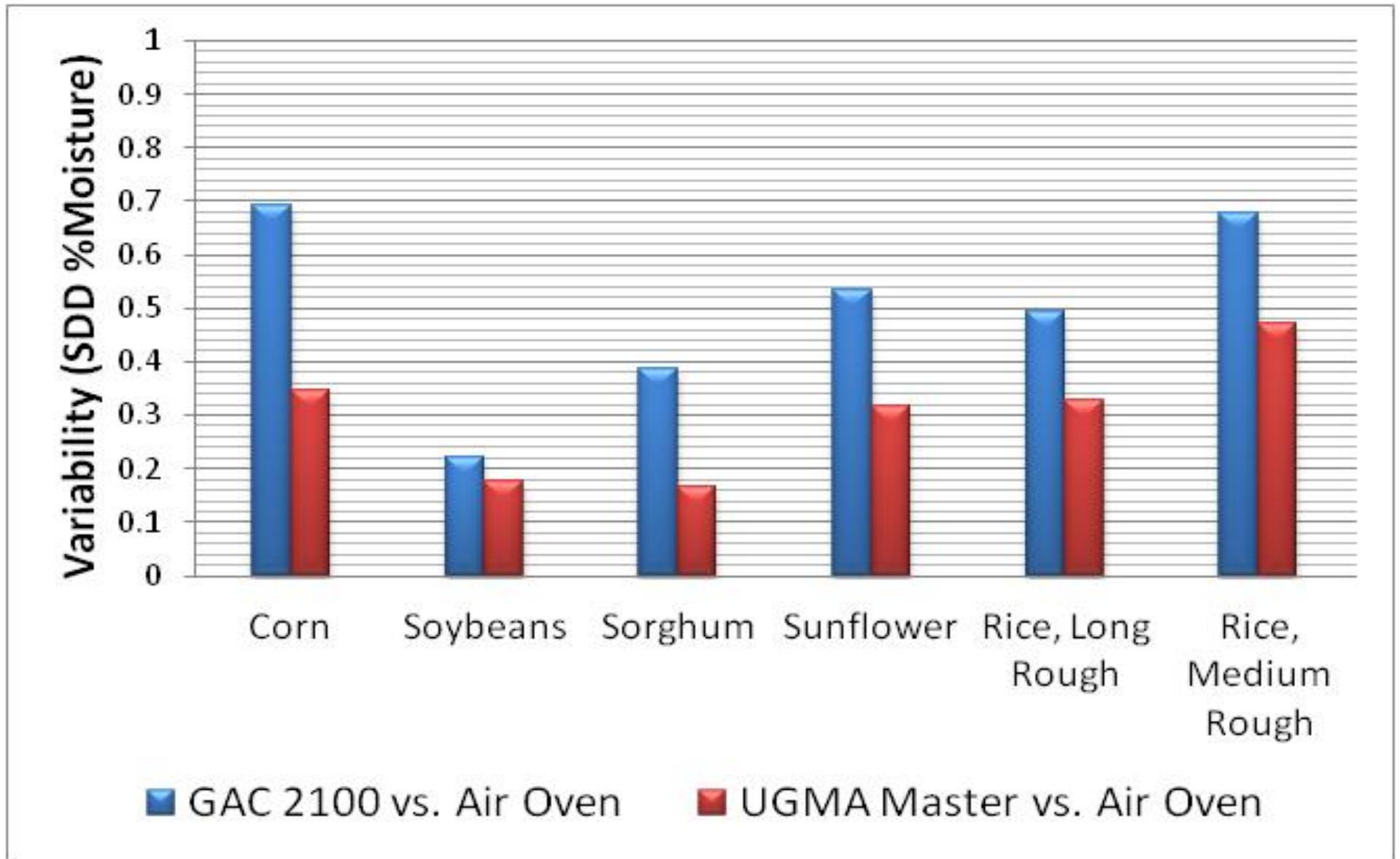
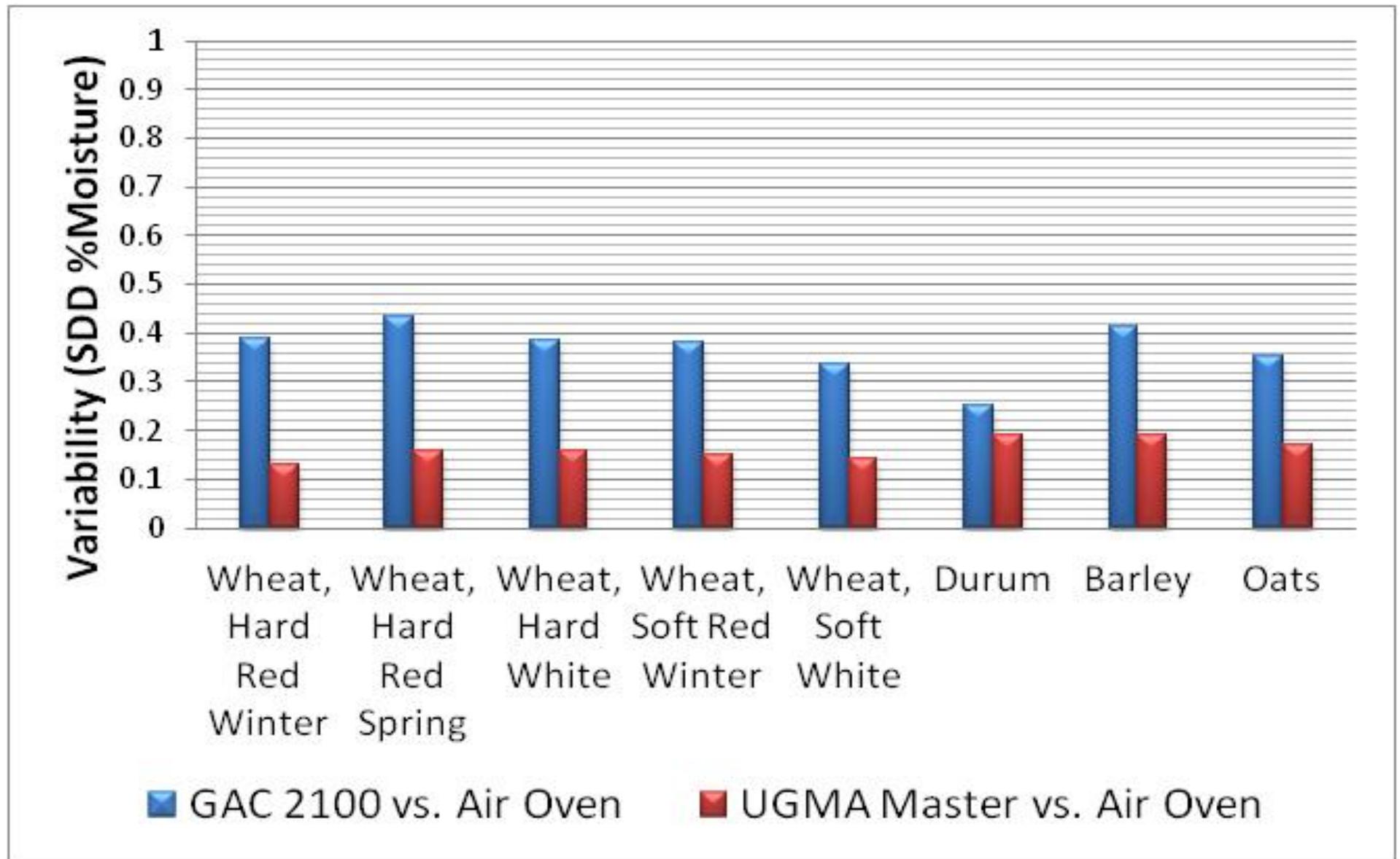


So, what have we achieved
with UGMA?

Improved Accuracy of UGMA



Improved Accuracy of UGMA



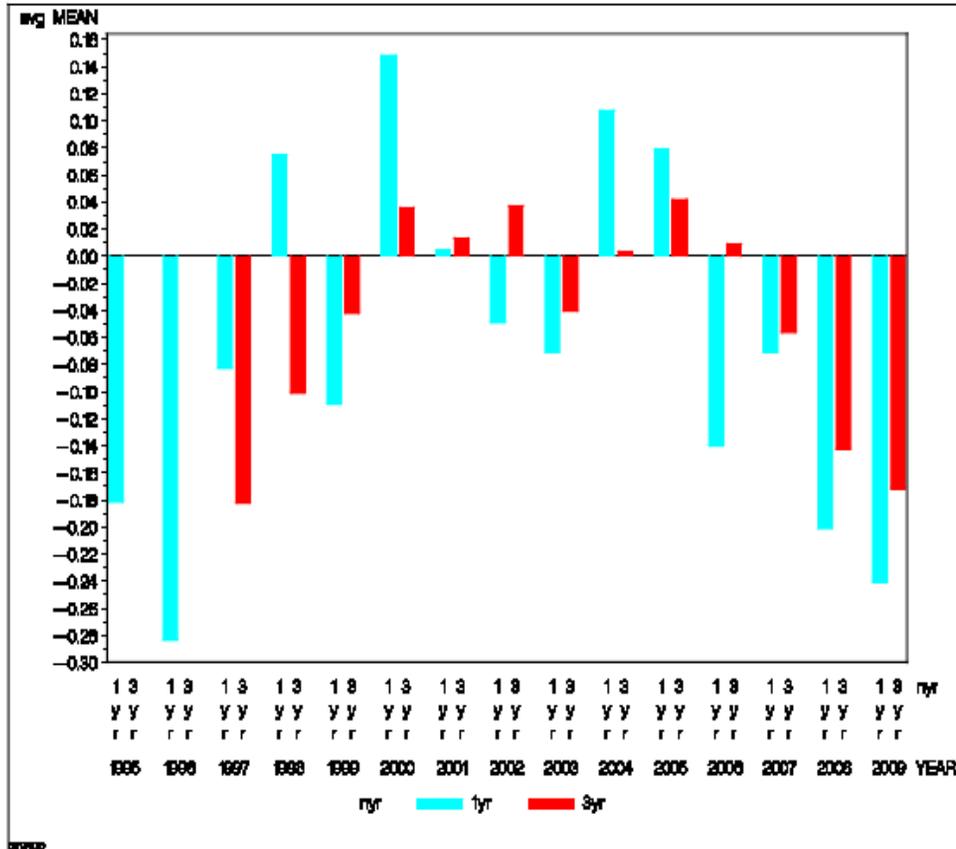
Reduced Differences Among Grain Types

- Many similar grain types use exactly the same calibrations (grain groups).
- Reduce time and cost of calibration development.
- Varietal differences within grain types are appear negligible.

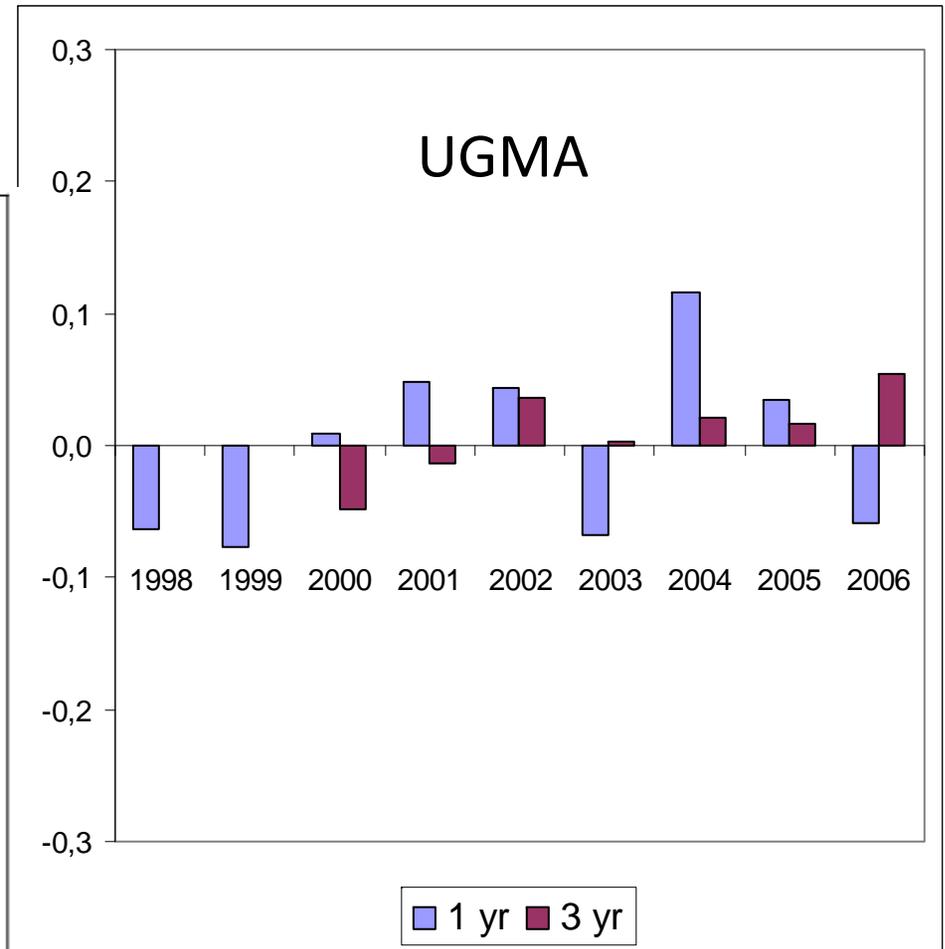
Improved Year-to-Year Calibration Stability

Corn

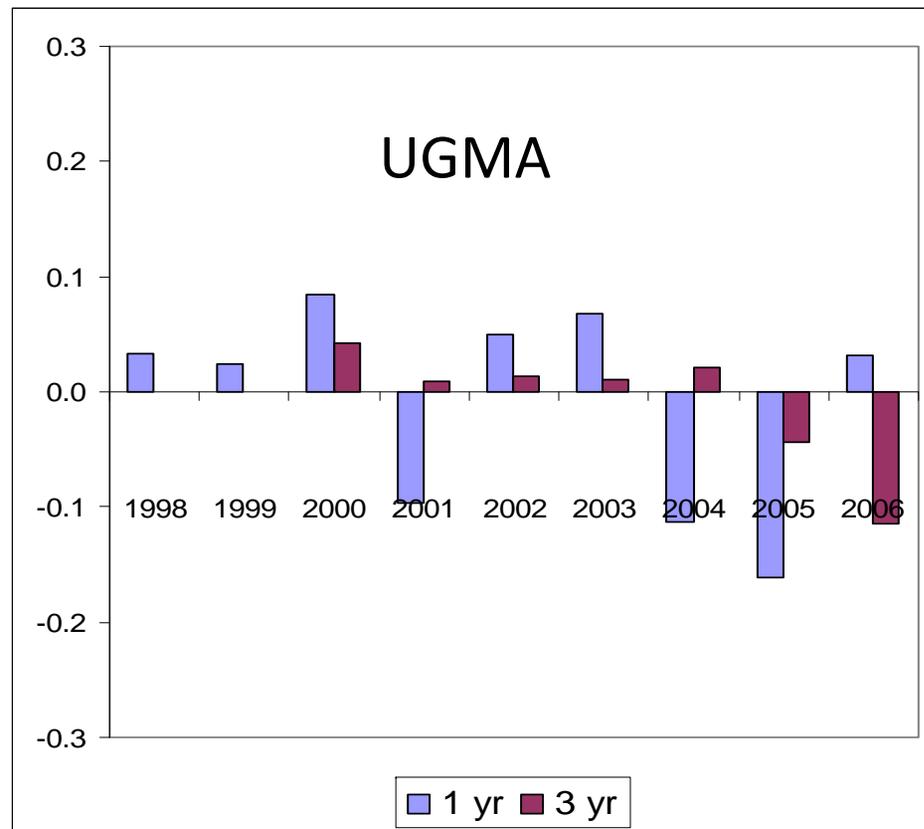
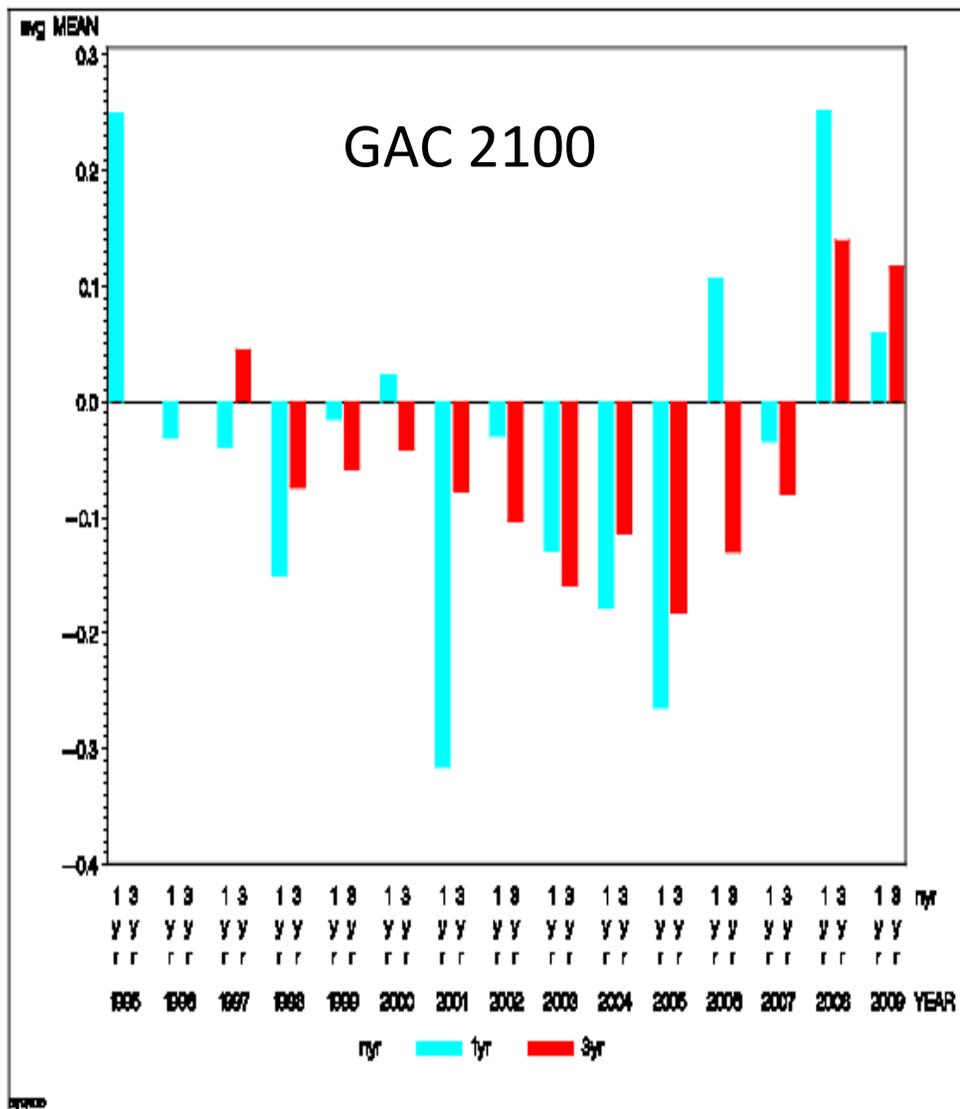
GAC 2100



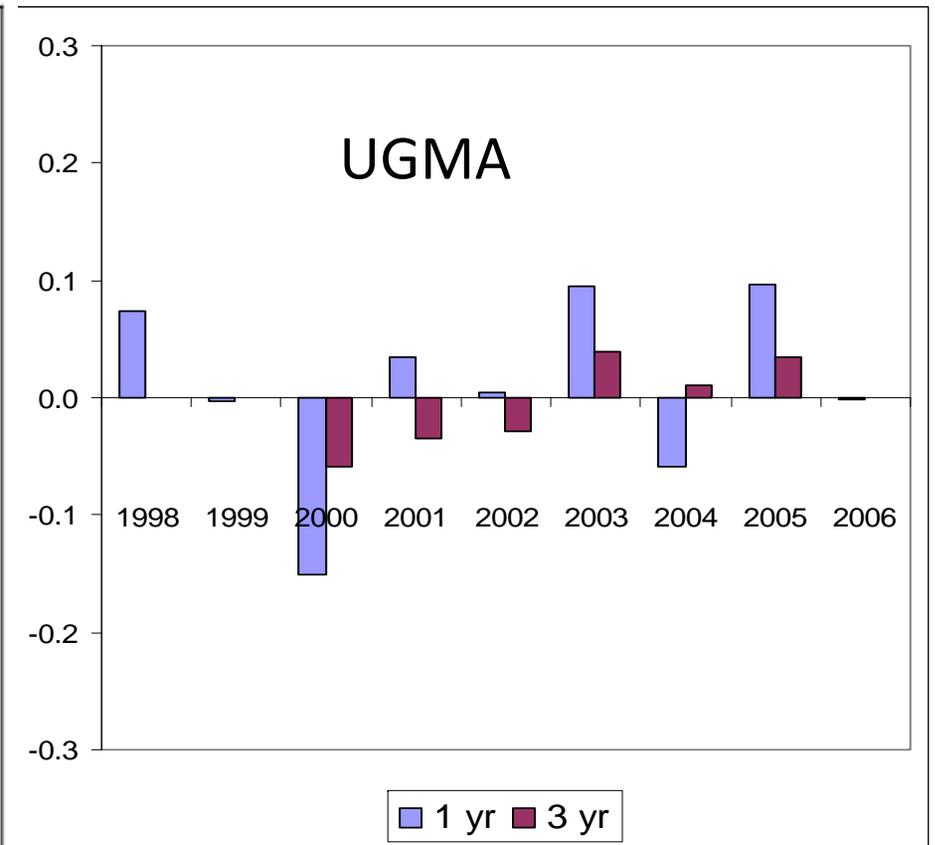
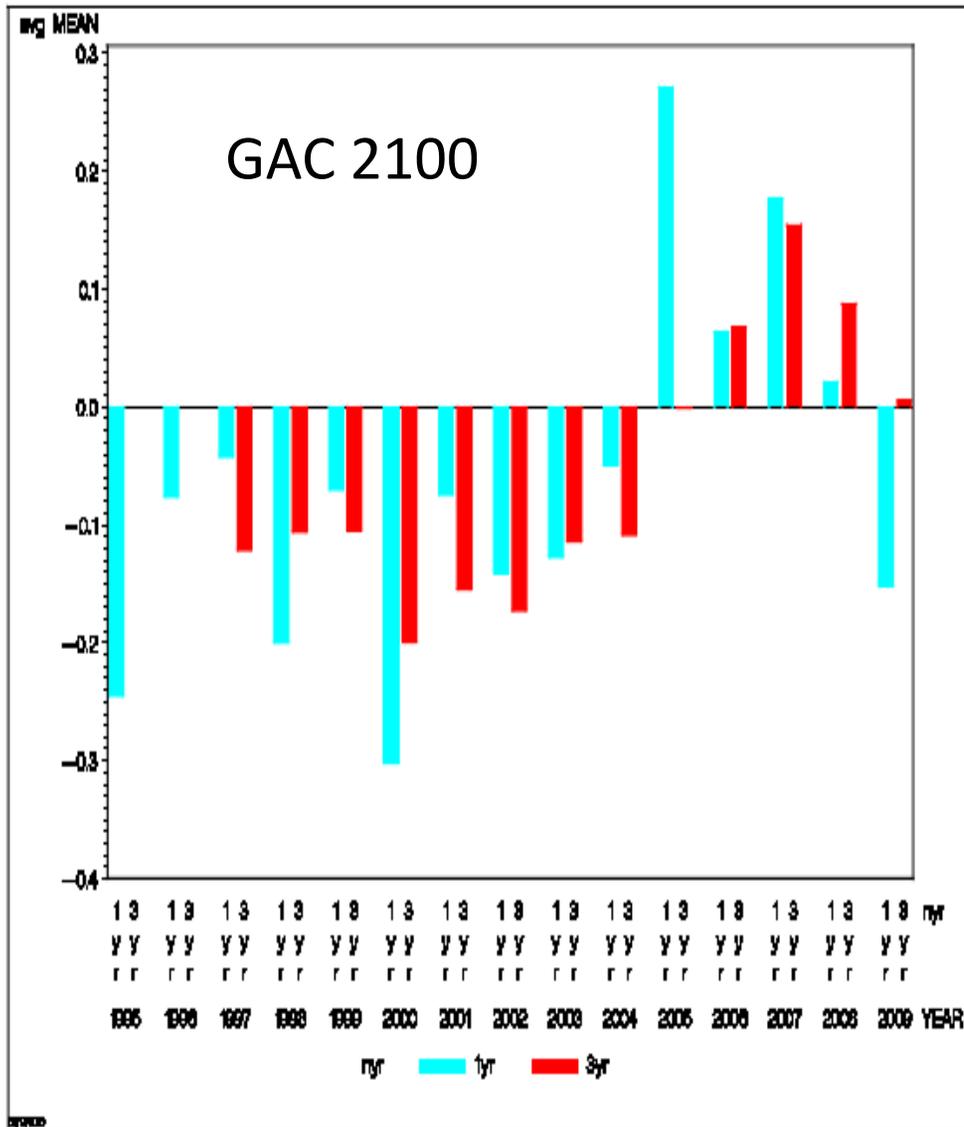
UGMA



Sunflower



Soft Red Winter Wheat

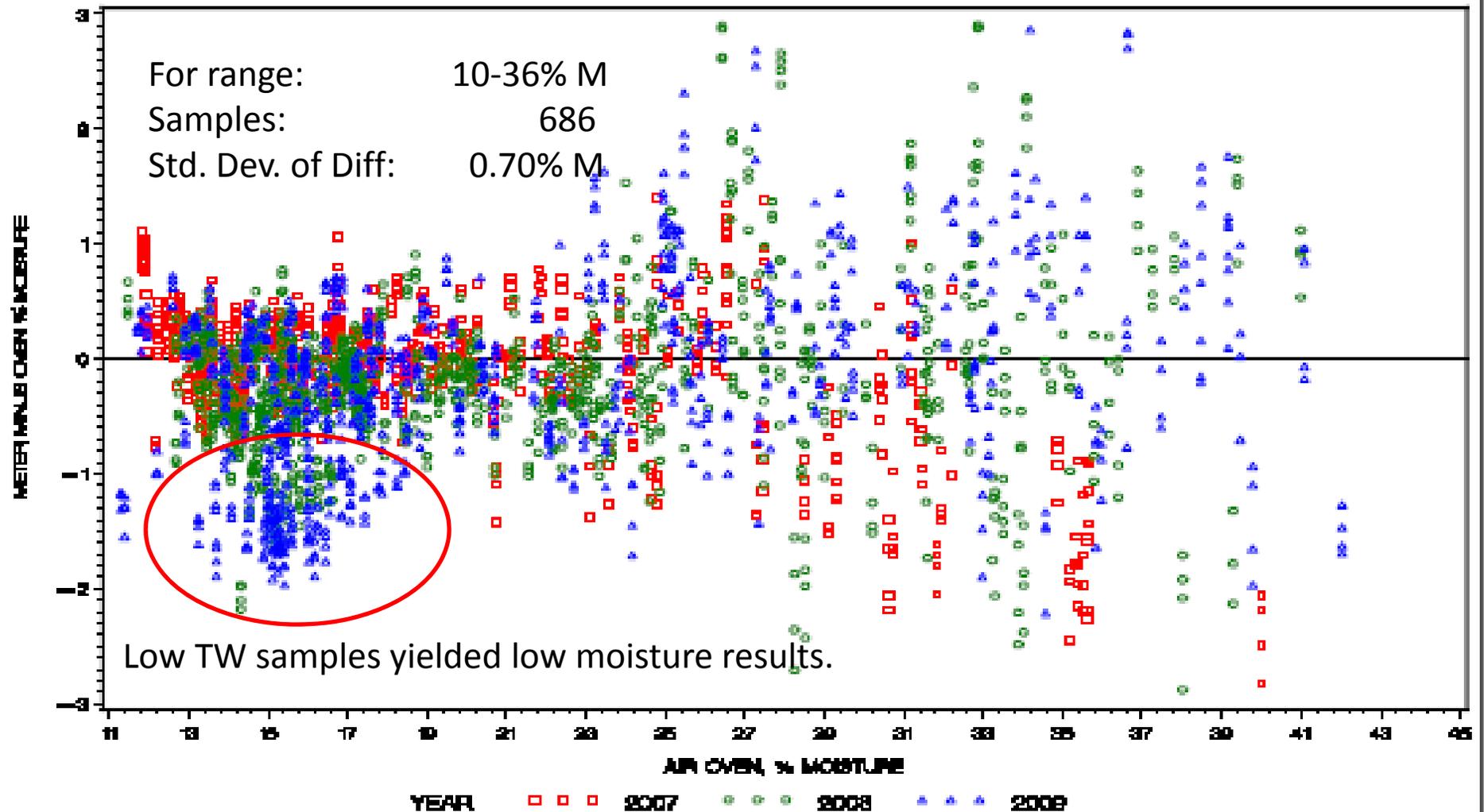


Drastically Improved Accuracy on
High and Low Test Weight Corn

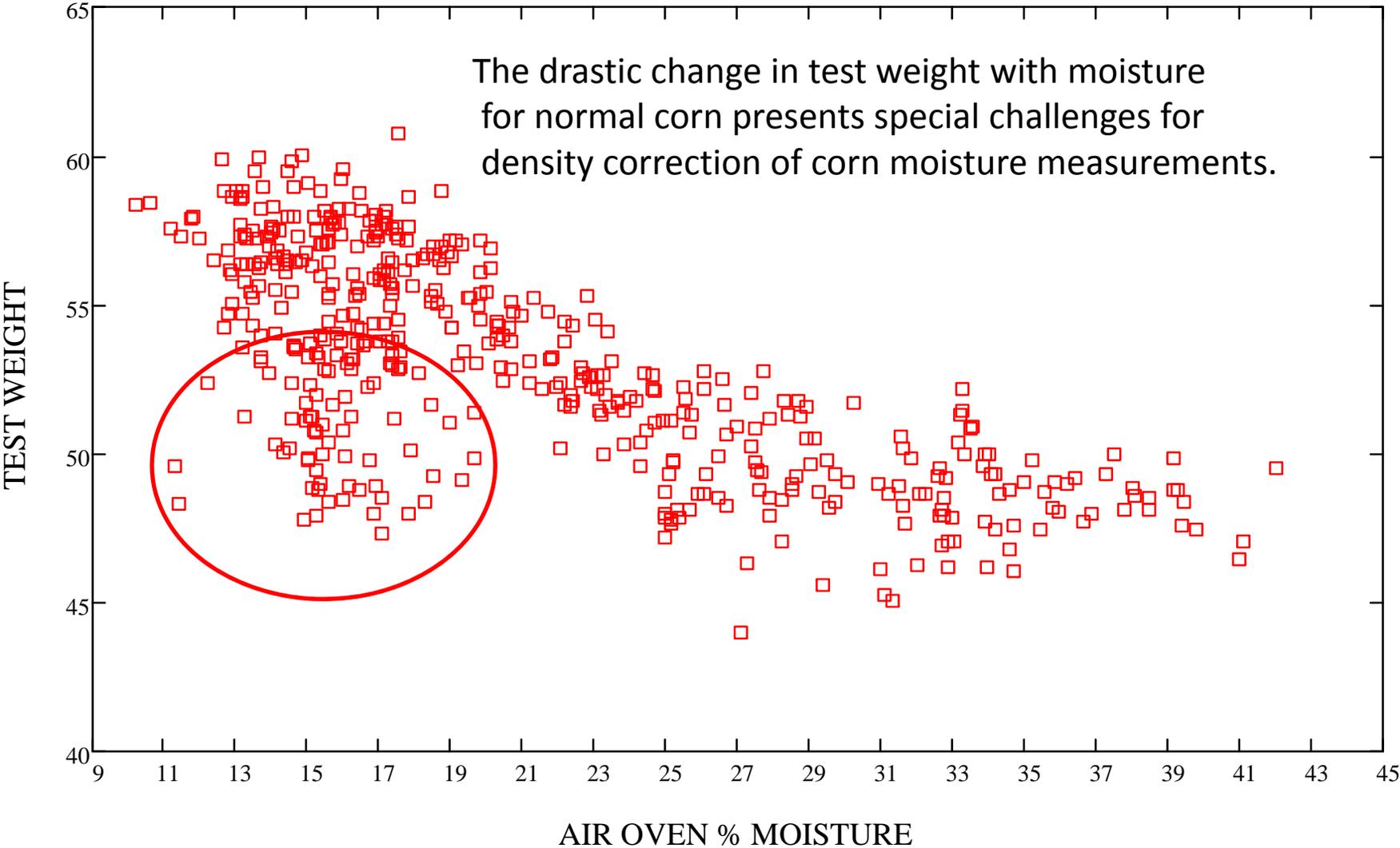
GAC 2100 Corn Results—Density Issue

Accuracy for 2007-2009 Crops

A. Plot of GAC2100 Accuracy vs. USDA Air Oven Moisture, Room Temperature Data Only

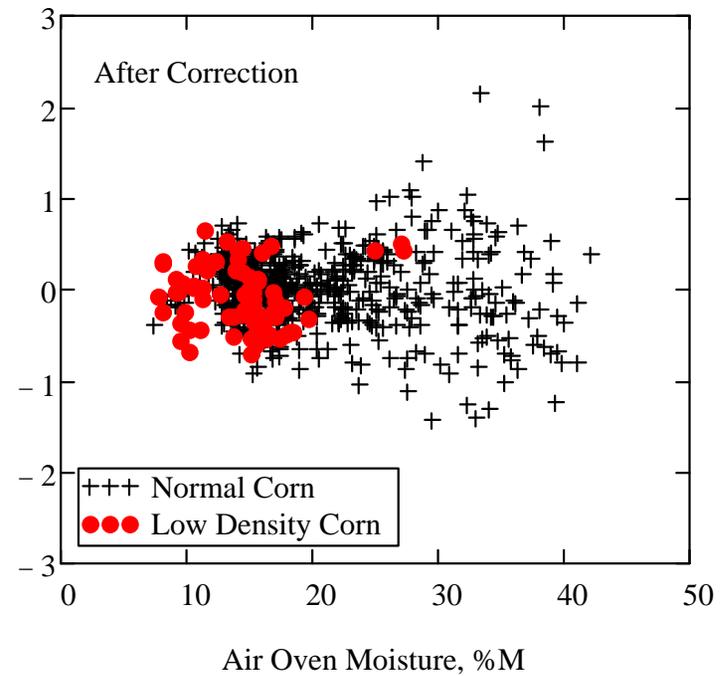
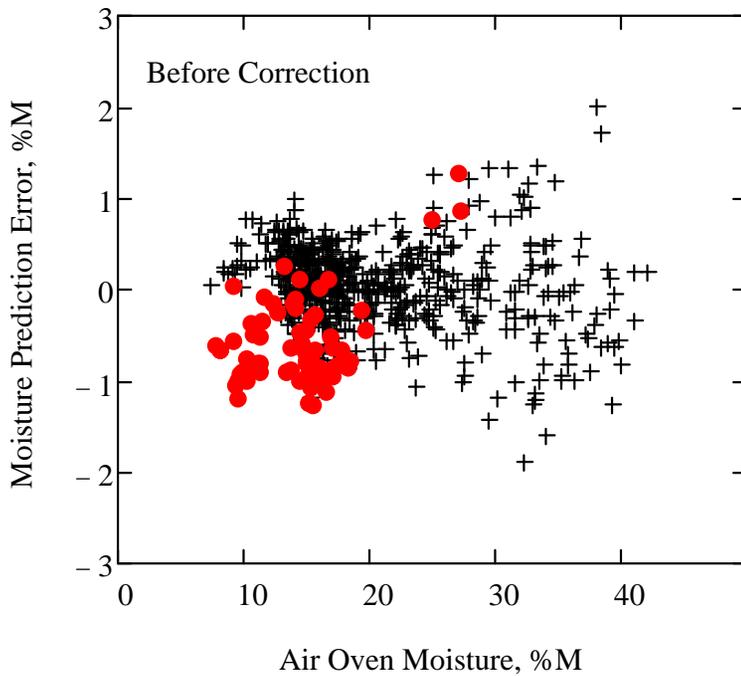


Corn: Official Test Weight vs. Air Oven Moisture



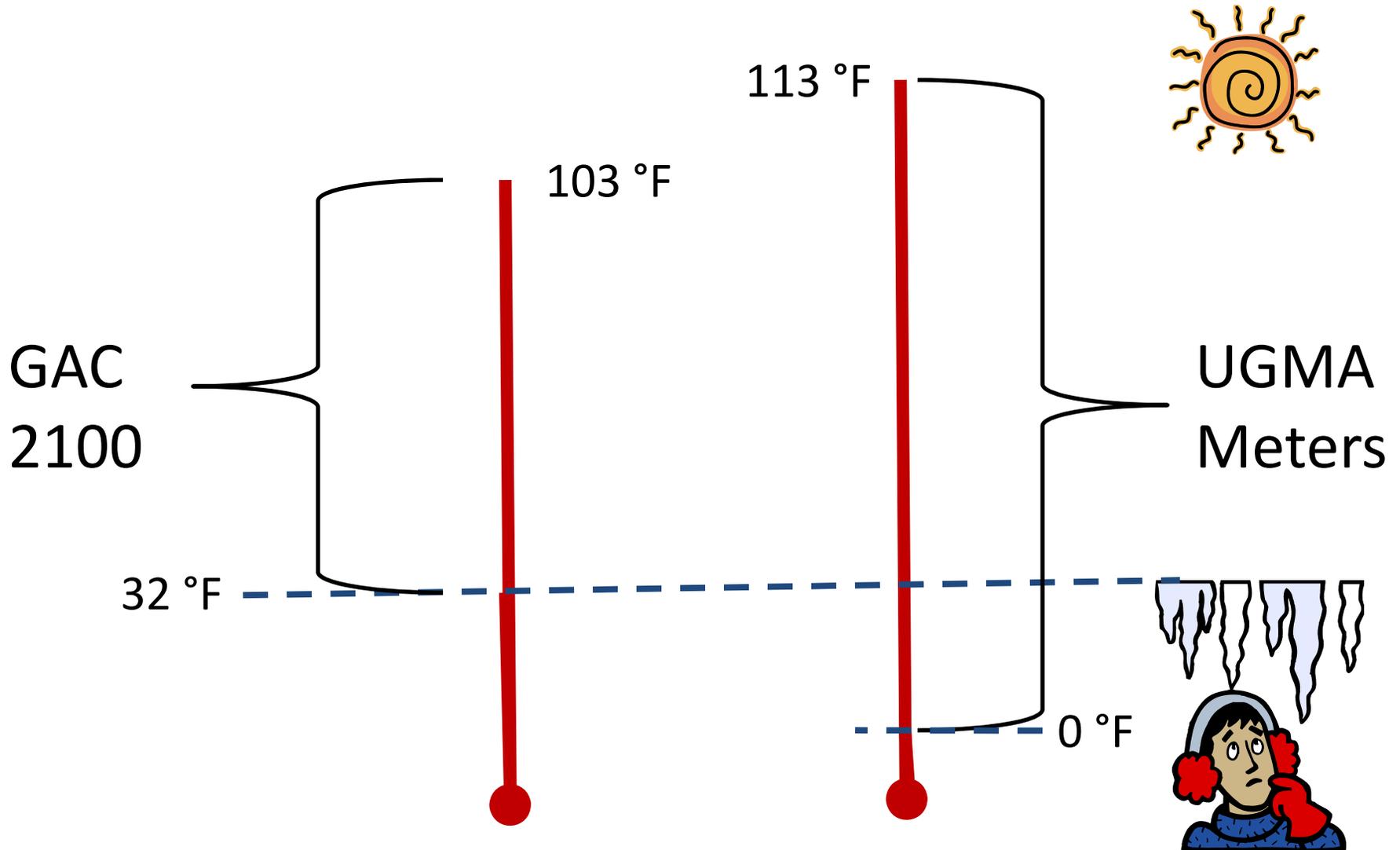
Secondary Density Correction

Corn Results for UGMA



	Before	Bias	STD	Slope		After	Bias	STD	Slope
All Samples		-0.04	0.46	-0.01	→	All Samples	-0.01	0.31	-0.01
Low Density		-0.66	0.34	0.00	→	Low Density	-0.11	0.32	-0.03
Normal		0.09	0.36	-0.04		Normal	0.01	0.30	-0.01

Wider Sample Temperature Ranges



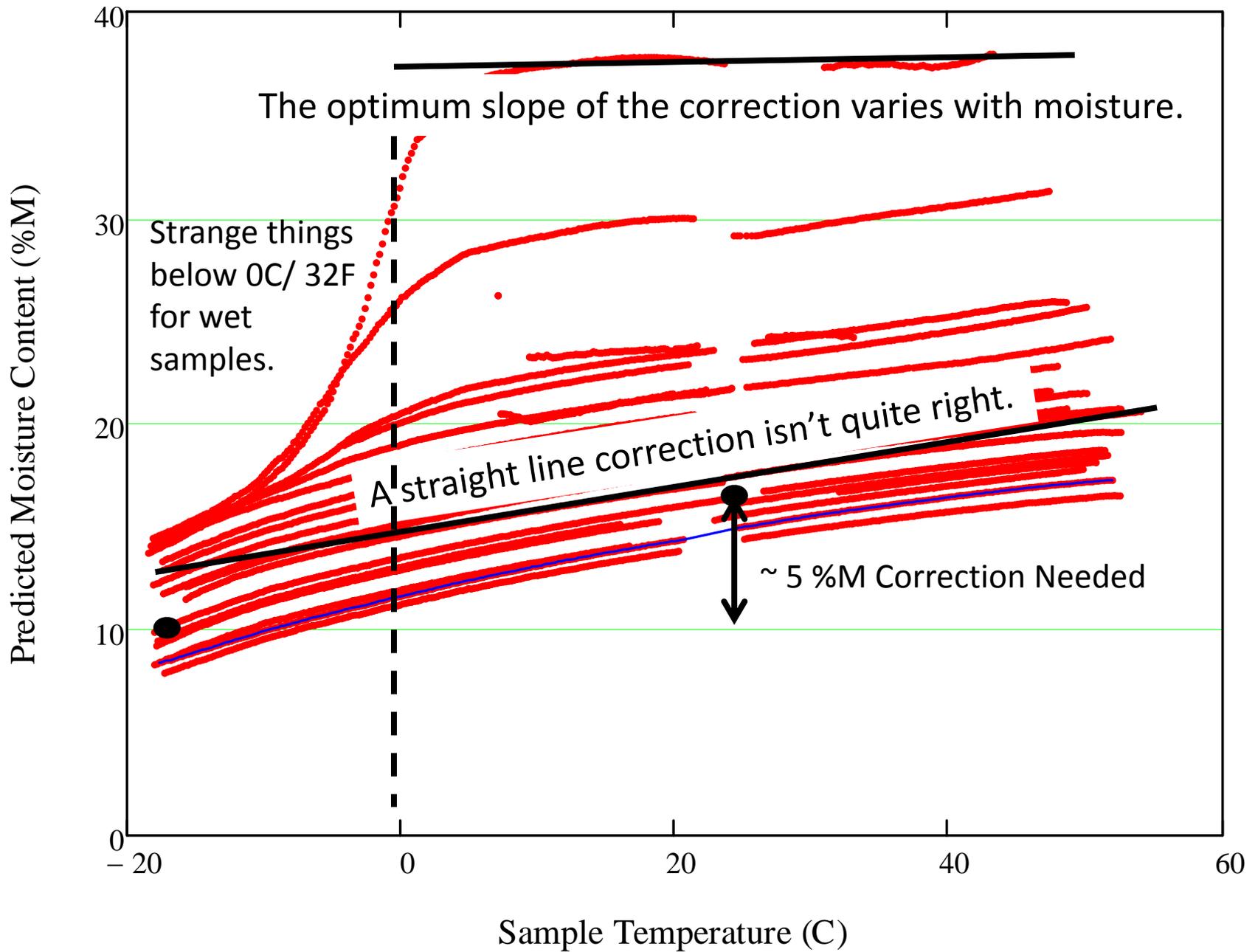
Reasons for Temperature Range Expansion for UGMA Meters

- UGMA criteria demand excellent temperature measurement accuracy.
 - As well as specifying a maximum average moisture error at temperature extremes.
- High measurement frequency reduces temperature effects and differences between temperature effects for different samples.
- UGMA research showed that grain moisture could be measured accurately below water's freezing point—with some limitations.
 - Wet grain is limited to measurement above 32 F.
- UGMA uses more complex and precise temperature correction functions.

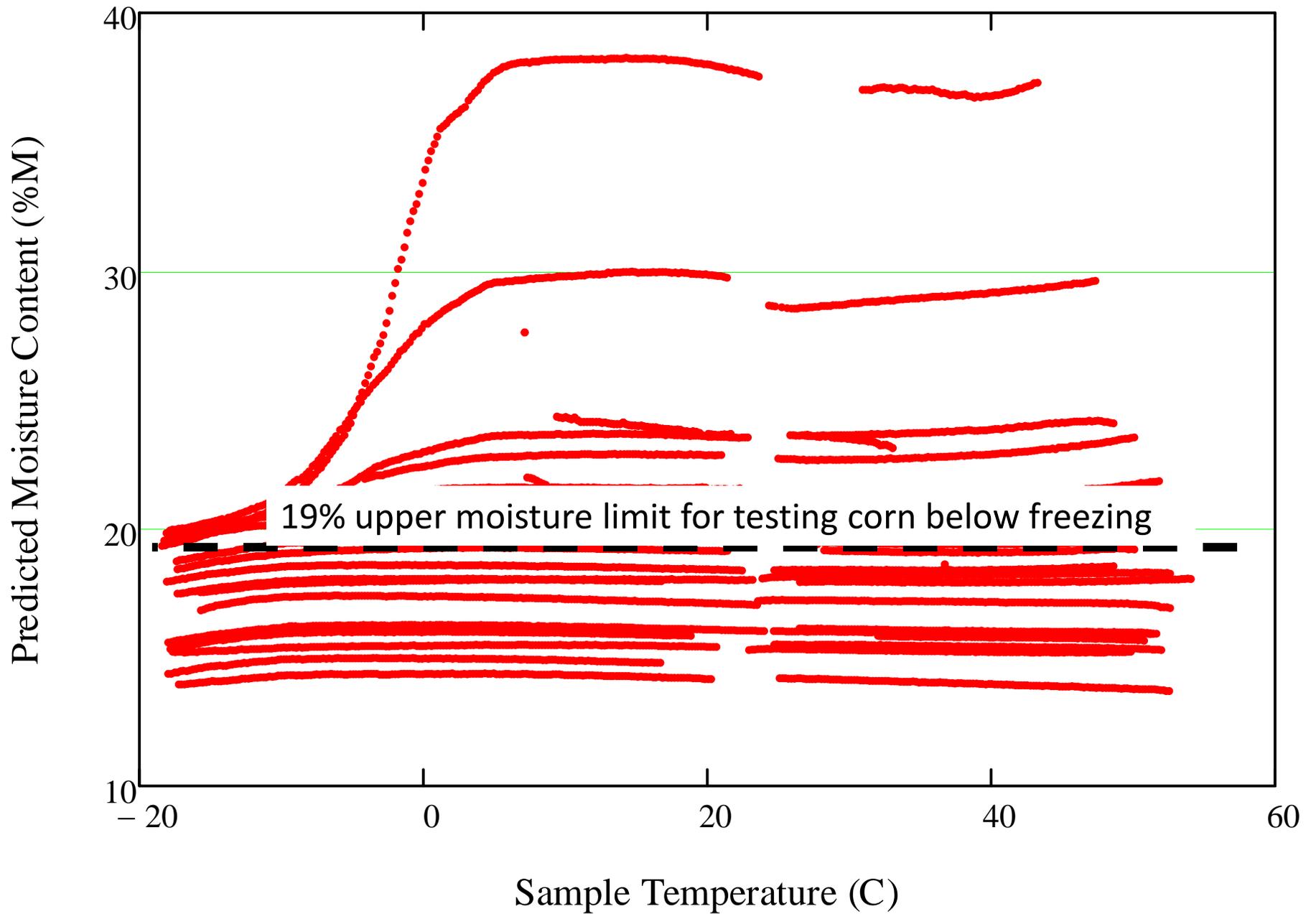
Sample Temperature Effects Require Precise Compensation

- Uncorrected, temperature affects moisture measurements by about -0.1 % moisture per degree C.
- For measurements at 0 F (-18 C), the magnitude of the correction is very large.
 - Roughly +5 % moisture!
- The temperature measurement must be very accurate.
- The amount of correction per degree Celsius must be chosen very carefully for each grain type and moisture level.
- FGIS has performed extensive temperature studies for each official grain type to optimize the temperature corrections.

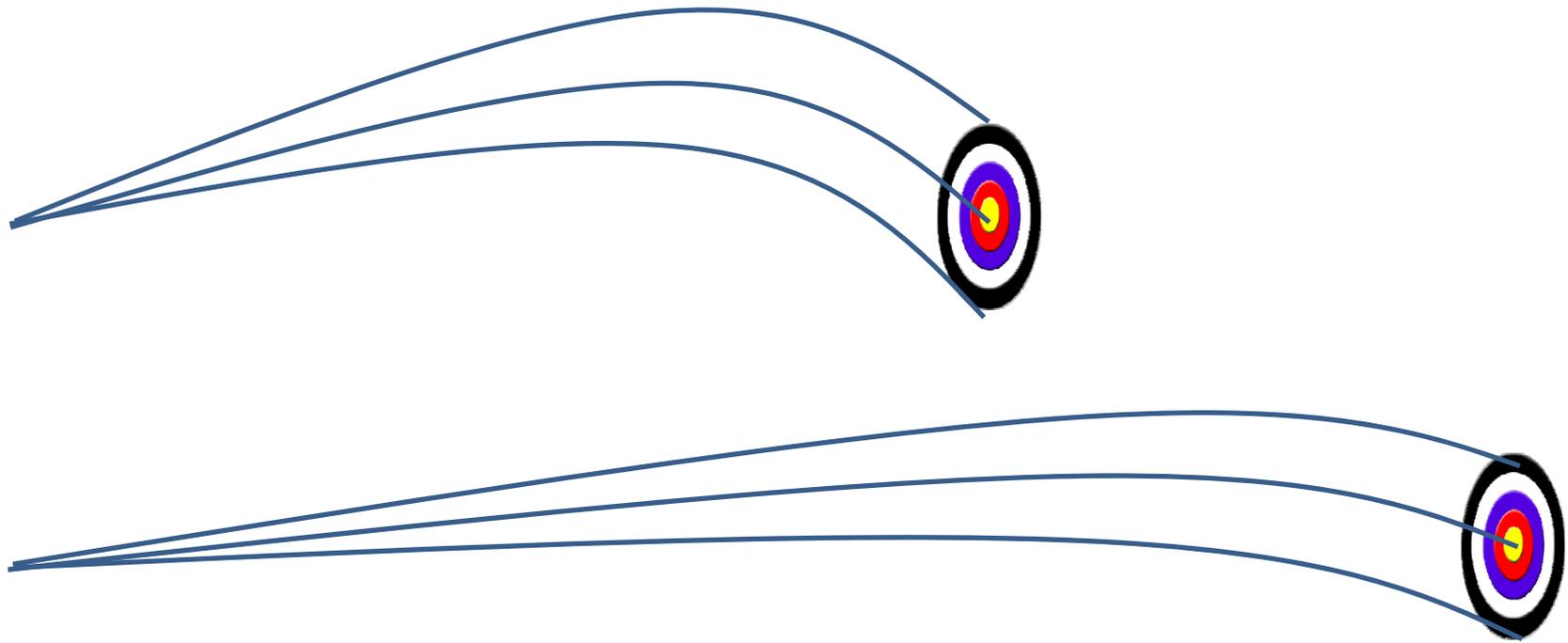
Without Temperature Correction



With Moisture-Dependent Temperature-Quadratic Correction

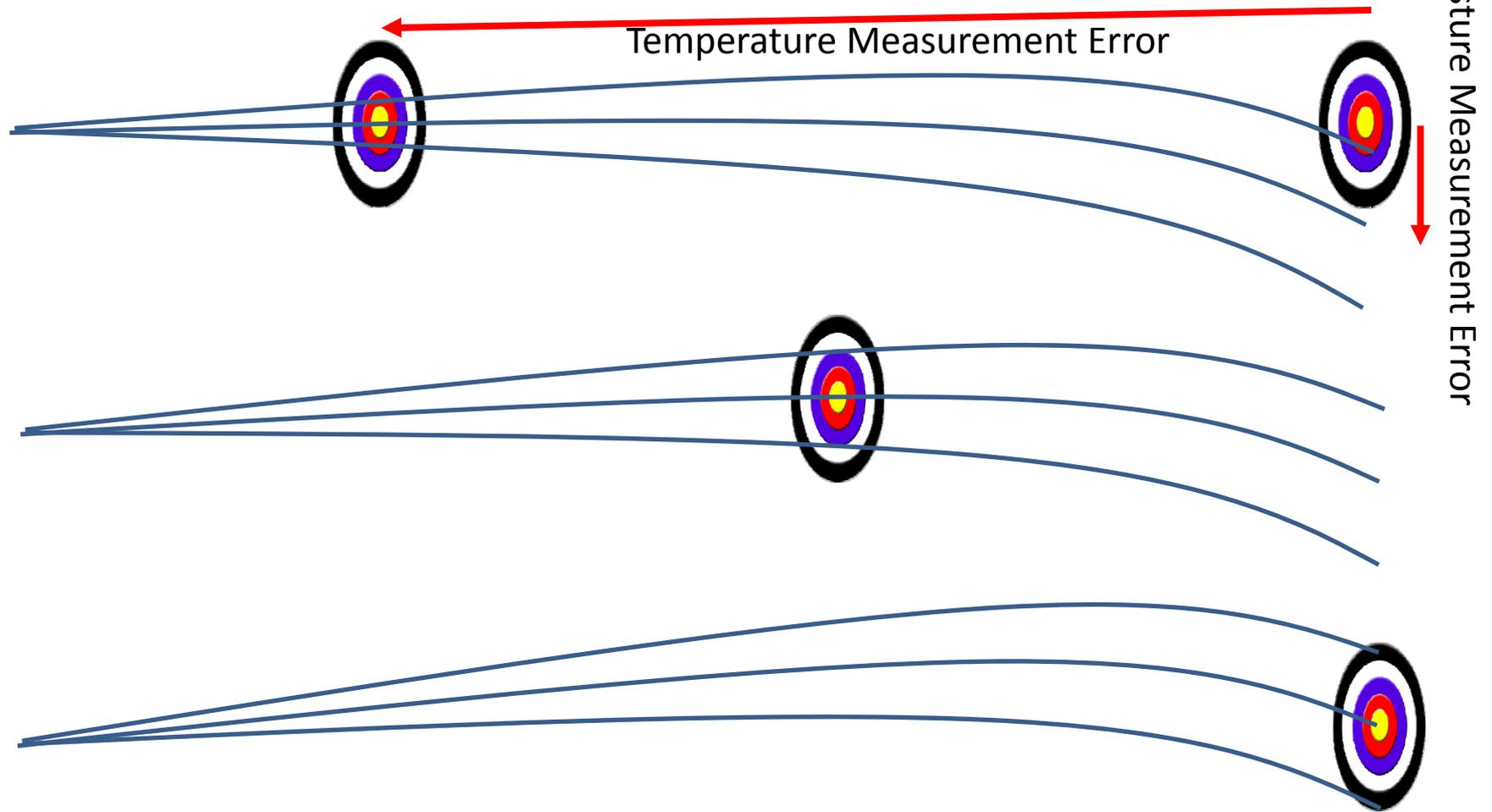


UGMA Technology Meets NTEP Tolerances Over a Wider Temperature Range



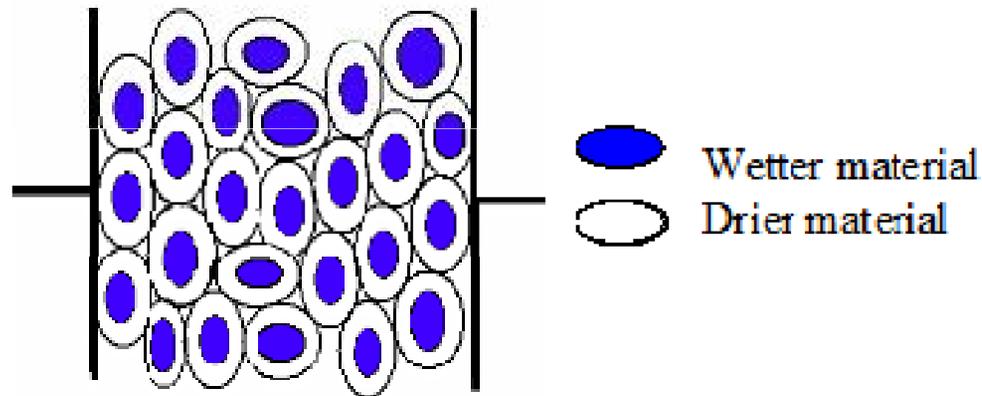
Tighter control over temperature measurements.
Less influenced by differences in grain characteristics.

Knowing the distance to the target is critical for accuracy



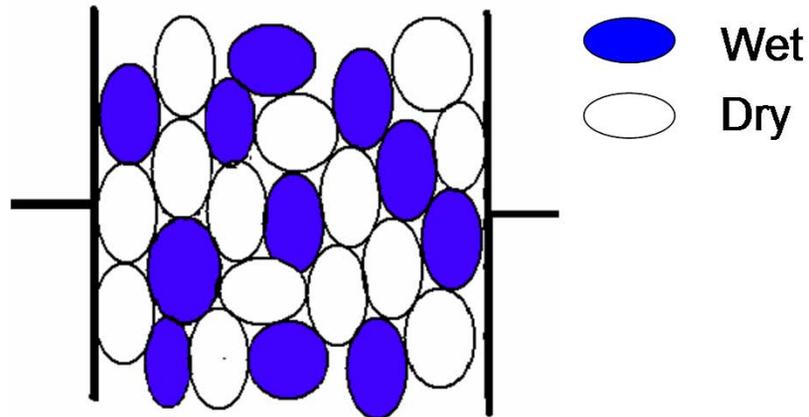
Moisture Rebound and “Green Grain” Effects

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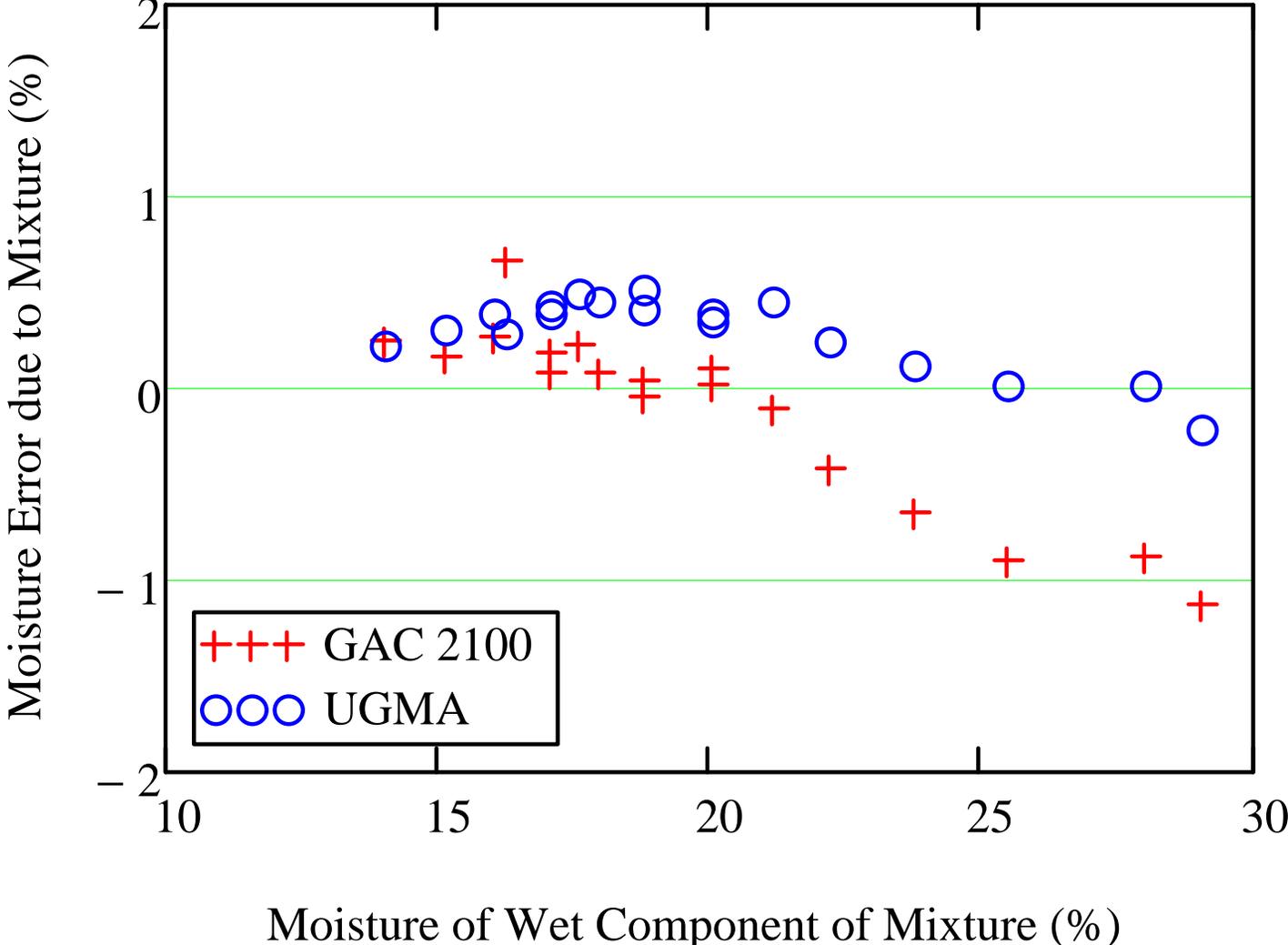


Moisture Rebound and “Green Grain” Effects

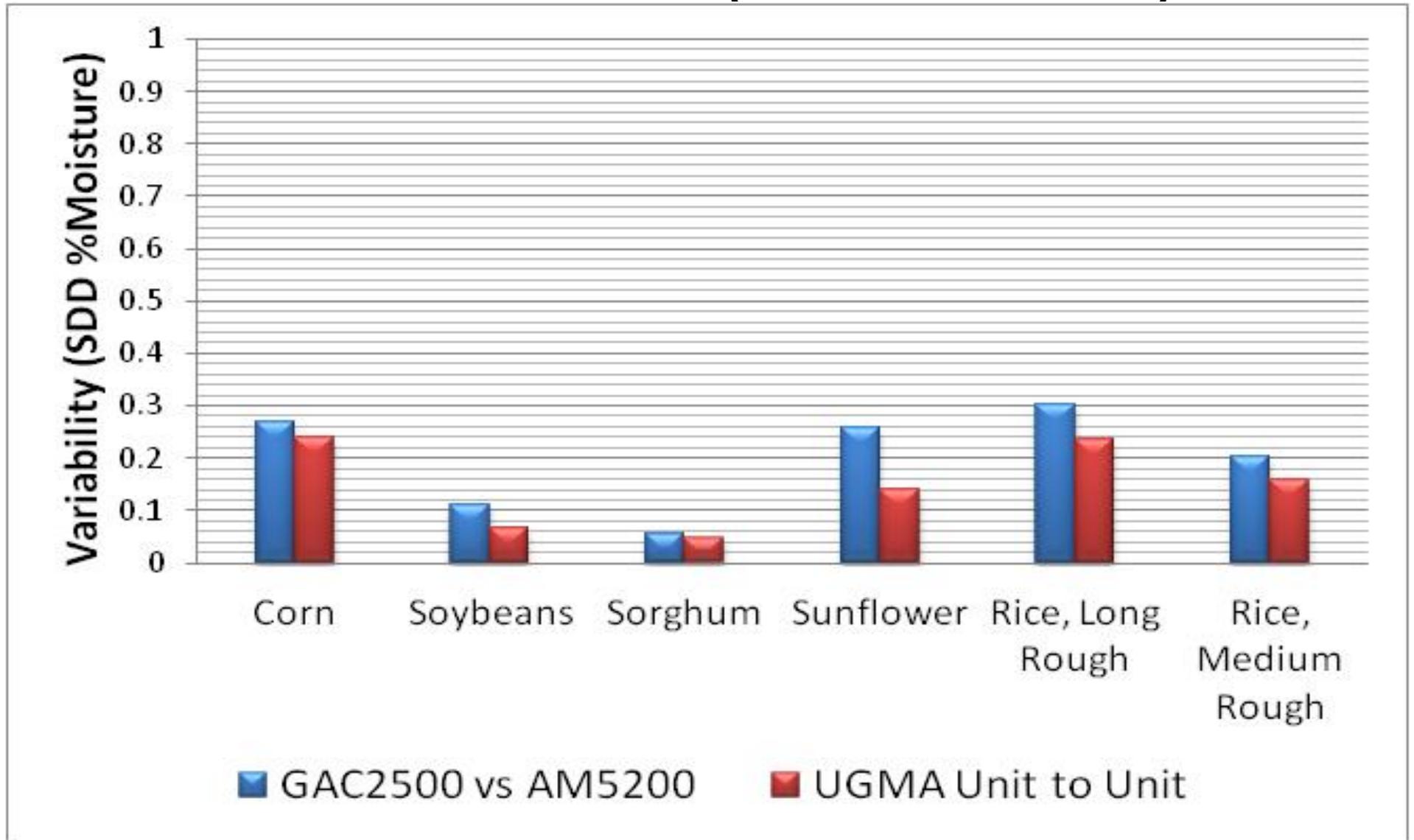
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- “Green Grain” effects occur when a sample of grain is a mixture of kernels with very different moisture contents.
 - Moisture is not distributed uniformly among grain kernels.
- Grain tested under such conditions may yield different results than if it is tested a day later (equilibrated).
- These effects involve several factors that may make moisture error either positive or negative.

UGMA Reduces “Green Grain” Effects

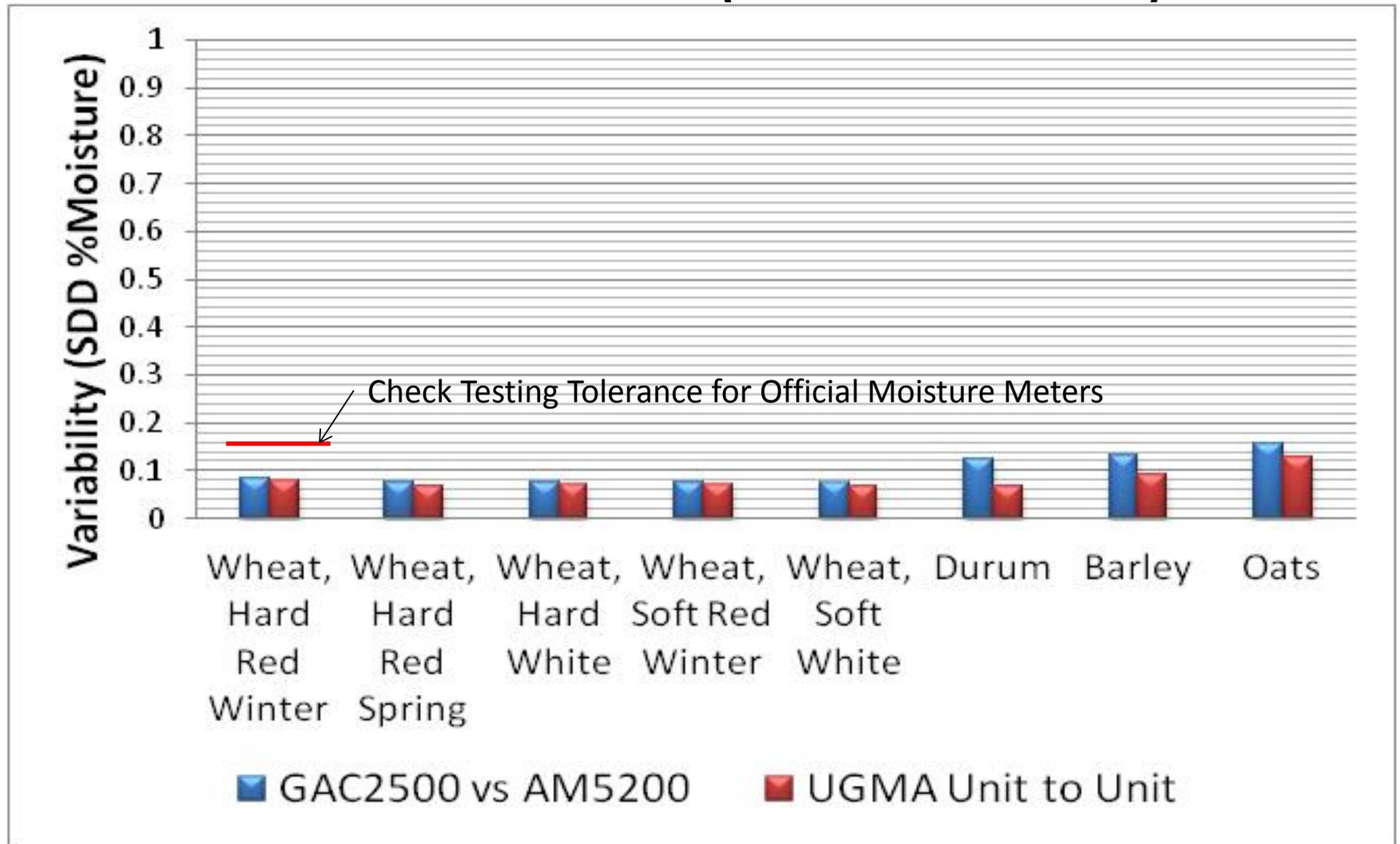
Effects of Mixtures of Wet and Dry Soybeans



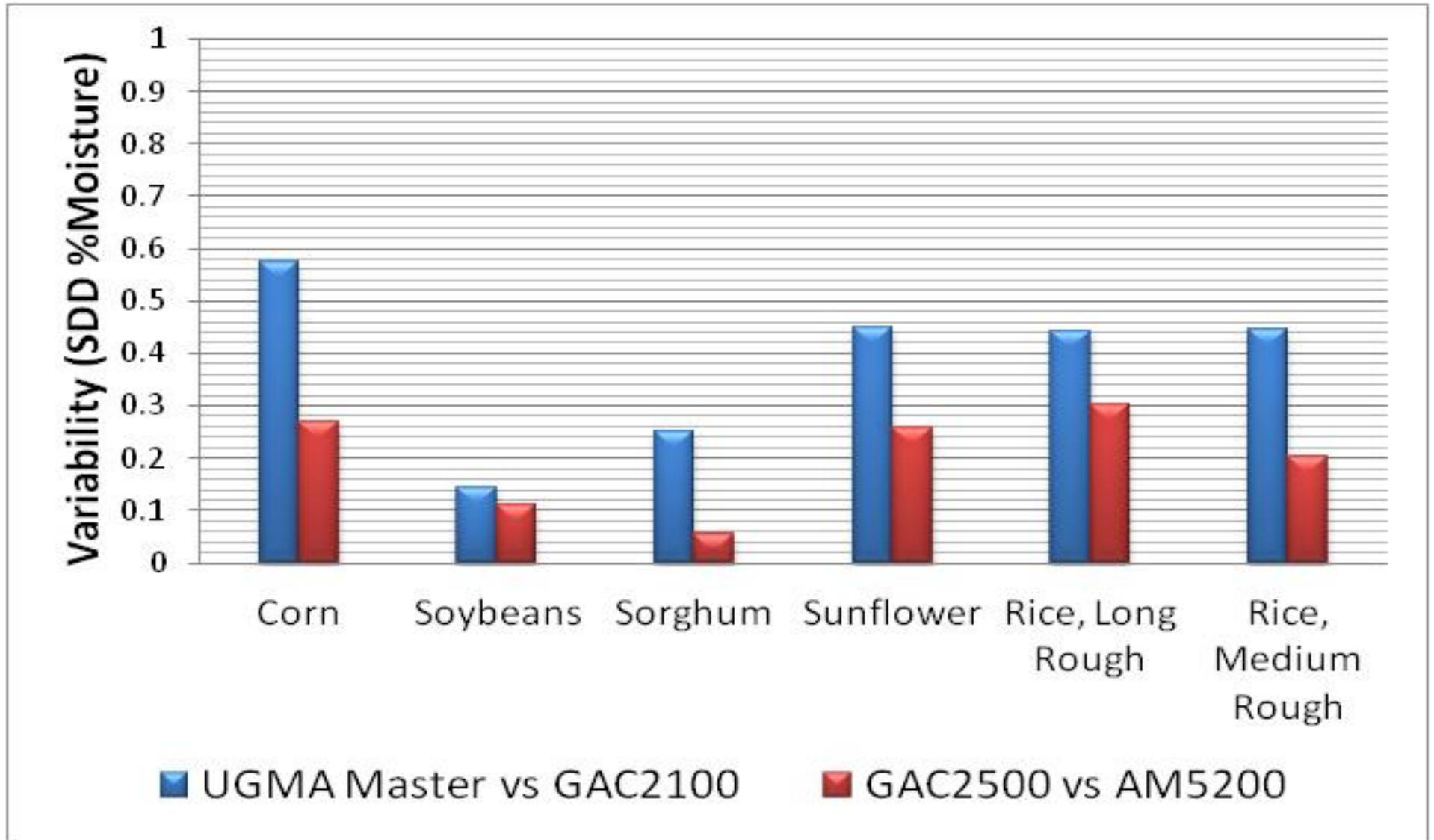
Excellent Agreement Between UGMA Models (Master Units)



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