# Inspection Method Updates

**David Funk**

**Grain Inspection Advisory Committee Meeting**
**Portland, Oregon**
**December 6-7, 2011**

# Topics

- Newly approved rice sheller
- Sorghum “storage musty” odor reference
- Proposed OIML project to create a “global” moisture reference method
- Report on “green grain” studies for new Official moisture measurement technology

# New Rice Sheller for California MGRR & SGRR

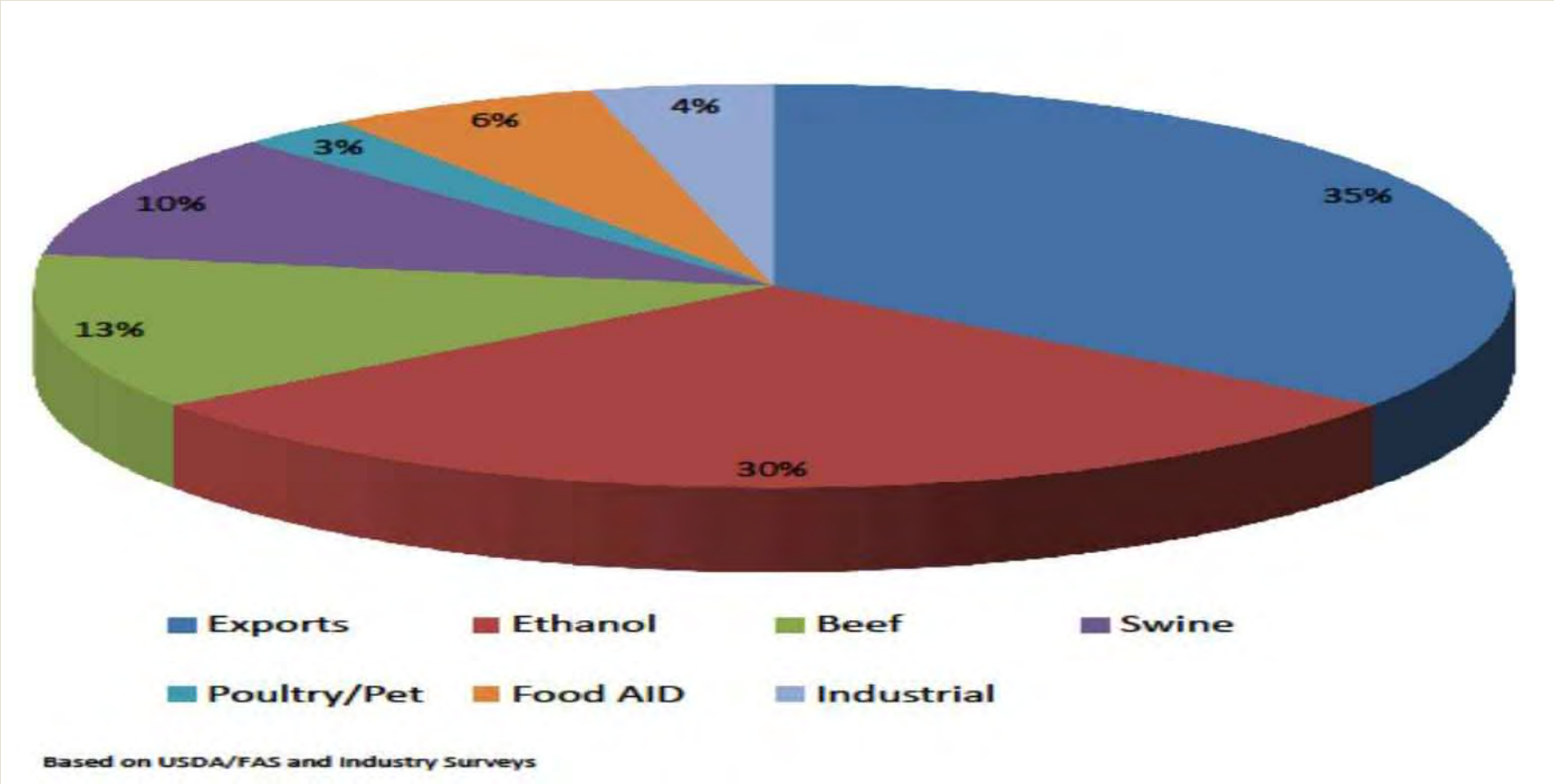
# Sorghum “Storage Musty” Odor

**June 2011 GIAC Resolution:**

“The Advisory Committee recommends that GIPSA continue working on sorghum odor. In continuing this effort, reach out for industry and end-user feedback to set a storage musty sorghum odor reference that refers to end uses.”

.

# Sorghum Usage



# Export Data (May 2011)

| Country | % of US Exports | Predominant Industry |
|---|---|---|
| MEXICO | 54% | Livestock, swine, cattle, poultry |
| SPAIN | 22% | Livestock |
| JAPAN | 10% | Livestock |
| ISRAEL | 5% | Livestock, poultry, dairy |
| MOROCCO | 4% | Livestock, poultry, dairy |
| FRANCE | 2% | Livestock |
| NETHERLANDS | 2% | Livestock |
| ITALY | 1% | Livestock |
| CHILE | < 1% | Livestock |
| TAIWAN | < 1% | Liquor |
| KOREA, REPUBLIC OF | < 1% | Liquor |
| CANADA | < 1% | Swine |
| PHILIPPINES | < 1% | Livestock |

# End-User Survey

- Locations visited:
  - Pork Producers Council — Pork
  - Seaboard Foods — Pork
  - Bonanza Bioenergy — Ethanol
  - Windriver Grain — Ethanol
  - ADM Milling — Drywall, Food
  - Hills — Pet Food

# Reference Sample Specification

- Base Sample : Stored sorghum with “okay” odor
- Chemicals Added:
  - Geosmine (0.0125 mg/kg)
  - 1, 2, 4–Trimethoxybenzene (12.5 mg/kg)
- Sample Size : 500 grams
- Applicability: “Storage Musty” odor in sorghum

# Project Timeline

- **October 2011.** Initiated a new shelf-life study
- **November 2011.** Started training official inspection personnel
- **January 2012.** Complete shelf-life study
- **February 2012.** Prepare reference samples
- **March 2012.** Distribute reference samples and implement
- **March 2012 – June 2012.** Conduct follow-up training at Quality Assurance Seminars

# OIML “Global” Moisture Reference

- Metrologists from several nations have proposed standardizing on a “globally acceptable” moisture reference method
- Seeking input on whether industry stakeholders would favor adopting a single reference method to define moisture in grain
- Change in moisture reference methods was considered & rejected by US grain industry in 1980’s

# OIML “Global” Moisture Reference

- Pros:
  - Remove inconsistencies in international trade
  - Establish traceability to one “globally accepted” definition of moisture content
- Cons:
  - Cause significant disruptions in trade due to the need to change production, handling, drying, and pricing practices
  - Significant changes in value of grain stocks
  - Simultaneous “global” adoption of moisture reference method: “inconceivable”

# New Official Grain Moisture Technology

- **June 2010:** Grain Inspection Advisory Committee (GIAC) passed resolution supporting adoption of new Official moisture measurement technology.
- **August 2010:** Agency made decision to pursue new Official moisture technology.
- **November 2010:** GIAC passed resolution urging testing new technology with “Green” rough rice.

# New Official Grain Moisture Technology

- **May 2011:** Completed initial assessments of sensitivity to "Green" rough rice and soybeans.

- **June 2011:** GIAC passed resolution urging continued evaluation and adoption of 149 MHz technology as new official standard.

- **July 2011:** FGIS procured updated Impedance Analyzer to support adoption of UGMA for Official moisture technology.

# New Official Grain Moisture Technology

- **Sept. – Nov. 2011:** Conducted "green" grain studies for soybeans and rough rice
- **February 2012:** Target for decision regarding adoption of 149 MHz technology
- **May 2013:** Implementation for most spring/summer harvest grains
- **August 2013:** Implementation for most fall harvest grains

# “Green” Grain Studies

- **Rebound:** Moisture error due to rapid drying of outer kernel layers
  - Typically observed when harvesting on warm sunny day after cool wet weather
- **Mixtures:** Wide moisture variations between kernels in the sample
  - Typically observed when harvesting grain with kernels at different levels of maturity

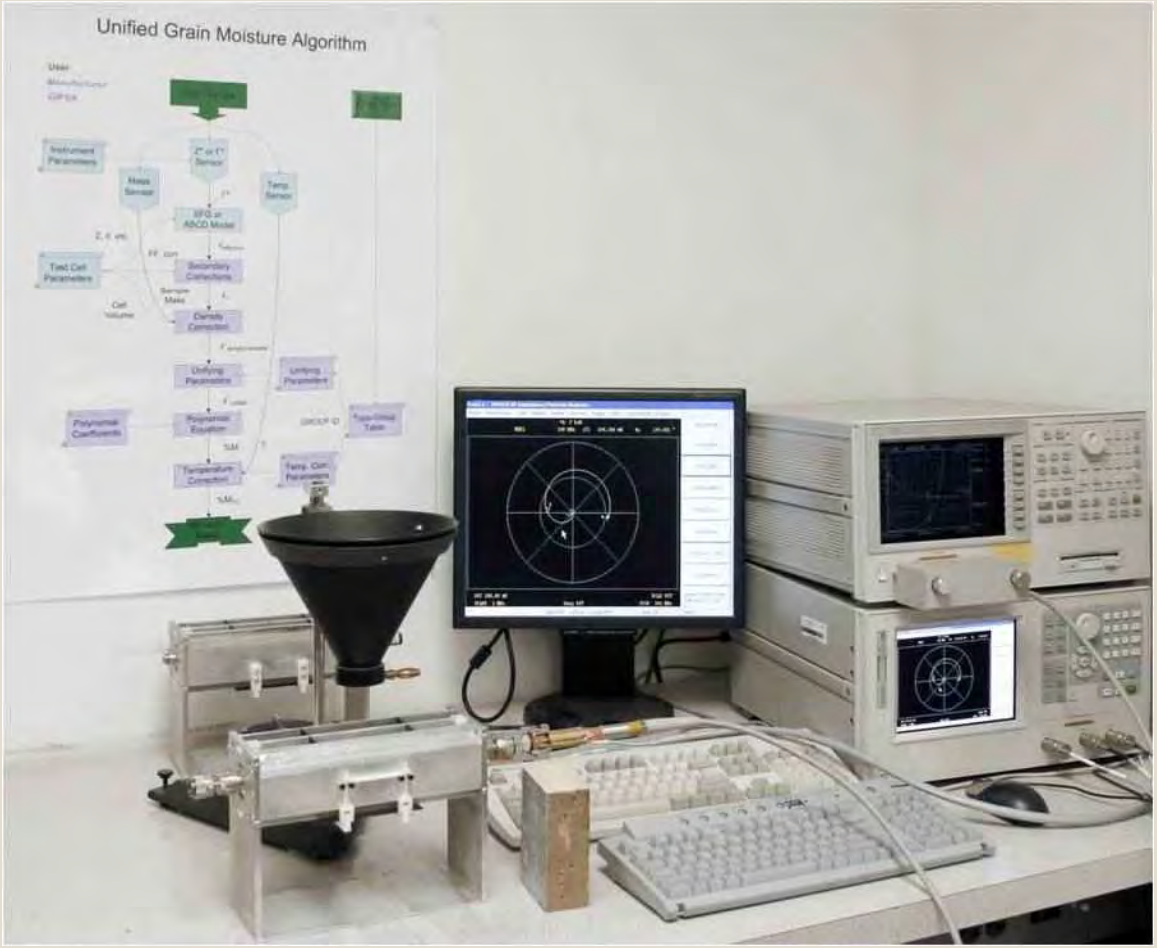
# Rebound Experiment

- Collected high moisture grain
  - Up to 29% for LGRR
  - Up to 21% for soybeans
- Dried rapidly to target moistures
  - 15-27% for LGRR
  - 12–13% for soybeans
- Air-cooled
- Tested with moisture meters
- Allowed to equilibrate (2-7 days)
- Retested with moisture meters

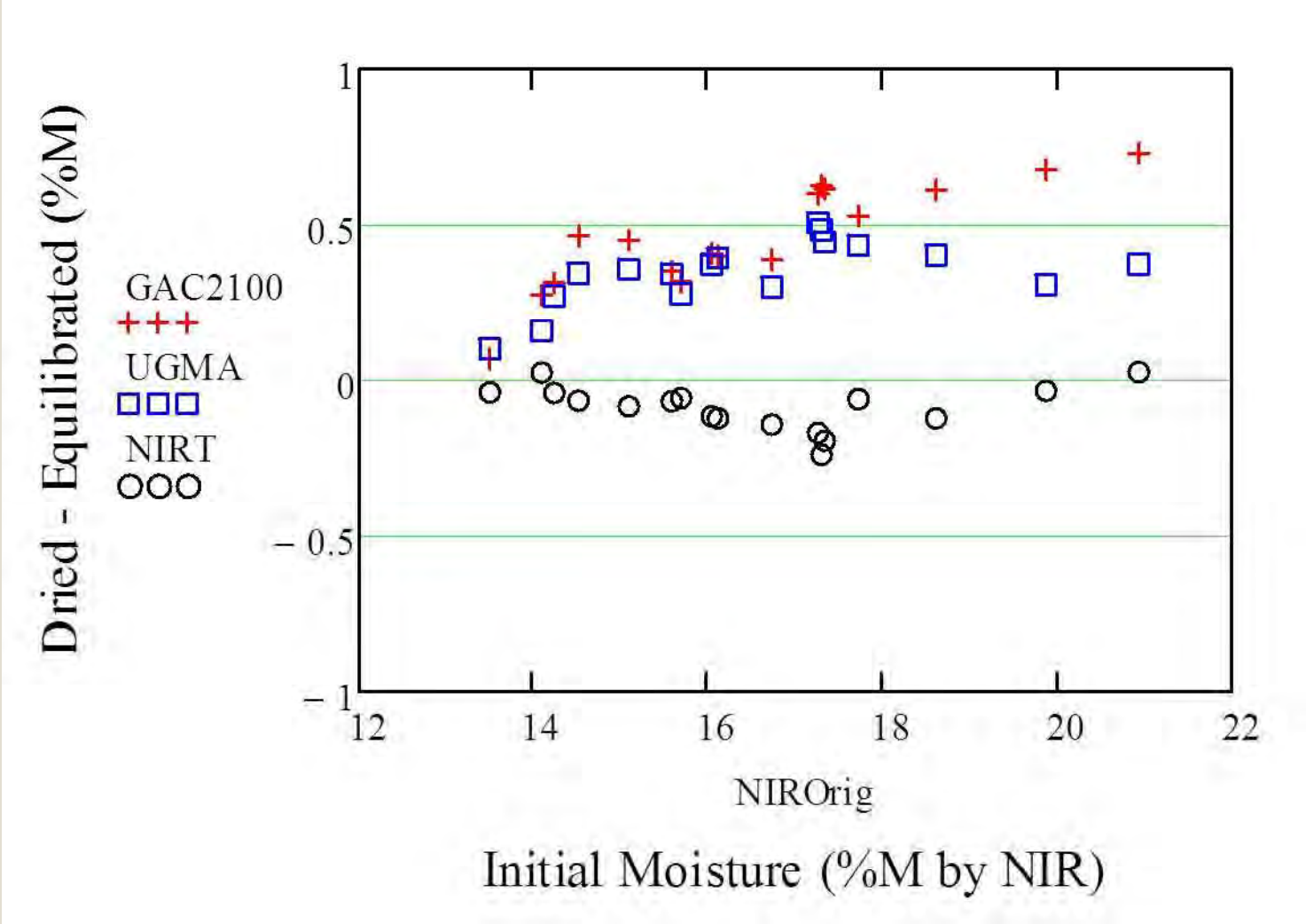
# Mixture Experiment

- Collected dry and wet grain
  - LGRR 12%, 20-30%
    - All naturally moist
  - Soybeans  9%, 14-27%
    - Soybeans above 21% were artificially moistened
- Prepared mixtures of dry and wet grain to achieve target moistures
  - 16-19% for LGRR
  - 12-13% for soybeans
- Tested on moisture meters
- Allowed to equilibrate (2-7 days)
- Retested on moisture meters

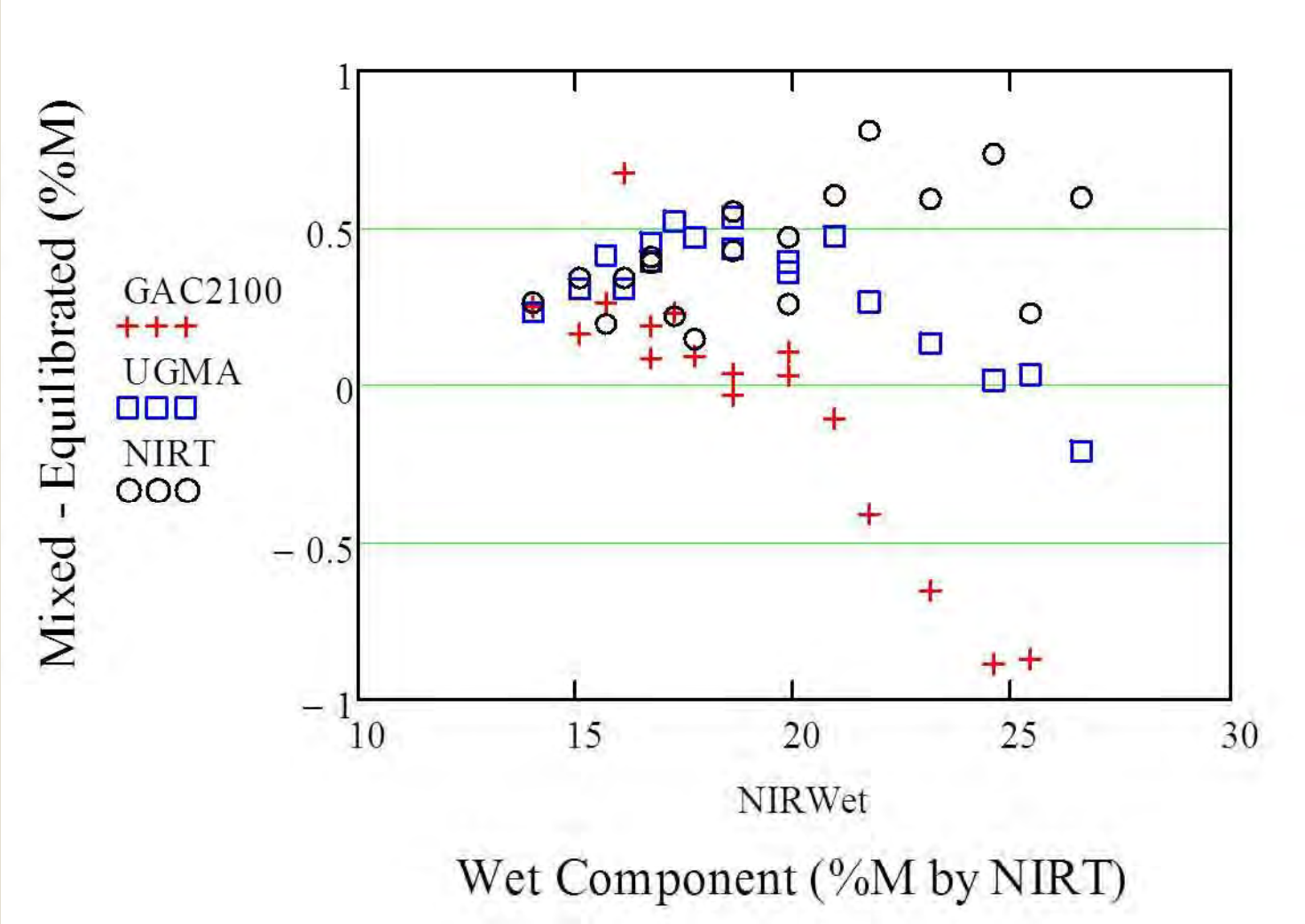
# Moisture Equipment Used



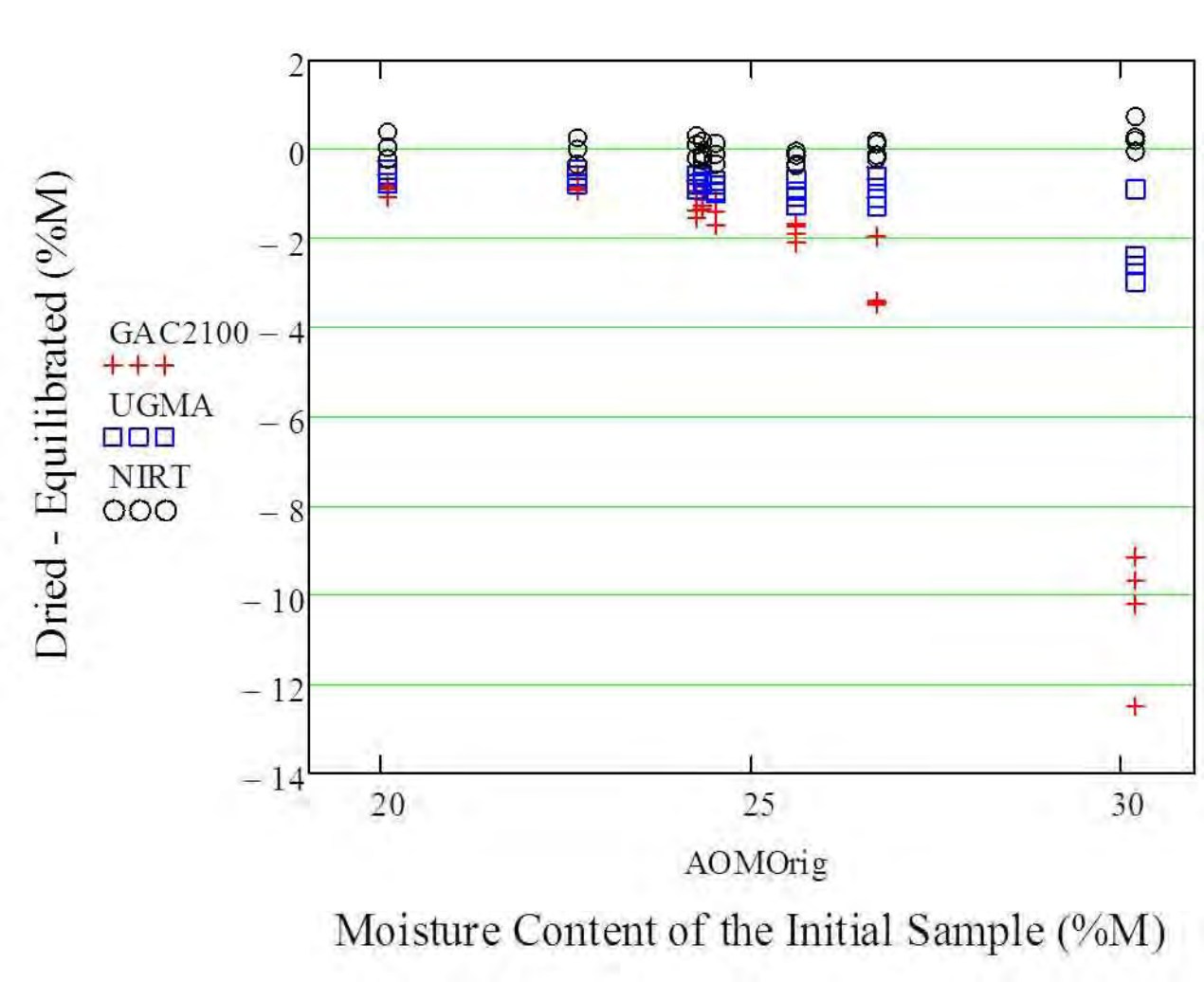
# Soybean Rebound Results



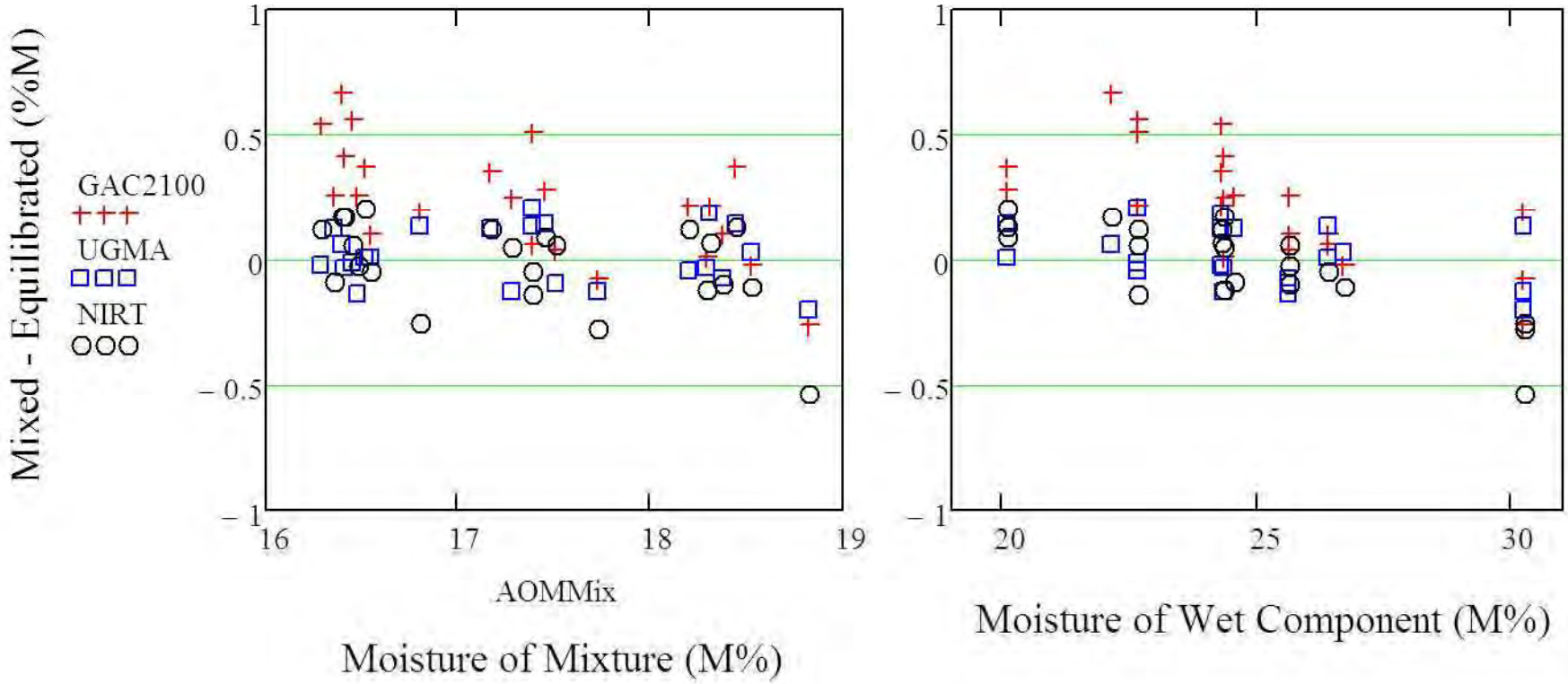
# Soybean Mixture Results



# Rice Rebound Results



# Rice Mixture Results



# Conclusions

- All three moisture measurement methods showed some sensitivity to these extreme cases of moisture rebound and mixtures.
- In most, but not all, cases, NIRT was least sensitive of the three to rebound and mixtures.
- In all cases, GAC2100 was the most affected by rebound and mixtures.
- Rice rebound showed the most significant errors.
- UGMA (149 MHz technology) was significantly less affected than the GAC2100.

# Acknowledgments


- Ben Lackey, Riceland Foods, provided an excellent set of LGRR samples for this experiment and gave valuable advice on moisture levels for the rice tests.
- Fred Seeber, Shore Measuring, provided valuable guidance on setting the moisture levels for the soybean tests.
- Zoltan and Biborka Gillay designed and conducted the experiments and analyzed the data.