

Sugar Content in Grasses

Part II: NIRSC Calibration

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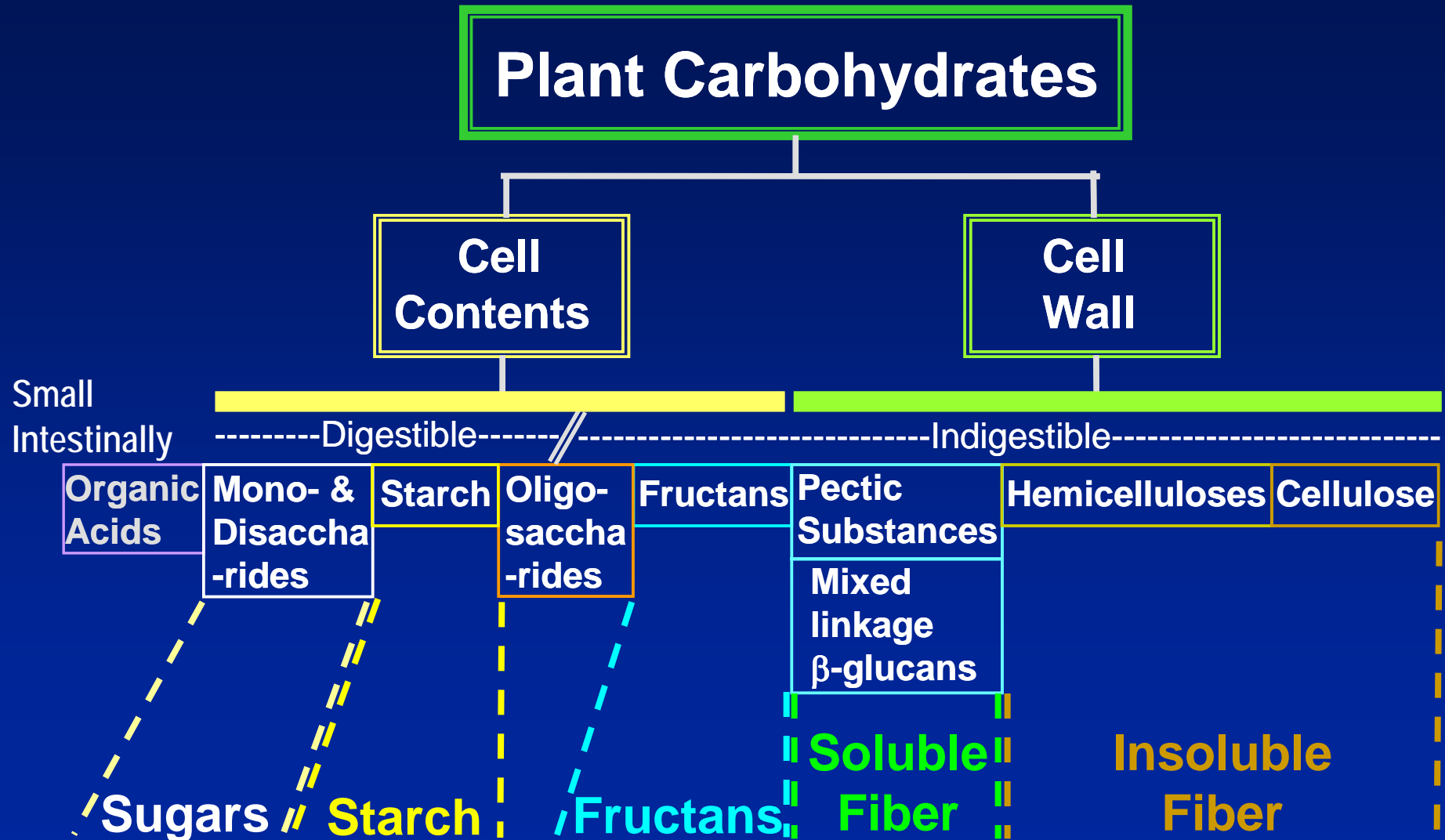
San Antonio, TX

Purpose of Sugar Calibration for Grasses

- Develop calibration to determine water soluble carbohydrate (WSC) concentration in grass
- Plant breeders will use calibration to select grasses for WSC
- Other consortium member labs can use to determine concentrations of specific carbohydrates of grass – horse owners in market place are requesting “low carbohydrate” grass hay



Nutritionally Relevant Carbohydrates



Proposed AAFCO Definitions

Sugars

The sum of all free disaccharides and monosaccharides such as sucrose, lactose, maltose, glucose, fructose and galactose or others digestible by enzymes found in the animal's digestive tract.

Fructans

Polysaccharides and oligosaccharides in which fructose is the major constituent and glucose is the minor constituent. Glucose content is 33% or less.



Methods

- Identified 67 samples from spectra of grass samples supplied by FFR and CAL/WEST



Methods

- **Samples analyzed by Philip Harrison, Forage & Range Research Laboratory, USDA-ARS, Logan, UT**
- **Analyzed for WSC in 2 steps:**
 - **First step determines glucose, fructose and sucrose (partial hydrolysis of maltose & raffinose)**
 - **Second step determines Oligosaccharides, which are primarily fructans (again small amount of Maltose & raffinose present)**



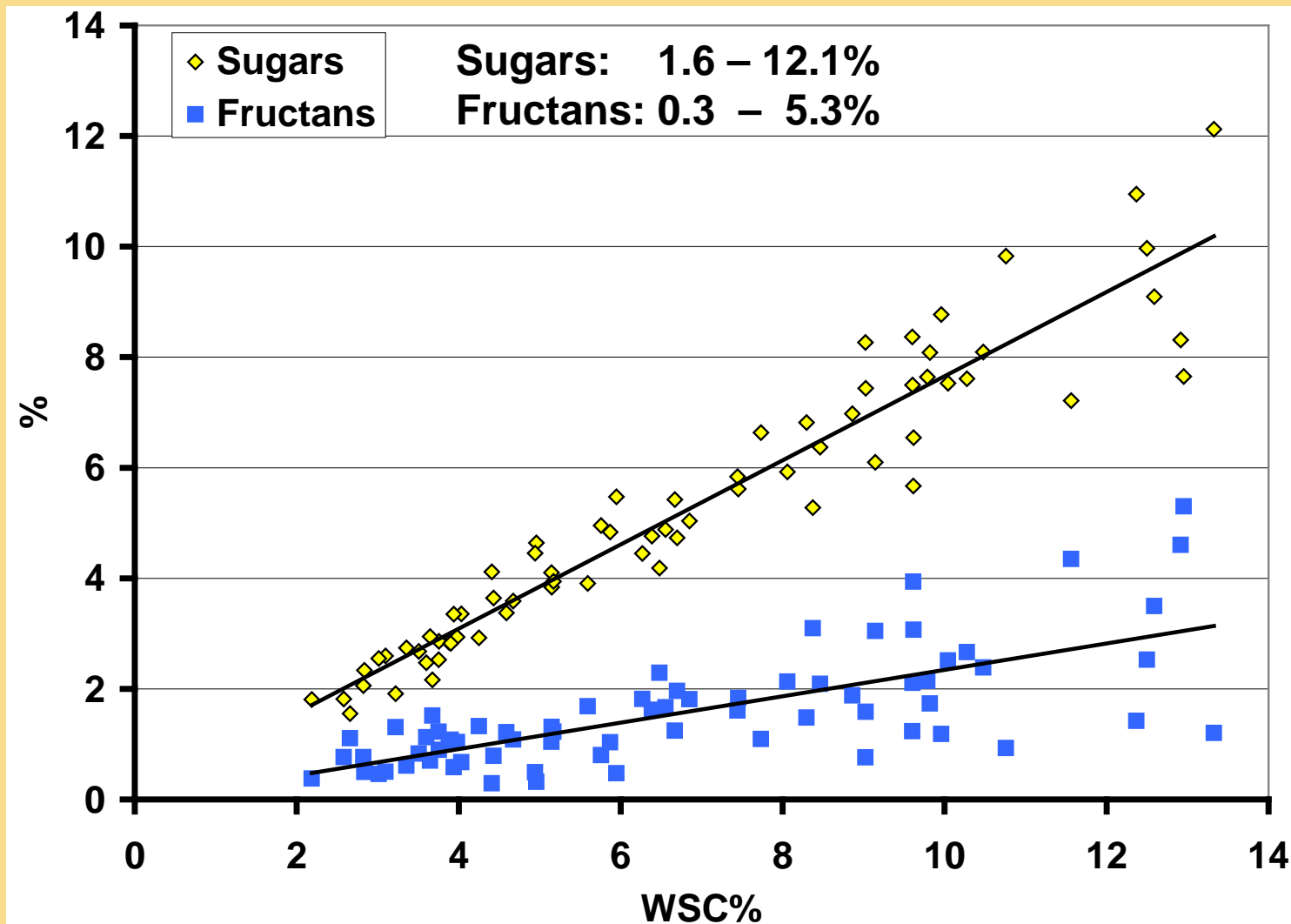
Methods

1. Hot water extraction
2. Hydrolyze sucrose+maltose with enzymes to release monosaccharides
3. Measure extracted and released total monosacc. (= Sugars)
4. Destroy monosaccharides
5. Acid hydrolyze fructans to release monosacc. (because available enzymes such as inulinase not entirely effective on grass fructans)
6. Measure released monosacc. (= Fructans)
7. WSC = sugars + fructans

Monosaccharides measured using *p*-hydroxybenzoic acid hydrazide (PAHBAH) reducing sugar assay



Results: WSC vs. Sugars & Fructans



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08SUG50S.EQA

Stat	Sugars	Fructan	WSC
N	65	67	66
Mean	4.90	1.43	6.54
SD	2.19	0.80	2.97
SEC	0.46	0.41	0.55
RSQ	0.96	0.74	0.97
SECV	0.56	0.46	0.69
1-VR	0.93	0.67	0.95

