INNOVATION BY

engrain™

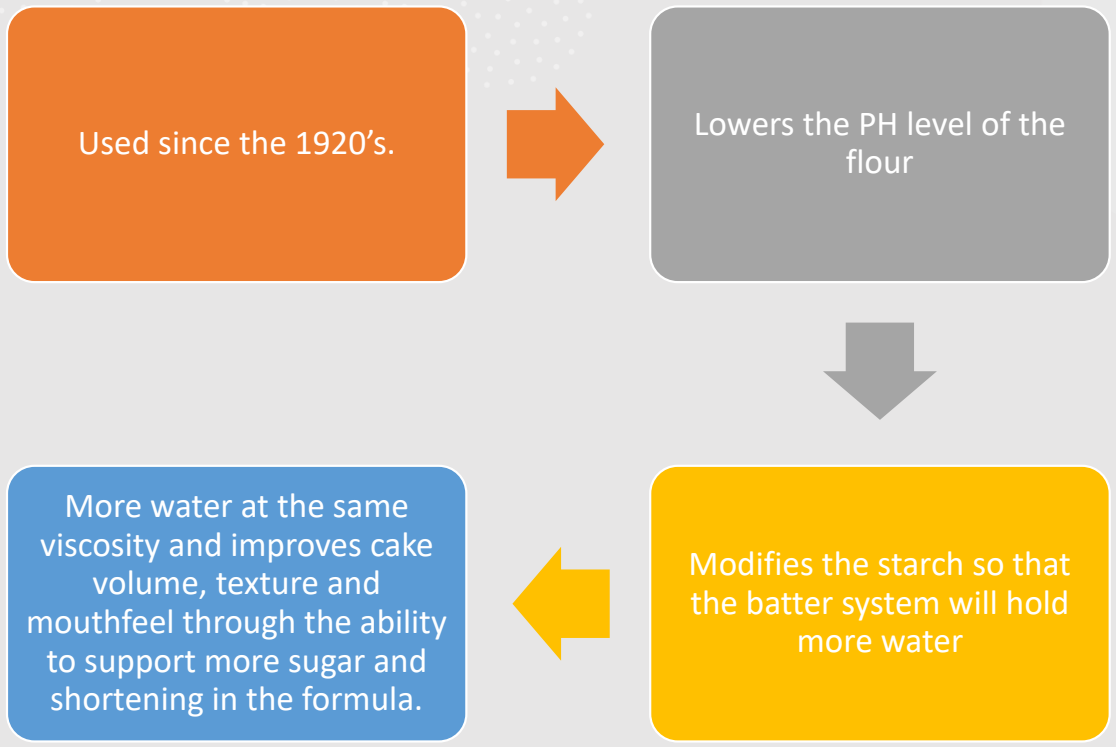
Since 2008, specialists in the optimization of undervalued raw materials. Lower-cost wheat classes for flour milling and pasta manufacturing; alternative ingredient formulations in poultry feeding


hydroSOFT™
Solving the Problem of Chlorine Replacement

What If

We could replace chlorine treatment in the mill?

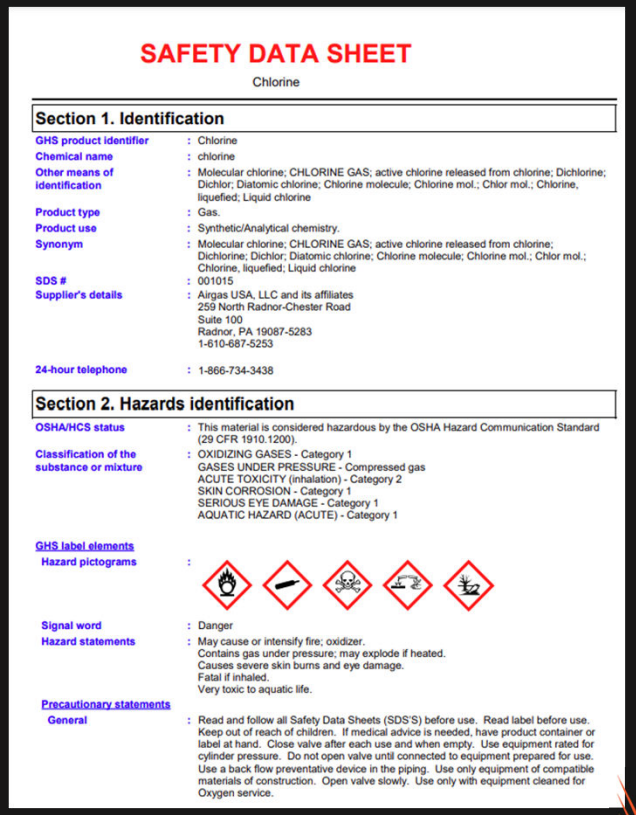
Chlorine Treatment



Chlorine Treatment is a Challenge for Millers

1. Chlorine is dangerous to work with
2. Chlorine is dangerous to the environment
3. Chlorine can hard to source
4. Additionally
   - Not all mills have a good source of soft wheat
   - Not all mills have a chlorine system
   - It is difficult to match the performance of chlorinated soft wheat with only hard wheat

Safety Data Sheet



SAFETY DATA SHEET

Chlorine

Section 1. Identification

GHS product identifier	: Chlorine
Chemical name	: chlorine
Other means of identification	: Molecular chlorine; CHLORINE GAS; active chlorine released from chlorine; Dichlorine; Dichlor; Diatomic chlorine; Chlorine molecule; Chlorine mol.; Chlor mol.; Chlorine, liquefied; Liquid chlorine
Product type	: Gas.
Product use	: Synthetic/Analytical chemistry.
Synonym	: Molecular chlorine; CHLORINE GAS; active chlorine released from chlorine; Dichlorine; Dichlor; Diatomic chlorine; Chlorine molecule; Chlorine mol.; Chlor mol.; Chlorine, liquefied; Liquid chlorine
SDS #	: 001015
Supplier's details	: Airgas USA, LLC and its affiliates 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
24-hour telephone	: 1-866-734-3438

Section 2. Hazards identification

OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Classification of the substance or mixture	: OXIDIZING GASES - Category 1 GASES UNDER PRESSURE - Compressed gas ACUTE TOXICITY (inhalation) - Category 2 SKIN CORROSION - Category 1 SERIOUS EYE DAMAGE - Category 1 AQUATIC HAZARD (ACUTE) - Category 1
GHS label elements	
Hazard pictograms	:
Signal word	: Danger
Hazard statements	: May cause or intensify fire; oxidizer. Contains gas under pressure; may explode if heated. Causes severe skin burns and eye damage. Fatal if inhaled. Very toxic to aquatic life.
Precautionary statements	
General	: Read and follow all Safety Data Sheets (SDS'S) before use. Read label before use. Keep out of reach of children. If medical advice is needed, have product container or label at hand. Close valve after each use and when empty. Use equipment rated for cylinder pressure. Do not open valve until connected to equipment prepared for use. Use a back flow preventative device in the piping. Use only equipment of compatible materials of construction. Open valve slowly. Use only with equipment cleaned for Oxygen service.

Customers Expectations

- Customers expect flour that creates cake with viscosity, water absorption, volume, texture, and mouthfeel provided by chlorinated cake flour.

Replacing Chlorine

- Chlorine was banned in Europe in the 1990's
- A common alternative is a high capital and high cost solutions using a flour heat treatment system.
- This alternative does come with some risk, and capacity is often limited.

hydroSOFT™

- Allows for optimal cake tenderness and volume when used at the 500ppm level based on flour weight.
- Can be used with 100% Soft or with a preferred 90/10 Hard flour will produce high volume, tender cakes that out-perform the chlorinated control.
- Replacing chlorine in flour also helps eliminate the harsh chemical taste and smell from the use of chlorine.

HydroSOFT500 addition will increase cake crumb softness as well as extend shelf life of the cake.

By using hydroSOFT 500 in soft wheat flour, this helps to create a natural alternative to using chemicals in foods.

hydroSOFT™

hydroSOFT™

The addition of hydroSOFT to the Type D soft wheat flour helped produce a higher volume, tender and tight crumb cake when compared to the chlorinated control.

Type D flour	Chlorinated Control	Type D flour
500ppm hydroSOFT 500	No Additive	No Additive
Average Volume: 31.66 mm	Average Volume: 31.22 mm	Average Volume: 30.68 mm

Type D flour	Chlorinated Control	90% Type D/ 10% HRW
500ppm hydroSOFT 500	No Additive	500ppm hydroSOFT 500
Average Volume: 31.66 mm	Average Volume: 31.22 mm	Average Volume: 31.83 mm

hydroSOFT™

HydroSOFT 500 allows for optimal cake tenderness and volume when used at the 500ppm level based on flour weight

Both cake options – 100% Type D flour with 500ppm hydroSOFT 500, as well as 90% Type D/10% hard wheat flour with 500ppm hydroSOFT 500 will produce high volume, tender cakes that out-perform the chlorinated control.

hydroMAX™

Feed the World with Peace of Mind™

hydroMAX

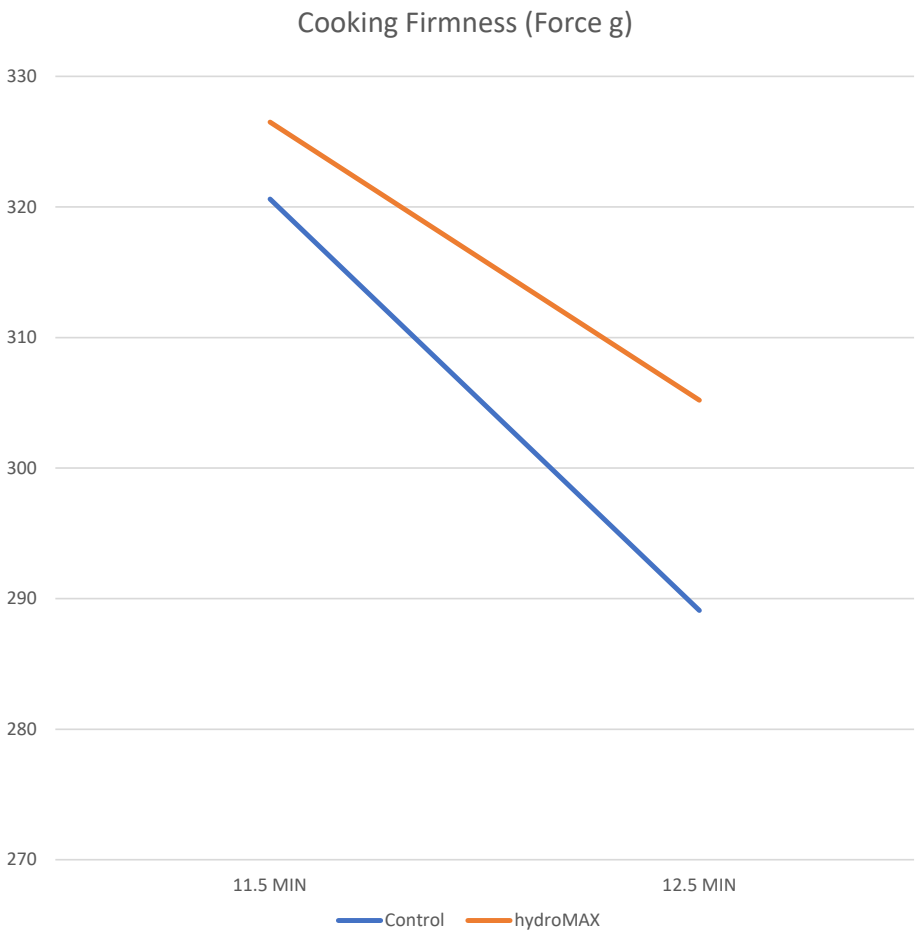
An Innovative enzyme Solution for Pasta and Noodle manufacturing

Why

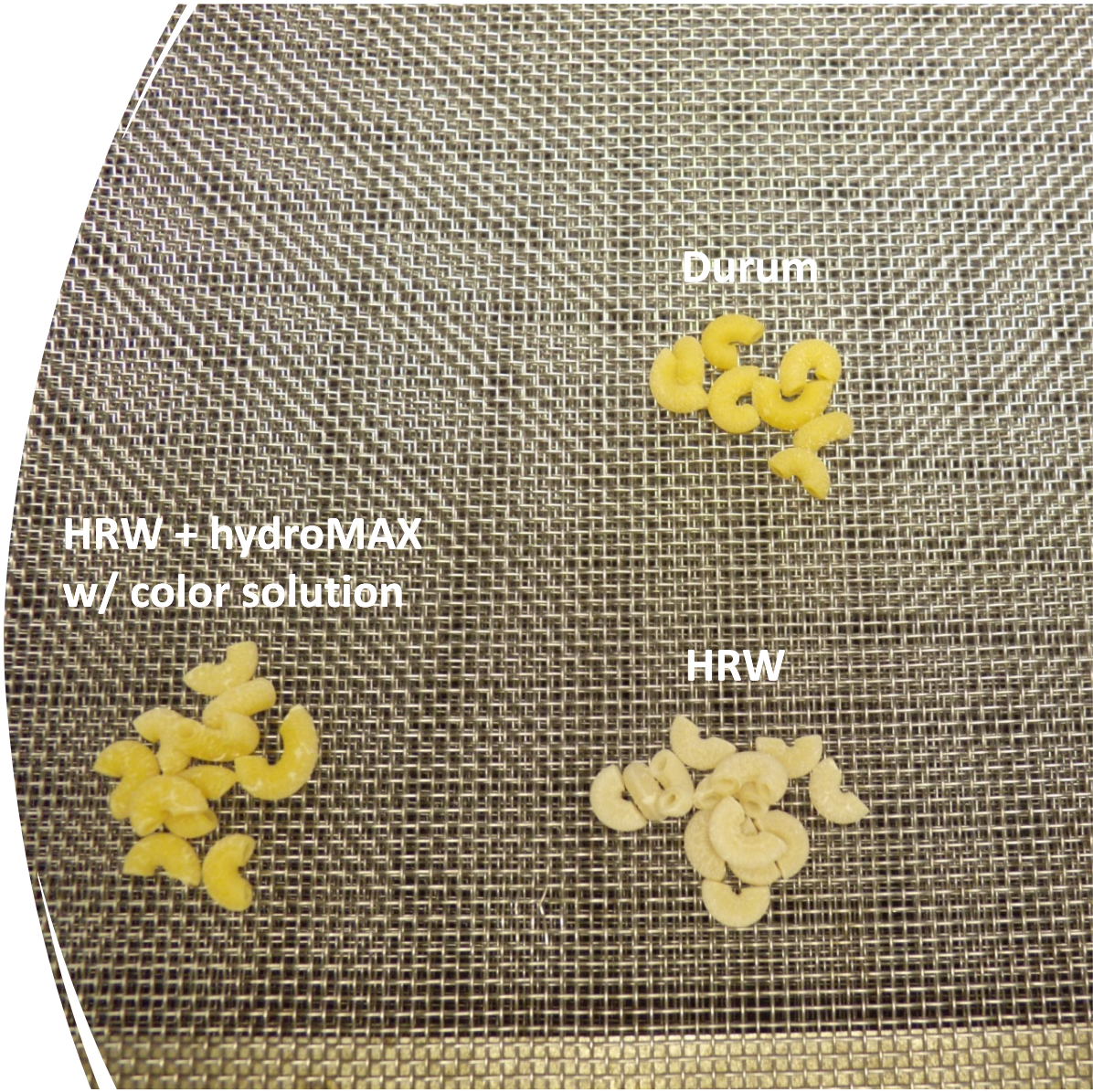
- Applied in a concentrated dosage – range of 250-300 ppm, hydroMAX is the right solution for low to medium protein bread flour pastas, premium noodles and cost-saving replacement for high protein spring wheats and Durum.
- In these flour pasta and noodles, hydroMAX yields finished product with a deeper, richer color, with smoother, glassy -like appearance and reduced cracking/checking in dried product.

Opportunities for using hydroMAX

- If still wanting to use 100% durum, a higher percentage of lower quality (higher ash) durum flour can be used in replacing a portion of the high quality durum semolina (granular).
- Durum semolina/flour can be replaced all or in part with lower quality/cost hard wheat flour to achieve net cost savings
- High cost adjuncts such as vital wheat gluten may be reduced or eliminated

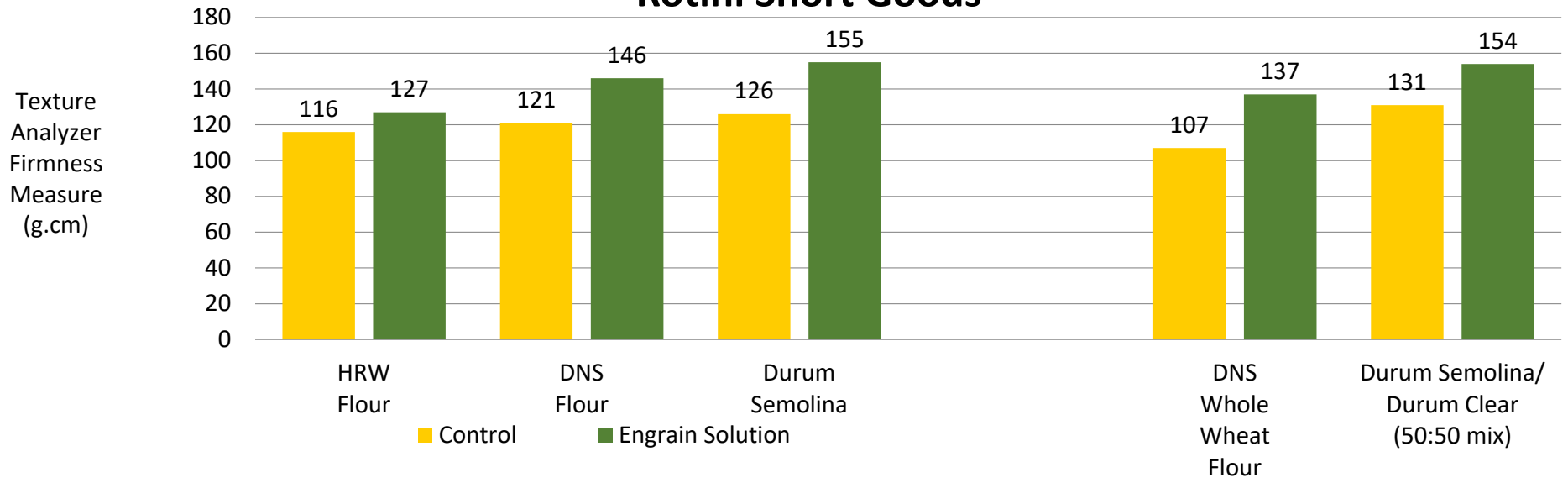


Pasta Color Enhancement



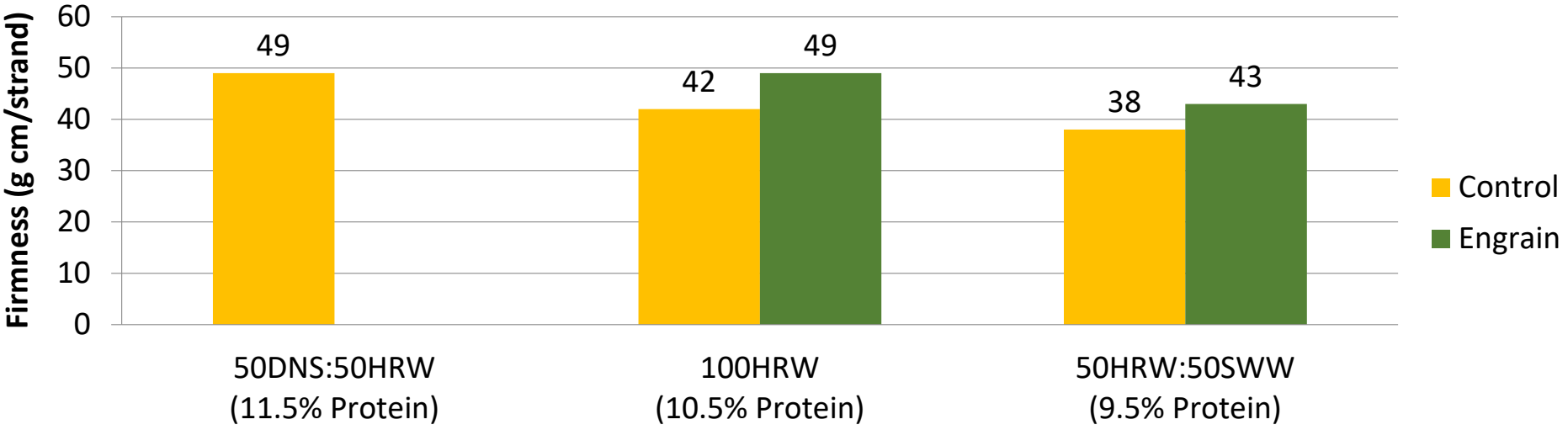
- Northern Crops Institute Trial
- Fargo, North Dakota
- July 2009

Improvement of Pasta Firmness In Rotini Short Goods

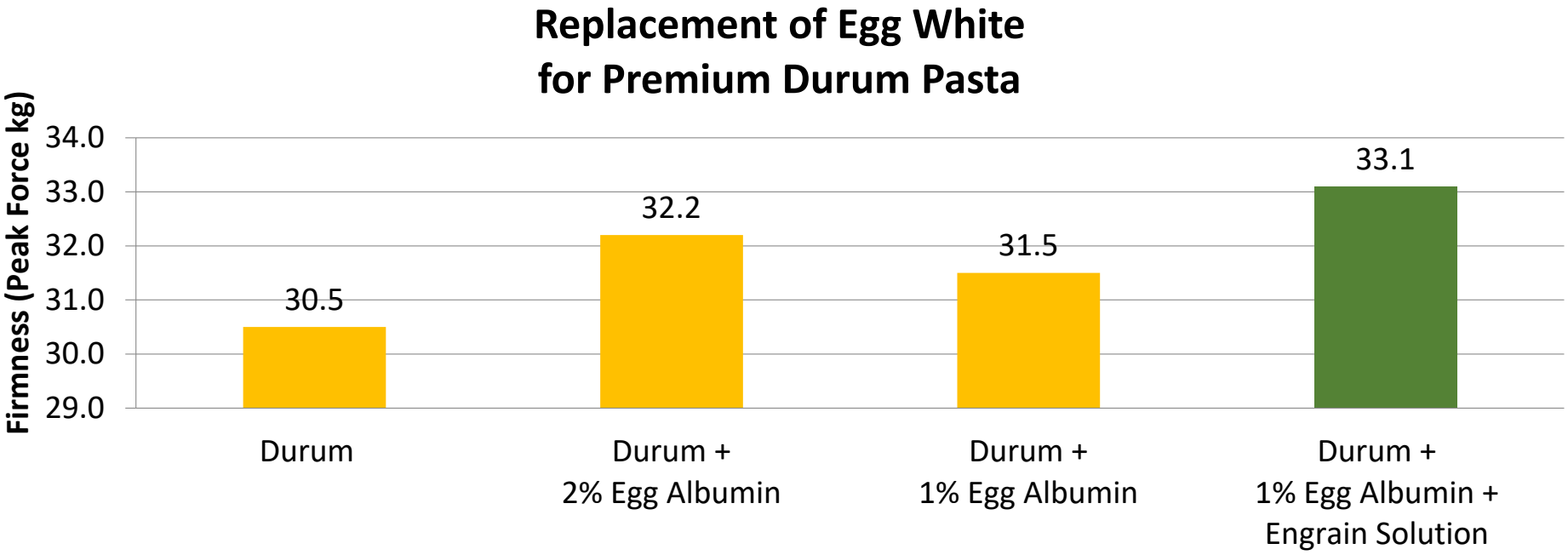


- Northern Crops Institute Trial
- Fargo, North Dakota
- January 2010

Improvement of Pasta Firmness in Macaroni Elbows



- Northern Crops Institute Trial
- Fargo, North Dakota
- November 2009

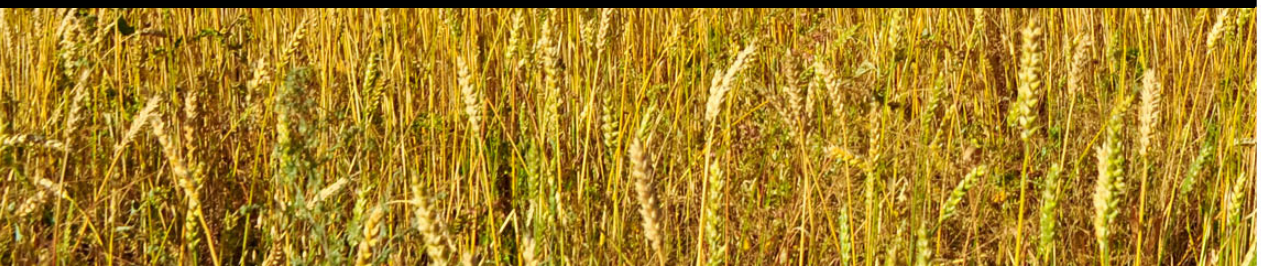


Economic and Quality Expectations

- Firmness (measured by texture analysis)
- Yield (percentage uptake of water during cooking to result in highest cooked weight)
- Degree of stickiness (with goal for cooked pasta pieces to stick together at any significance)
- Cooking tolerance (maintain desired firmness with overcooking – greater than 14 minutes)
- Color (if using non-durum pasta, to achieve yellow color in white flour pasta close to durum standard)

- hydroMAX yields finished pasta products with a deeper, richer color, with smoother, glassy -like appearance and reduced cracking/checking in dried product.
- hydroMAX helps starch retention which adds to better bite and aids in overcooking

Muchas Gracias



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