

UNIVERSITY  
of GUELPH



# Discriminating Flour Quality



OCIRC Industry Day



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August 17, 2009

# Sources of Funding



- Mathematics of Information Technology and Complex Systems (MITACS) Internship Program
  - Developing an analytical tool to classify wheat gluten protein quality for breeding programs
  - MITACS = \$15 000
  - Hyland Seeds = \$15 000
- The Ontario Wheat Producers' Marketing Board
  - Discriminating gluten protein quality during early stages of wheat breeding: Developing a torque-based technique
  - \$73 000
- Brabender GmbH and Co.
  - Sponsoring 2 month internship in Germany for further research





# Research Objective

- Develop a technique to classify wheat gluten protein quality using small sample sizes
  - Torque based method using Gluten Peak Tester (GPT)
  - Flour samples of <10 grams
  - Will allow for protein discrimination at earlier stages of breeding (2<sup>nd</sup> and 3<sup>rd</sup> generation)



# Specific Goals

- Determine optimal test parameters for GPT
  - sample size, protein/water ratio, temperature, spindle RPM
- Understand how different flour samples affect GPT measurements
  - hard, soft, durum wheat, whole grain
- Understand how different protein to water ratios & varying gliadin and glutenin compositions effect GPT torque
- Correlate GPT data with traditional protein quality instruments
  - farinograph, alveograph, extensograph, SDS sedimentation



# Relevance to Industry

- No simple, quick, and efficient methods to evaluate protein quality for end use applications using small sample sizes (<10 grams)
- No classification system for all wheats (hard, soft, durum) on a spectrum using universal testing parameters for all wheat types
- This research will directly benefit wheat breeders as a screening tool to classify protein quality early in a breeding program (2<sup>nd</sup> or 3<sup>rd</sup> generation of crossing)
- Simple and quick sample preparation, results in under 20 minutes



## Relevance to Industry Cont'd

- Flour manufacturers will be able to monitor the protein quality in the flour they are producing
- Baking industry will be able to monitor the quality of flour they are being supplied thereby ensuring consistency of their end product
- Quality assurance capabilities since industry will be able to monitor protein quality to ensure consistency of protein quality over time that will ensure consistency in their final product

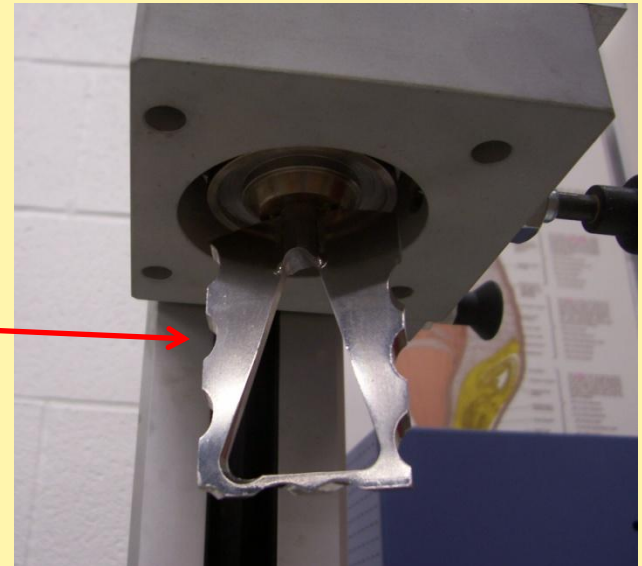
# Gluten Peak Tester



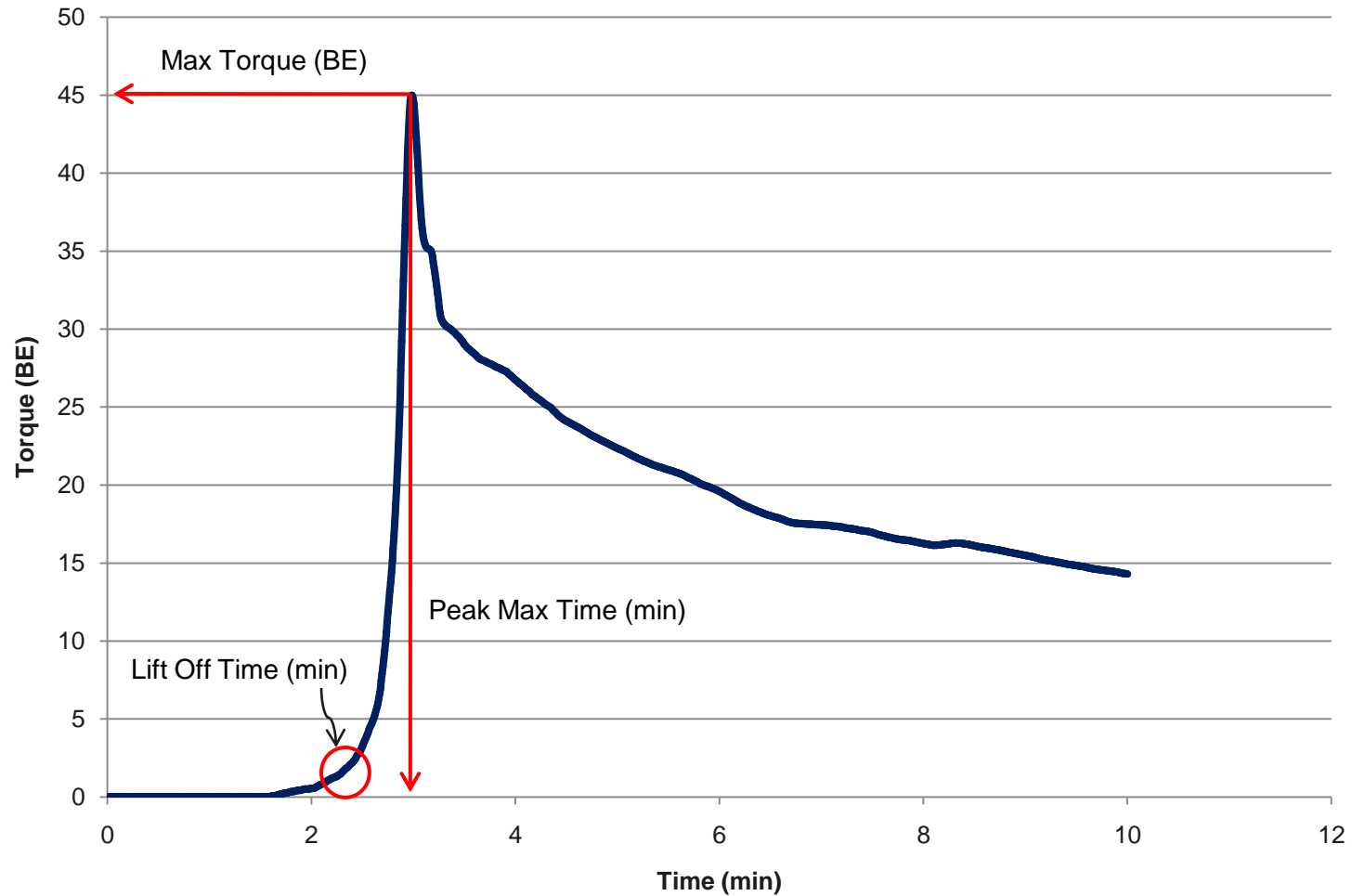
Paddle

Sample Cup

Paddle

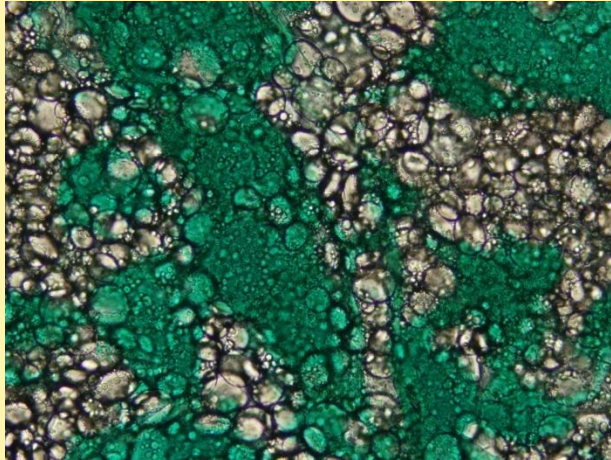


# Sample GPT Curve

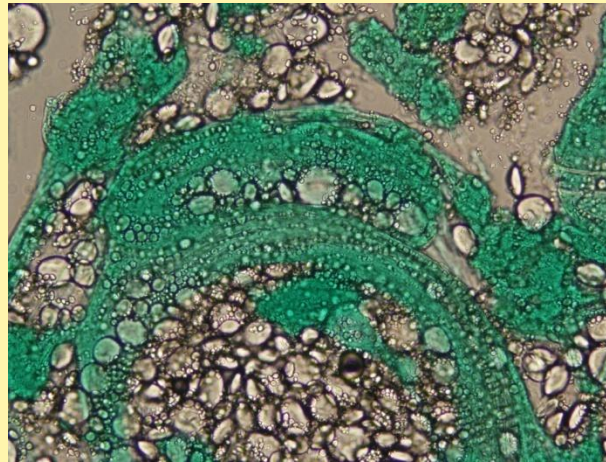


# Light Microscopy

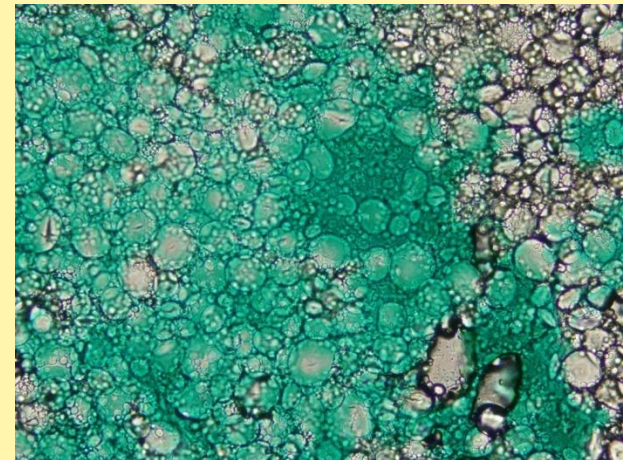
Lift Off (30 s)



Max Peak (180 s)

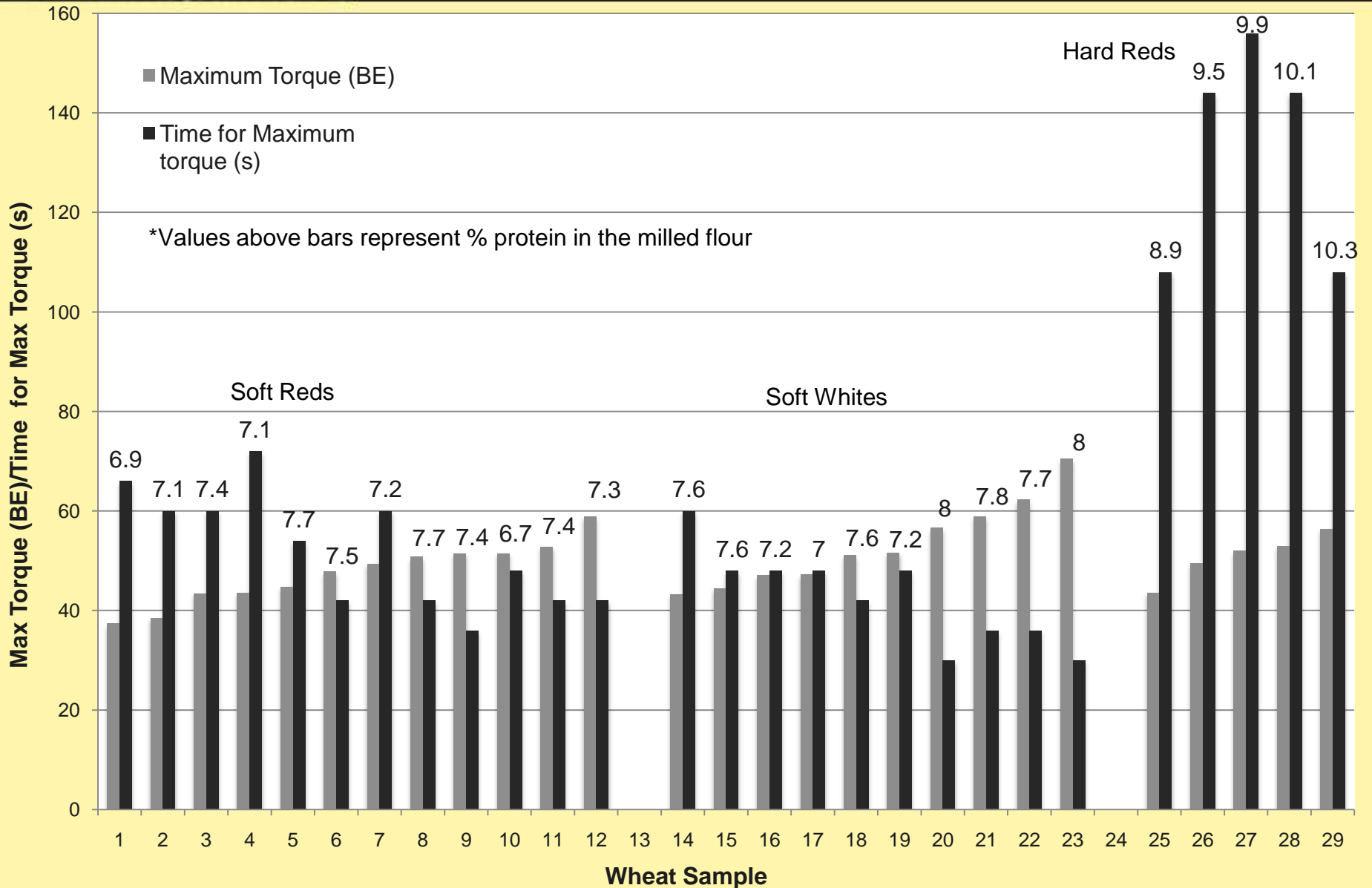


Breakdown (300 s)



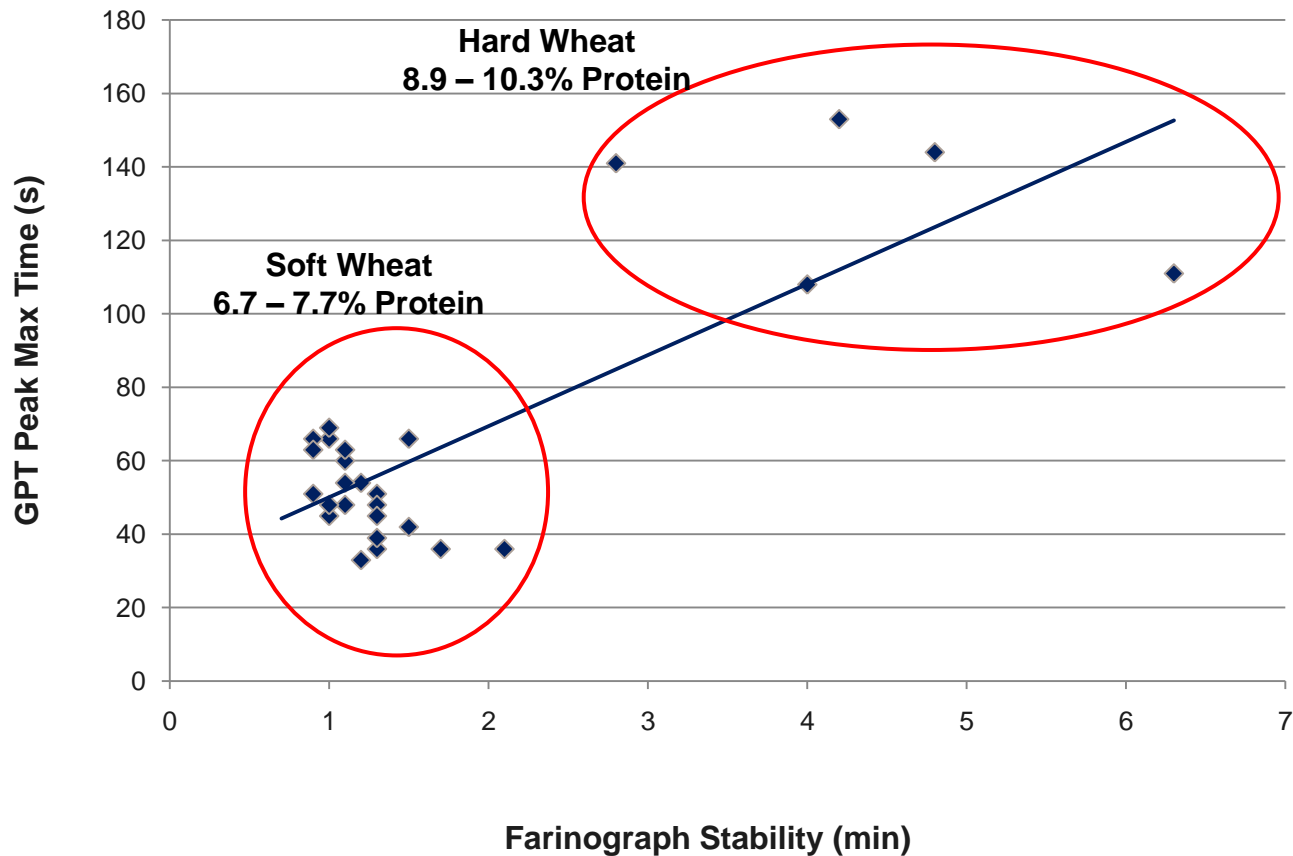


# Preliminary Data



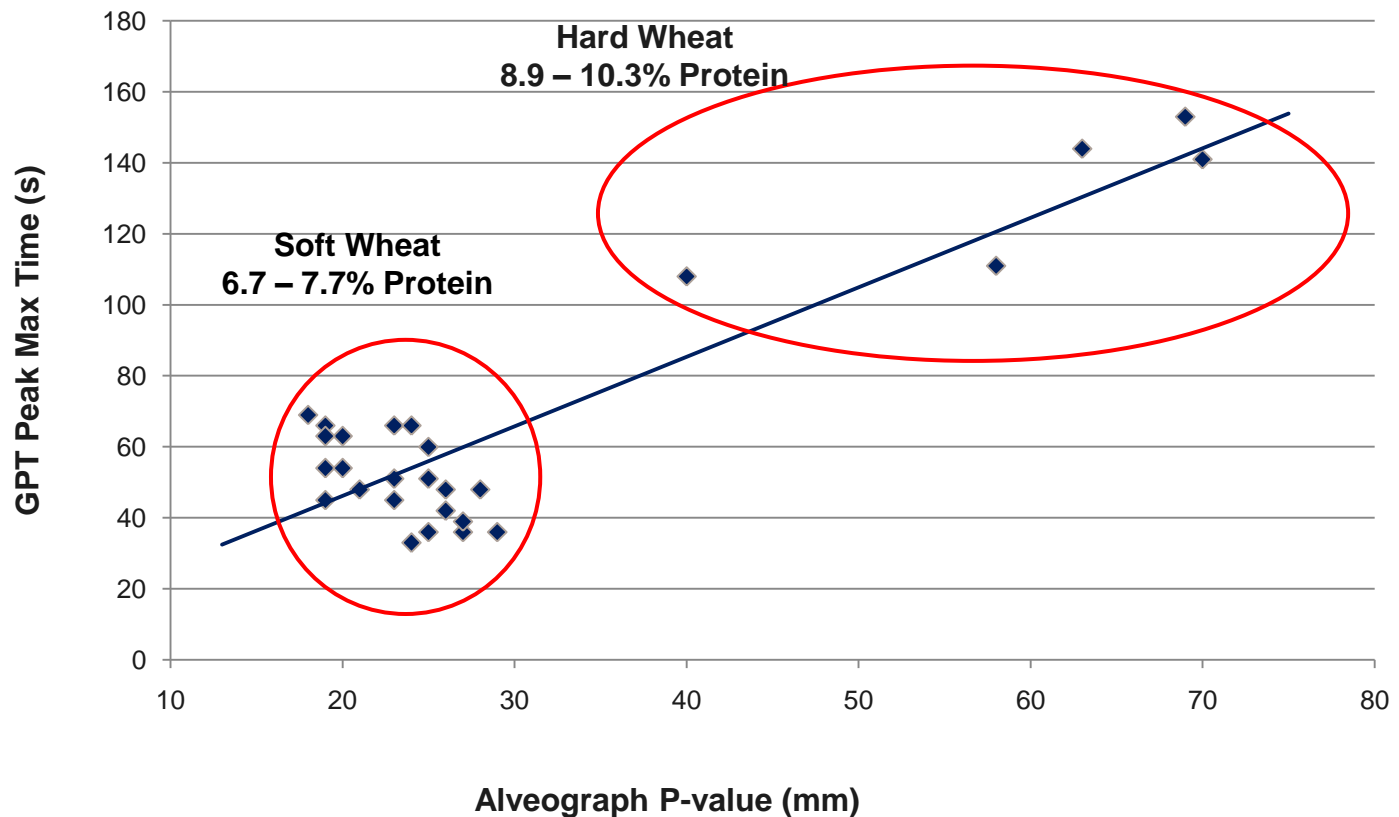
# Preliminary Data

Correlation between dough stability measured with Farinograph and peak maximum time measured with Gluten Peak Tester



# Preliminary Data

Correlation between P-value measured with Alveograph and peak maximum time measured with Gluten Peak Tester





# Conclusion

- Complete understanding of GPT is still unknown
- Preliminary data provides clues that torque is affected by total protein content and composition of protein within flour
- Further research will help determine how maximum torque and peak max time are affected by different wheat samples so a tool can be developed to classify wheat gluten protein quality for breeding programs



**Thank You!**

