MILLING NEW CROP WHEAT: MYTH AND REALITY

C J Lin, Lonnie Andrews, Gang Guo and Meera Kweon

the Mennel MILLING COMPANY Since 1886

USDA ars SWQL

Introduction

- New crop – frantic or anxiety
- Millers – poor milling yield, reduced production, bulky or fluffy nature, etc.
- Bakers – changes in water absorption, dough or batter mixing properties, baking performance, etc.
- Both desire for aged wheat or after “sweat”
- Economic and storage limitation – dilemma
- To study fresh wheat’s milling and baking performance

Milling Environment Effect

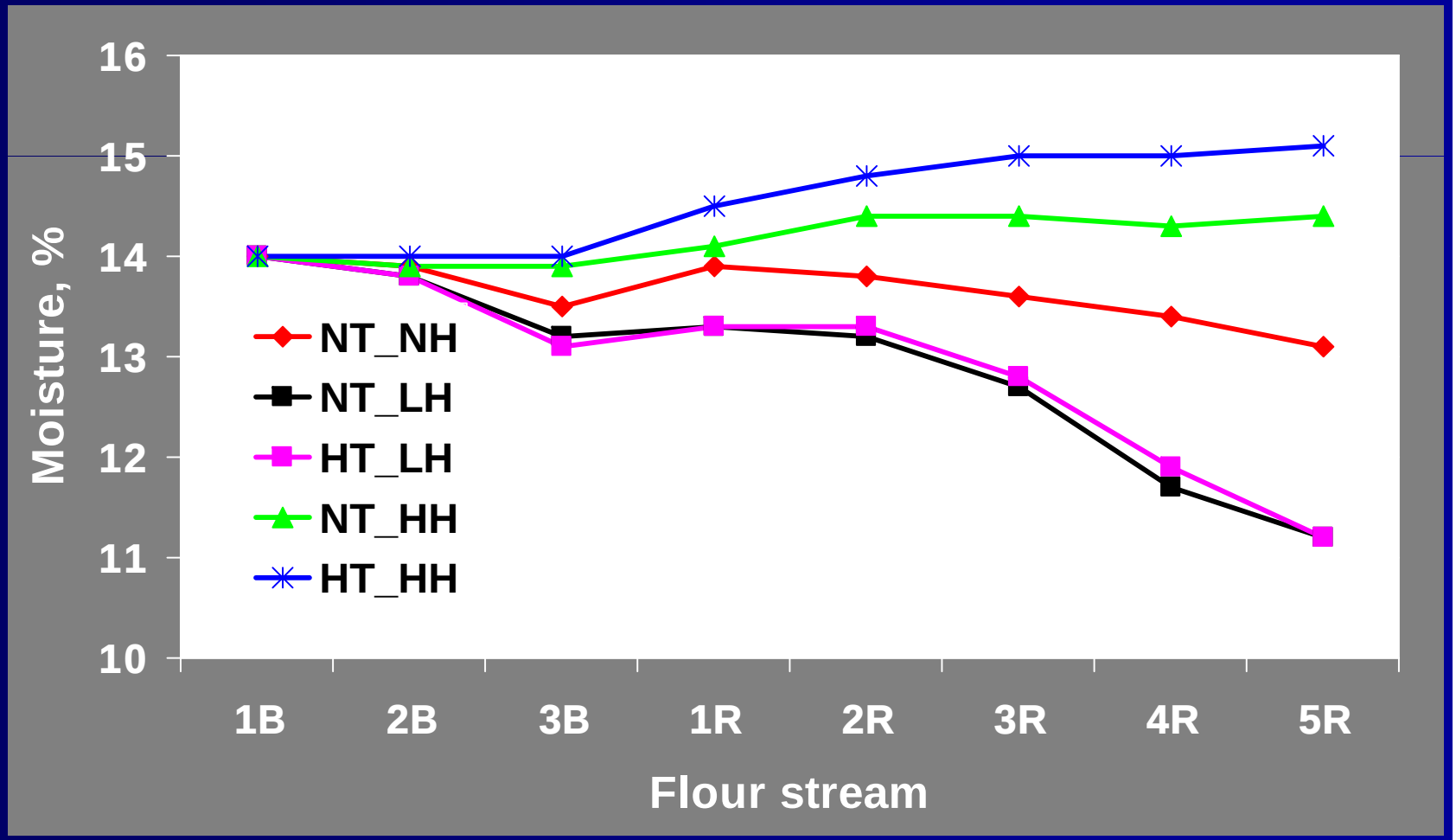
- Miag mill at SWQL
- Environmentally controlled room
- Aged wheat or 9-d newly harvested wheat
- Change – milling room temperature and humidity
- Milling performance response

Flour yield changes of aged wheat in response to milling room temperature and humidity

Temp, F	68	69	68	78	77	81
RH, %	60	43	78	60	41	80
	NT-NH	NT-LH	NT-HH	HT-NH	HT-LH	HT-HH
Flour yield change, %	0	+1.0	-2.1	0	0	-5.0

N – Normal; L – Low; H – High

Moisture changes of aged wheat flour streams in response to milling temperature and humidity



Flour yield change of aged wheat in response to tempered wheat moisture and milling environment

Temp, F	68	69	69	81	81
RH, %	60	43	43	80	80
Tempered wheat moisture, %	14	14	15	13	14
Flour yield change, %	0	+1.0	0	-2.5	-5.0

Flour yield changes of 9-d fresh wheat in response to milling room temperature and humidity

Temp, F	68	69	68
RH, %	60	72	50
Flour yield change, %	0	-1.6	+0.3

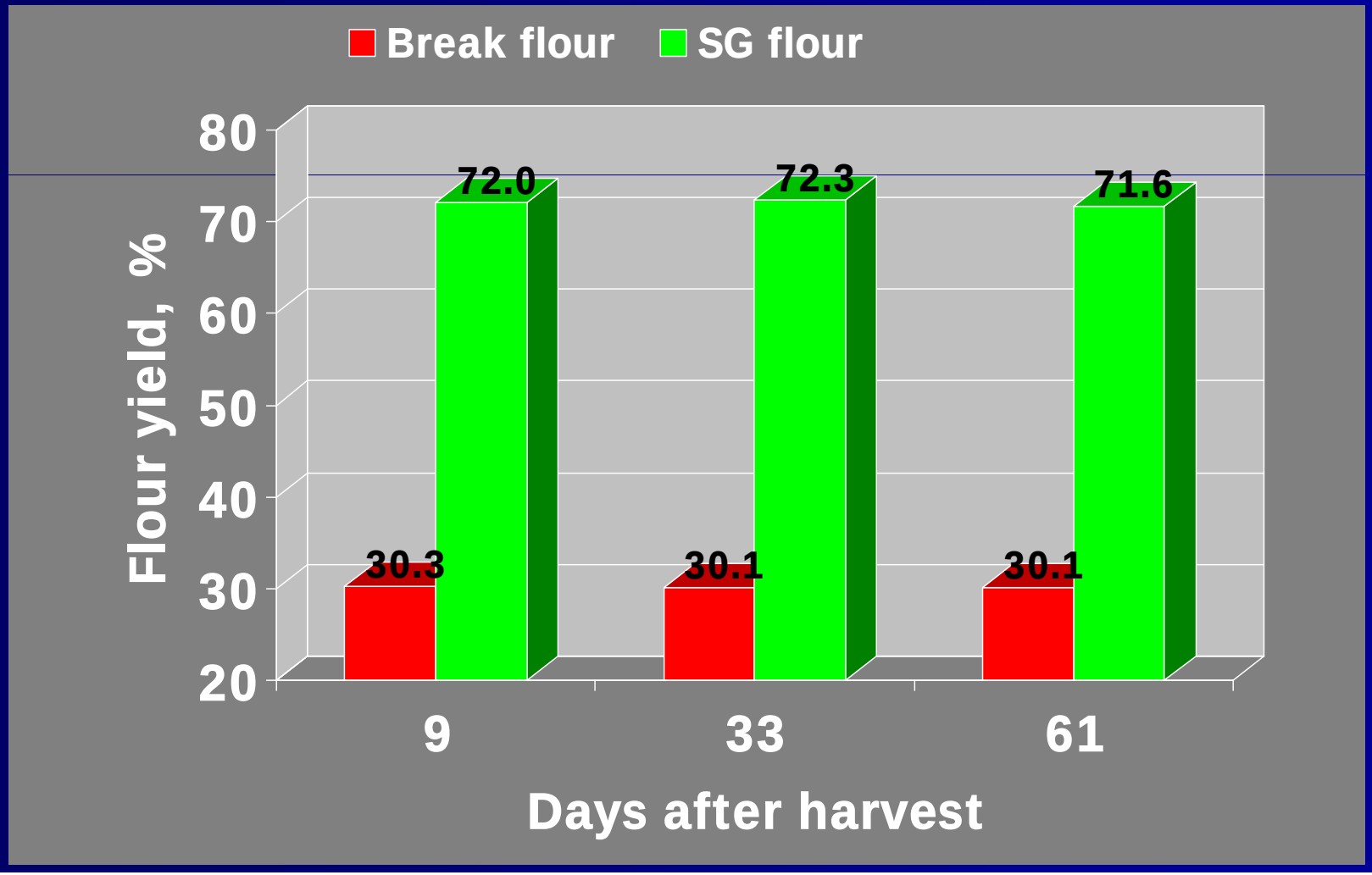
Summary

- Milling environment affected milling performance regardless of aged or fresh wheat
- High humidity detrimental to milling performance
- Reduction in tempered wheat moisture partially compensated for the negative impact of humidity on milling performance

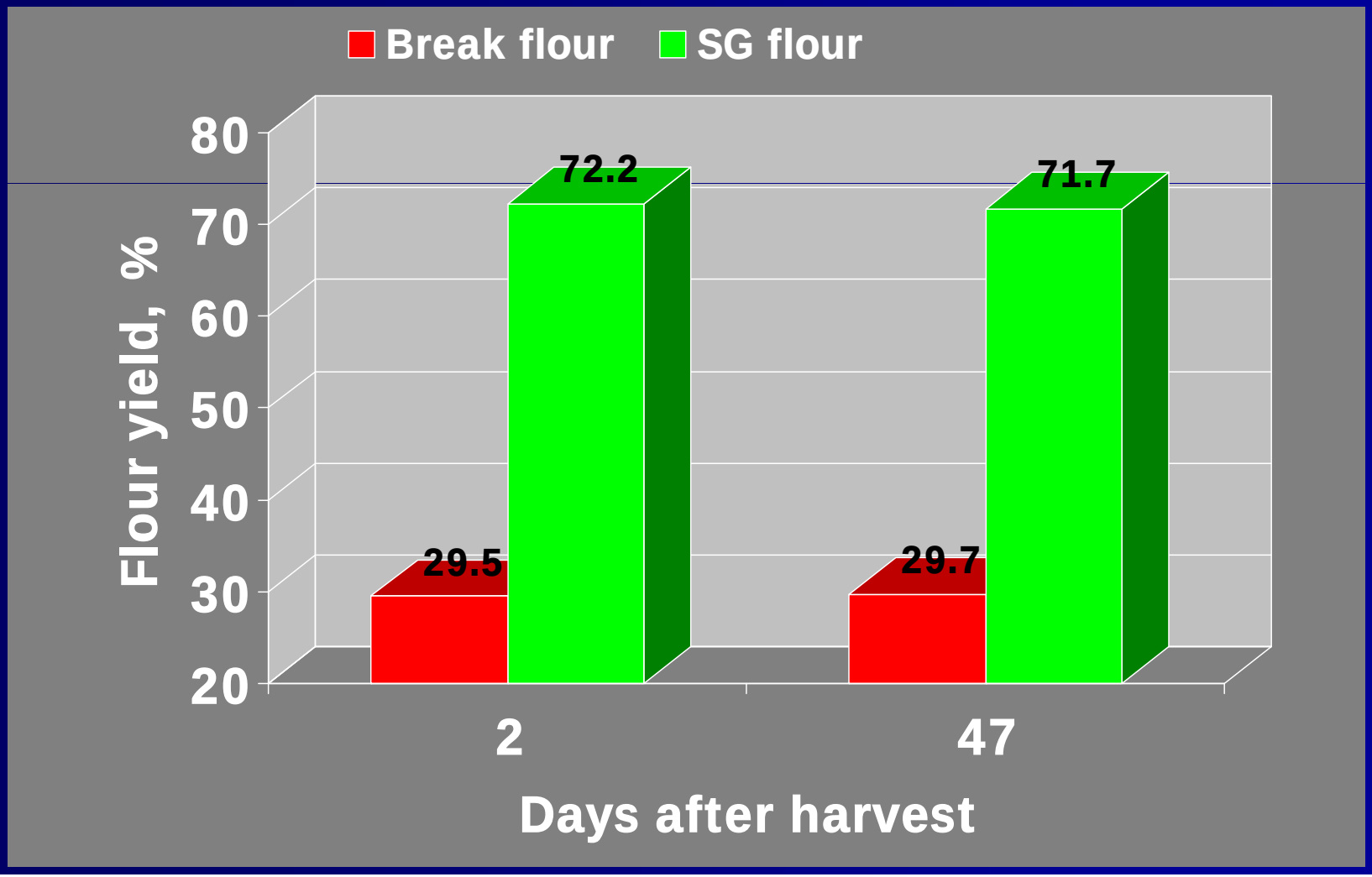
Fresh Wheat Study #1

- Two cultivars – Hopewell and Bravo
- Wheat of each cultivar stored in 55 gal drum immediately after harvest
- The grain moisture - 14.6 and 15% for Hopewell and Bravo, respectively, and stayed constantly throughout the storage
- Samples taken periodically and milled as is
- Miag pilot mill and constant milling environment – 68 F and 58% RH

Post-harvest storage effect on milling performance of Hopewell wheat by Miag mill



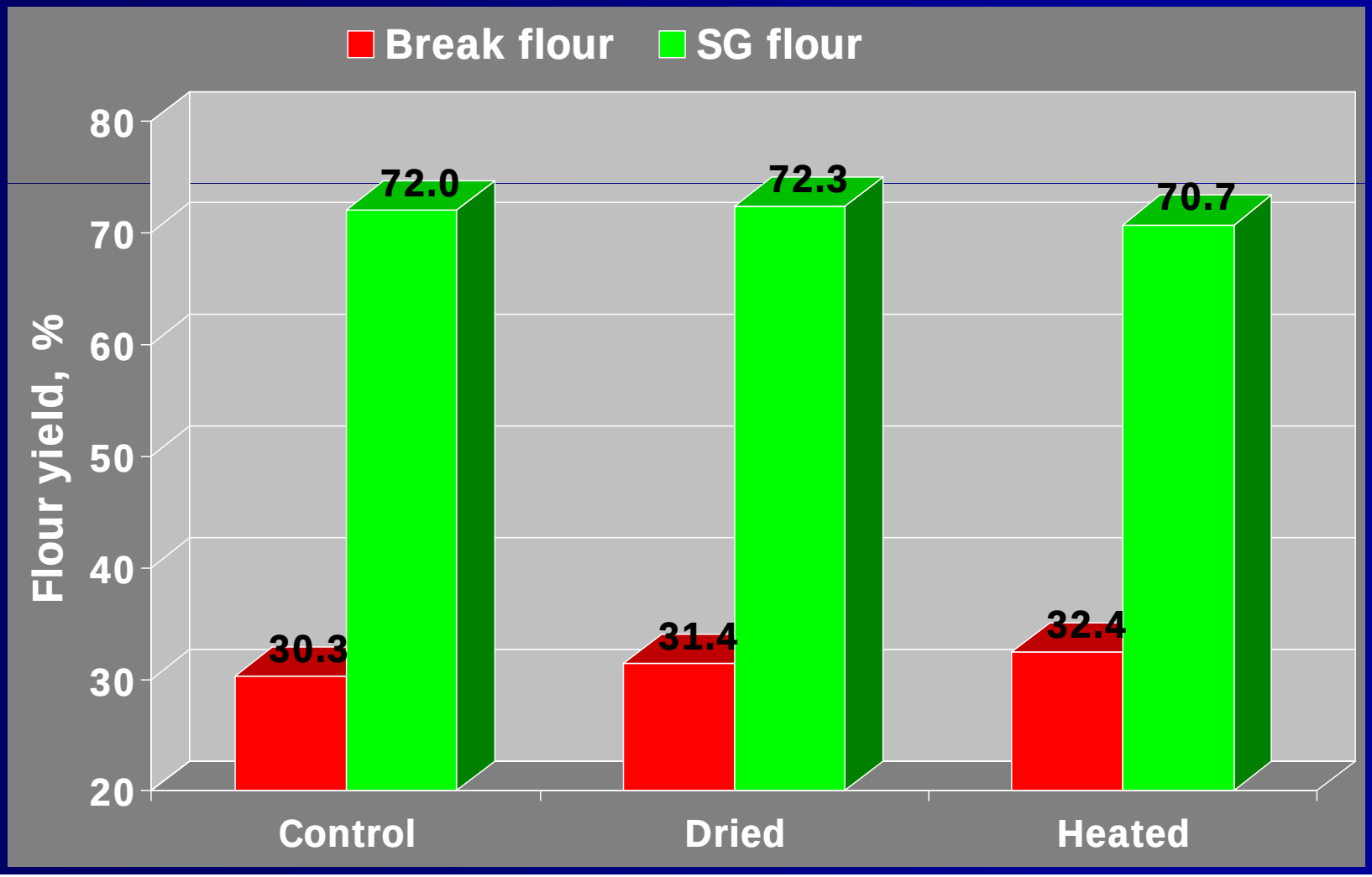
Post-harvest storage effect on milling performance of Bravo wheat by Miag mill



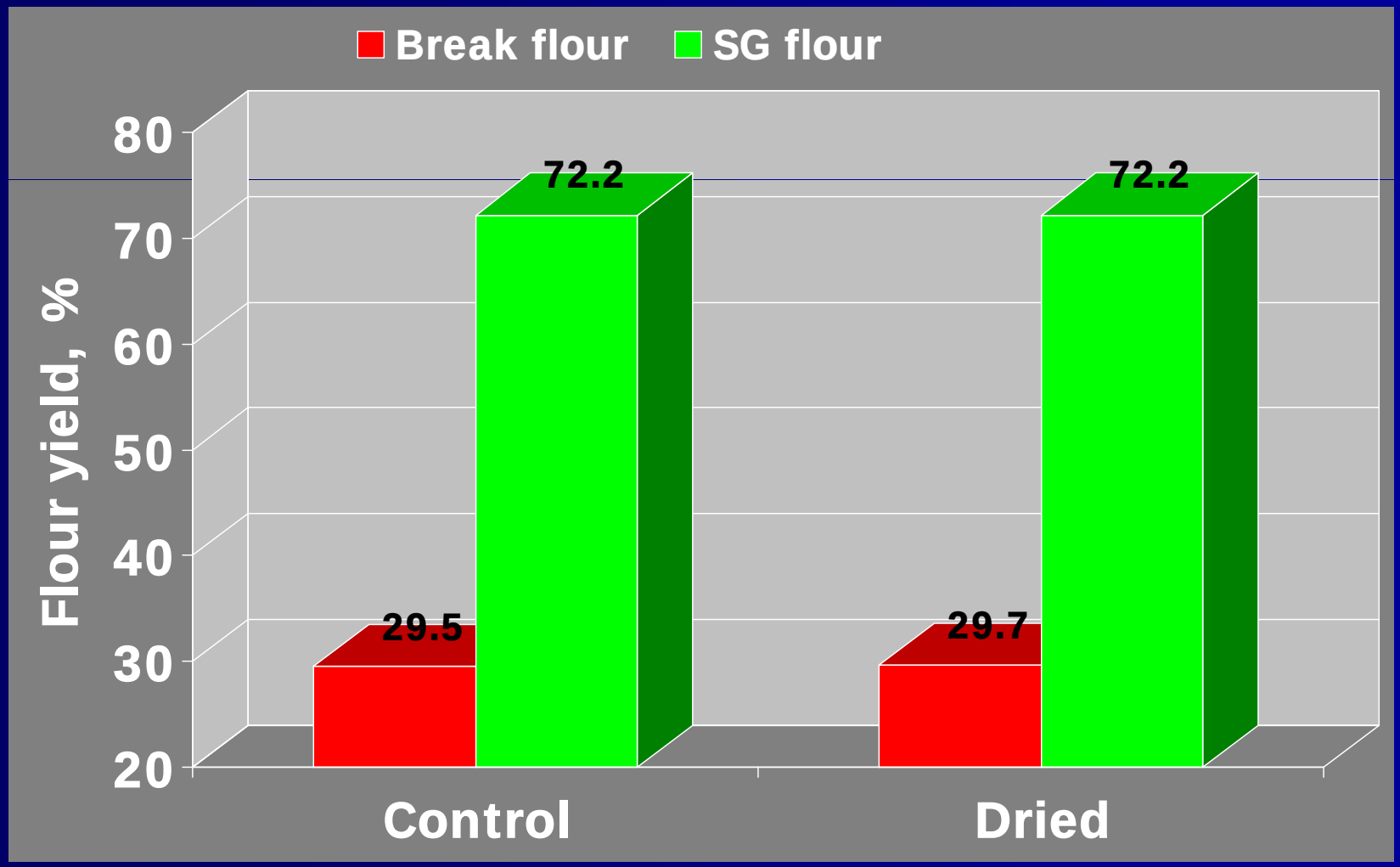
Fresh Wheat Study #1 (cont'd)

- To test drying or heat-moisture effect
- Part of the fresh wheat samples dried at 110 F by a forced air grain dryer to moisture about 10%, then tempered to original moisture before milled at constant environment – drying effect
- The other part heated at 110 F in sealed container for 2 days and then followed by milling without tempering – heat moisture effect

Flour milling performance of Hopewell fresh wheat affected by drying or heating



Flour milling performance of Bravo fresh wheat affected by drying



Cookie baking performance of flours by wheat post harvest storage

Cultivar	Days post harvest	Moisture, %	Protein, %	Cookie width, cm	Cookie top grain
Hopewell	12	13.9	8.05	8.99	4
	61	14.3	8.05	9.14	4
Bravo	2	13.6	8.47	8.99	4
	47	14.3	8.42	9.27	5

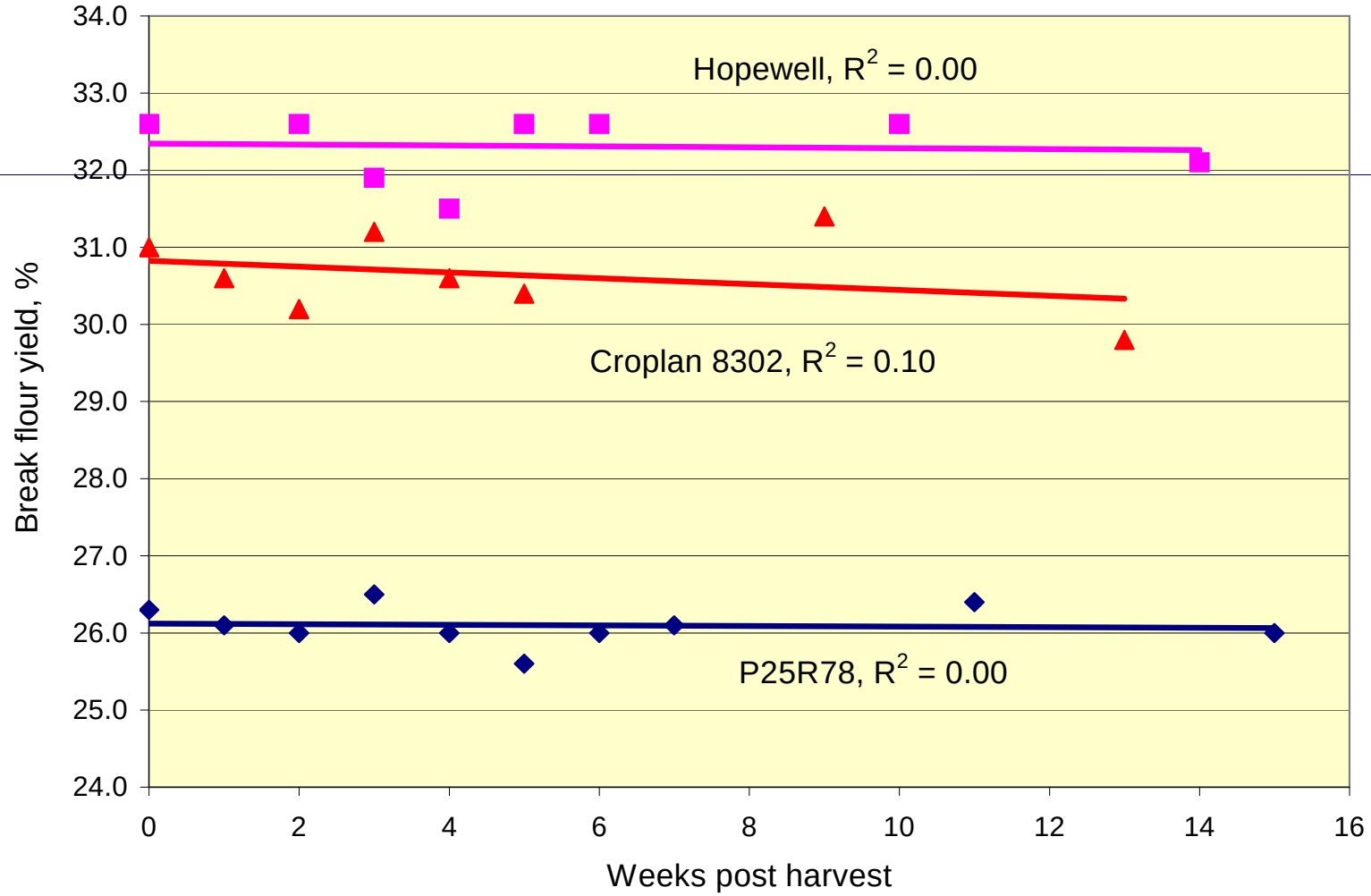
Summary

- Fresh wheat of two tested cultivars milled as well as the aged wheat within the two month period
- Drying fresh wheat and then tempering prior to milling had no effect on milling performance
- Heating fresh wheat had adverse impact on milling performance
- Flour milled from aged wheat tended to bake a slightly larger cookie

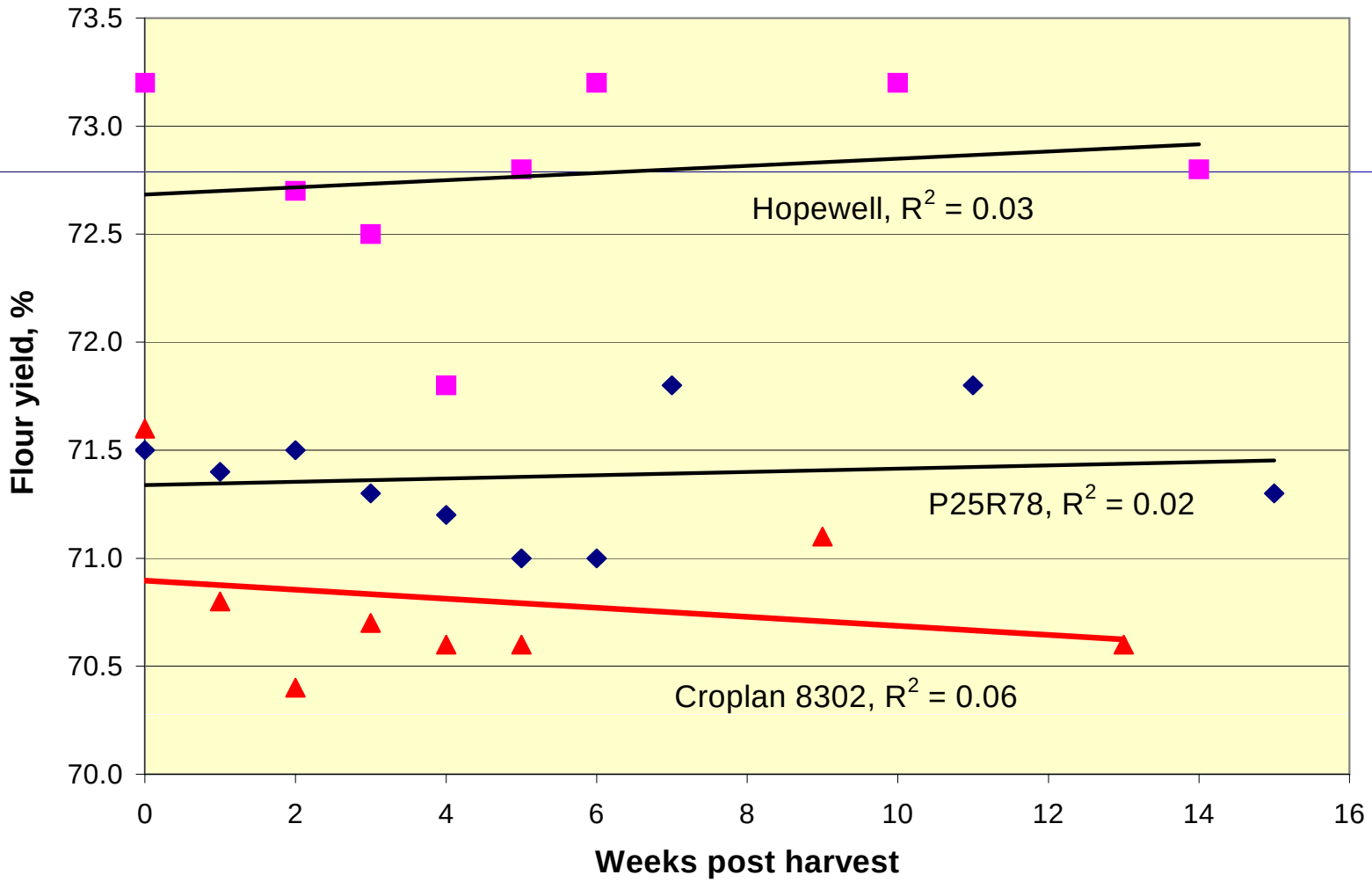
Fresh Wheat Study #2

- Three cultivars – P25R78, Hopewell and Croplan 8302
- Wheat of each cultivar stored in 55 gal drum immediately after harvest for up to 15 weeks
- Samples taken periodically and milled by Miag pilot mill at 68 F and 58% RH
- Flour samples taken for cookie baking
- The chlorinated samples for layer cake baking

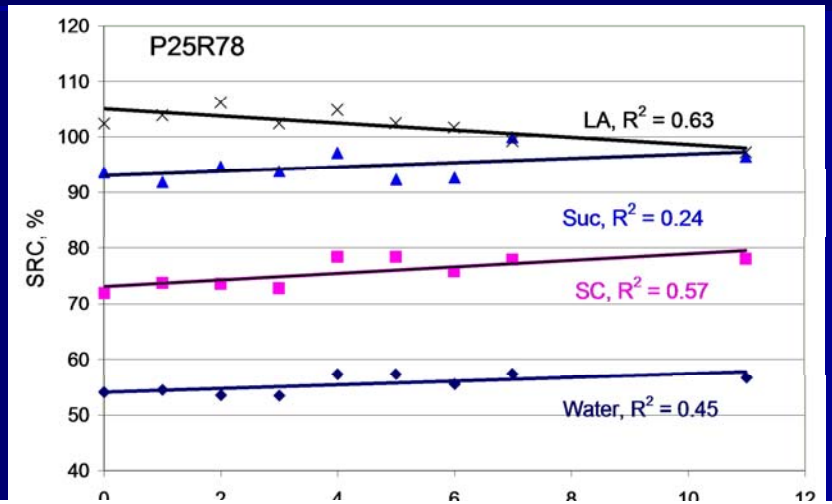
Break flour yield of three cultivars in response to post harvest storage or aging

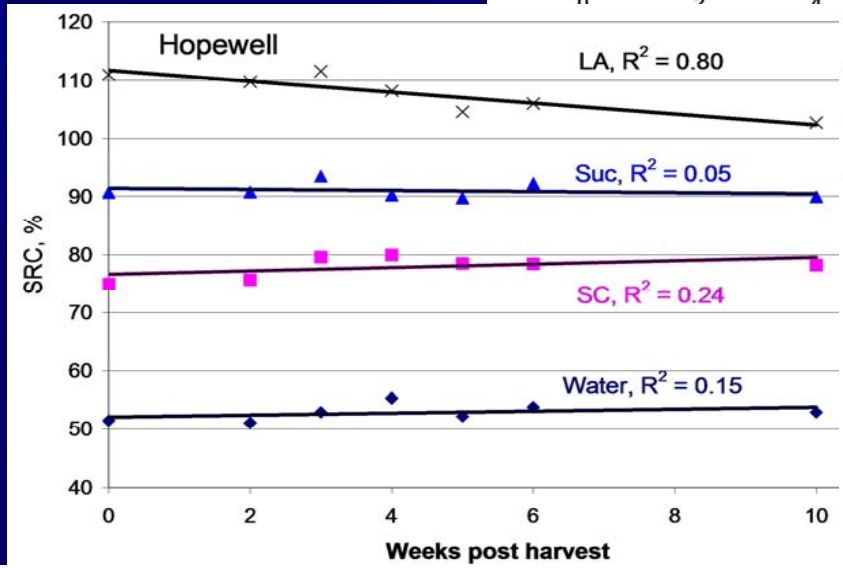


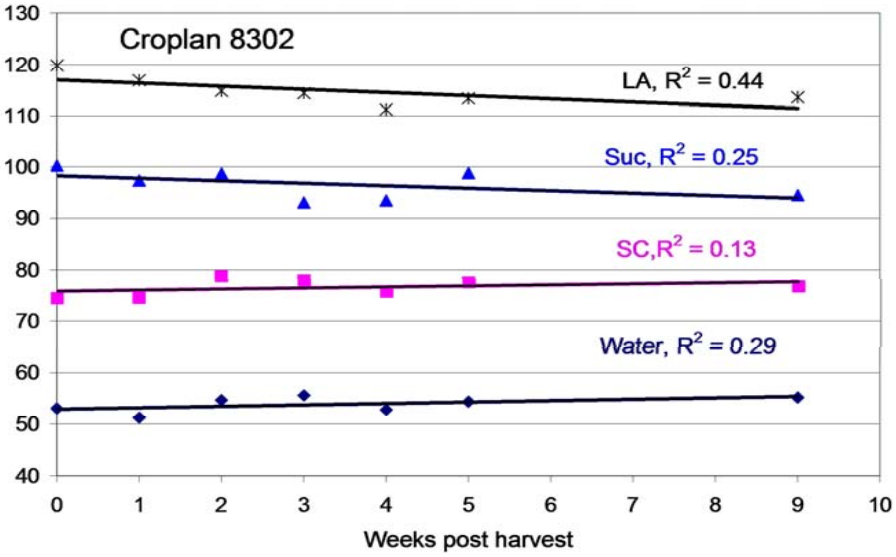
Flour yield of three cultivars in response to post harvest storage or aging



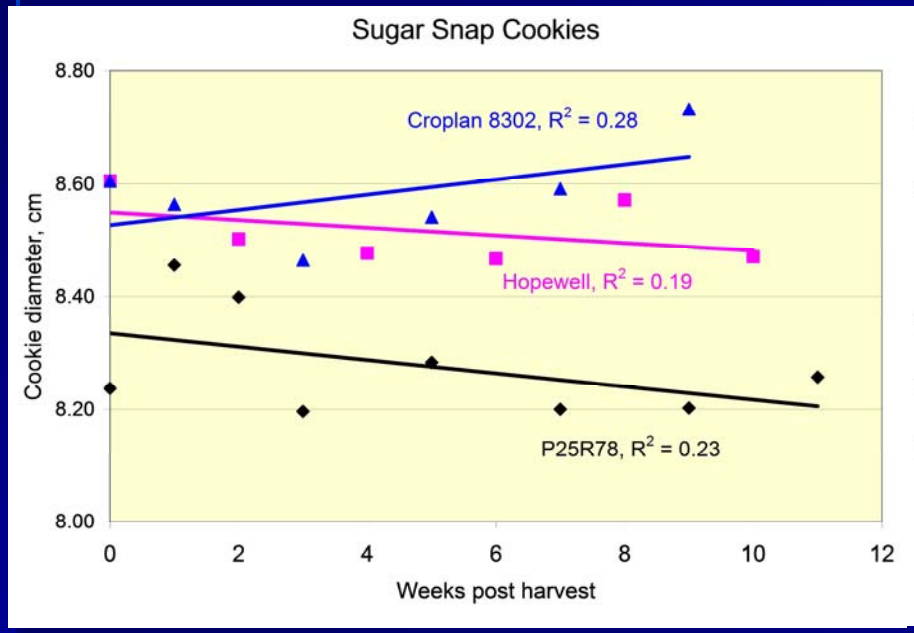
Effect of wheat storage period on flour SRC

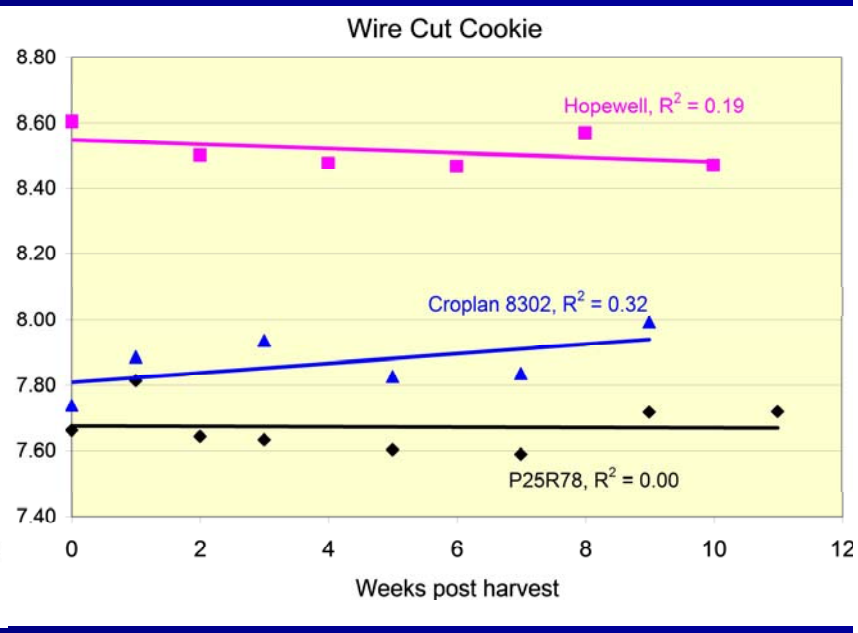




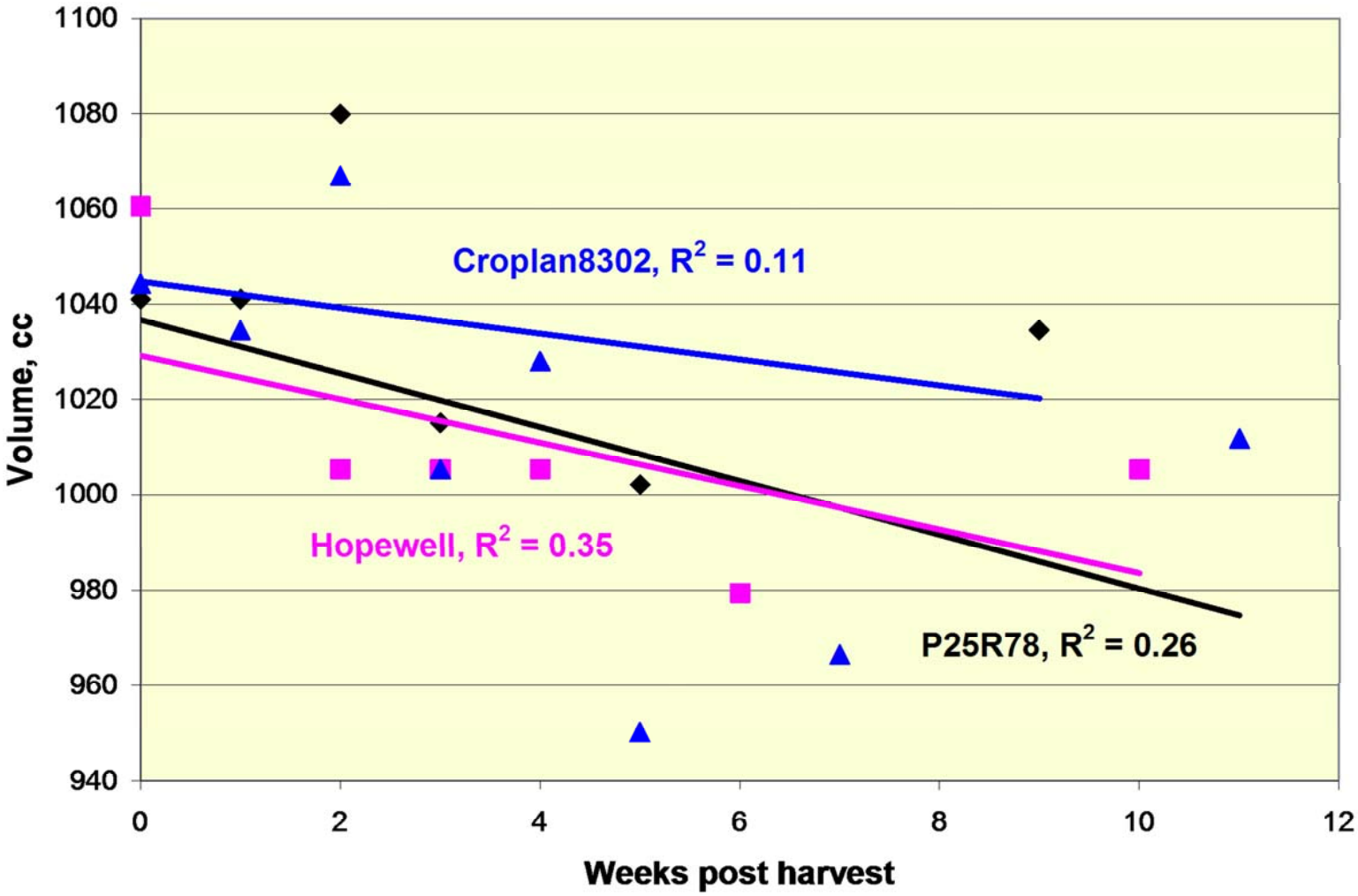


Effect of wheat storage period on cookie baking performance





Layer cake baking volume of flours milled from different cultivars affected by post harvest storage period



Summary

- Fresh wheat millability of three cultivars changed little during the storage period up to 15 weeks regardless of milling quality
- SRC values changed little during the post harvest storage except for lactic SRC which tended to decrease over time
- Baking quality of long patent flour for wire-cut or sugar snap cookie similar for fresh and aged wheat
- Layer cake baking quality of chlorinated flour not affected by storage

Conclusion

- Our studies show fresh wheat mills and bakes the same as the aged wheat
- The poor milling performance of fresh wheat observed in the summer may be attributed to high humidity and temperature
- Argument – whether the 55-gal drum will simulate the large bin
- The studies didn't investigate the fluffiness or woolliness experienced with fresh wheat by millers in summer time

Acknowledgement

- Don Mennel
- Dr. Charles Gaines, Dr. Ed Souza and SWQL staff
- R&D staff scientists – Dr. Gang Guo, Edmund Tanhehco and Stephen Wanjiku
- James Elkins, Jim Schuh and the Fostoria QA staff

the Mennel MILLING COMPANY Since 1886

Thank You