How Good Is Your Grist?

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> Jennifer Helber Grain to Glass, LLC North Kansas City, Missouri

- M.S. in Microbiology
- Established Boulevard Brewing Co.'s Quality Assurance Lab, 1999-2008
- Member of the American Society of Brewing Science; Sensory Committee
- Judge for GABF since 2006
- BJCP Judge since 2009
- Chair of Technical Subcommittee which ran a collaborative on the Manual Sieve Method



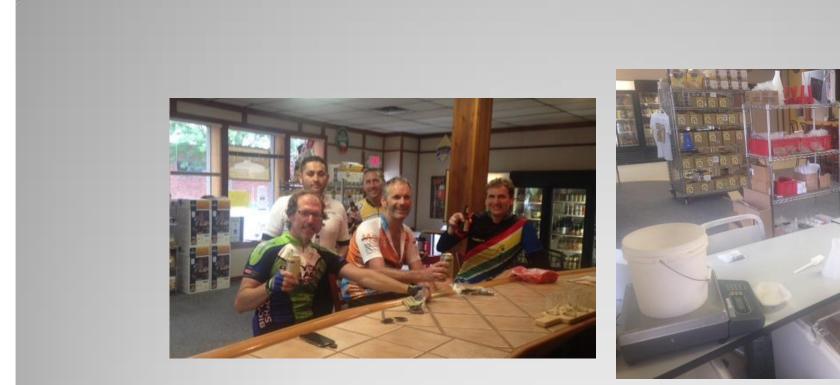
Homebrewer since 2006
Graduate of Siebel's Advanced Homebrewing Course, 2009
ZZ Hops President, 2010-2012
Member of KC Biermeisters

 Currently, Microbiologist for the USDA, at the National Grain Center in KCMO



Owner/President of a local Homebrew supply/Bottle Shop--*Grain to Glass, LLC* (established 2012), in North Kansas City, Missouri





Beers and malts

We prepare recipes while homebrewers enjoy a beer!

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Malting Science

Barley is Best

- It has a <u>husk</u> that protects the Be germ
- High starch-to-protein ratio
- Complete enzyme system
- Light color
- Neutral flavor



Milling: Definitions or objectives

Mill(v) to grind into a grist, flour, meal or powder

Milling ultimately is a compromise that each brewmaster reaches with a batch of grain. Their objectives are to find an acceptable middle ground between:

- Yield
- Separation Efficiency (Lautering)
- Quality

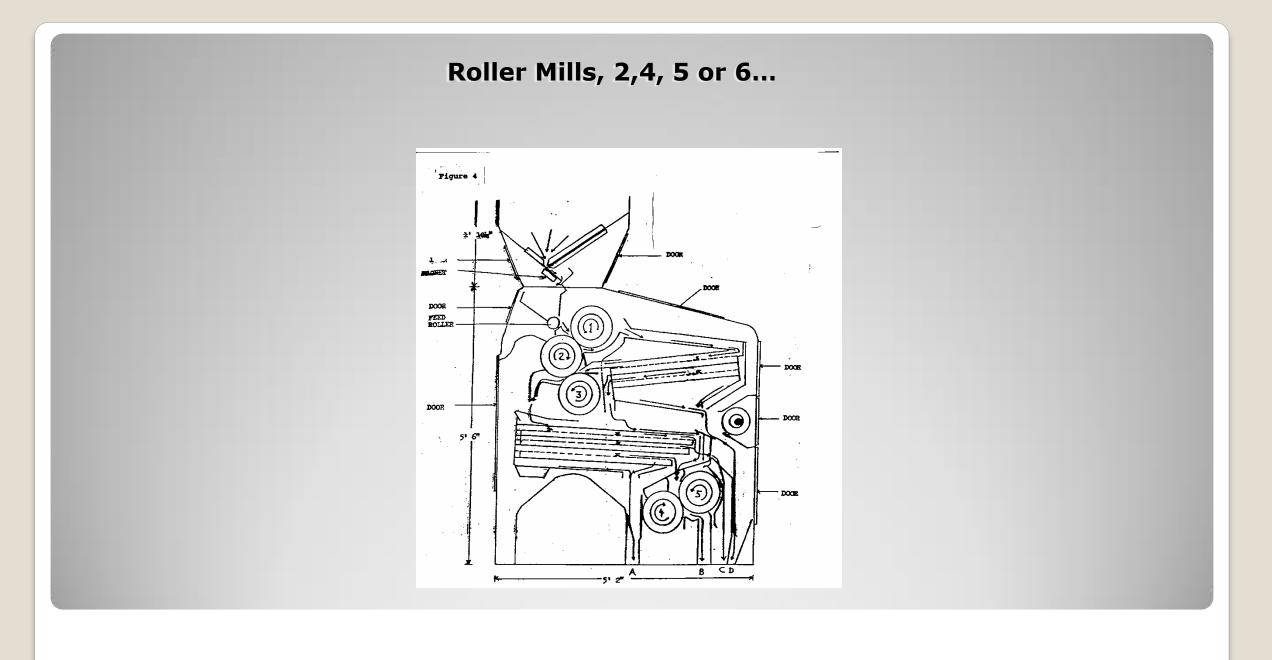
What's a Mill?

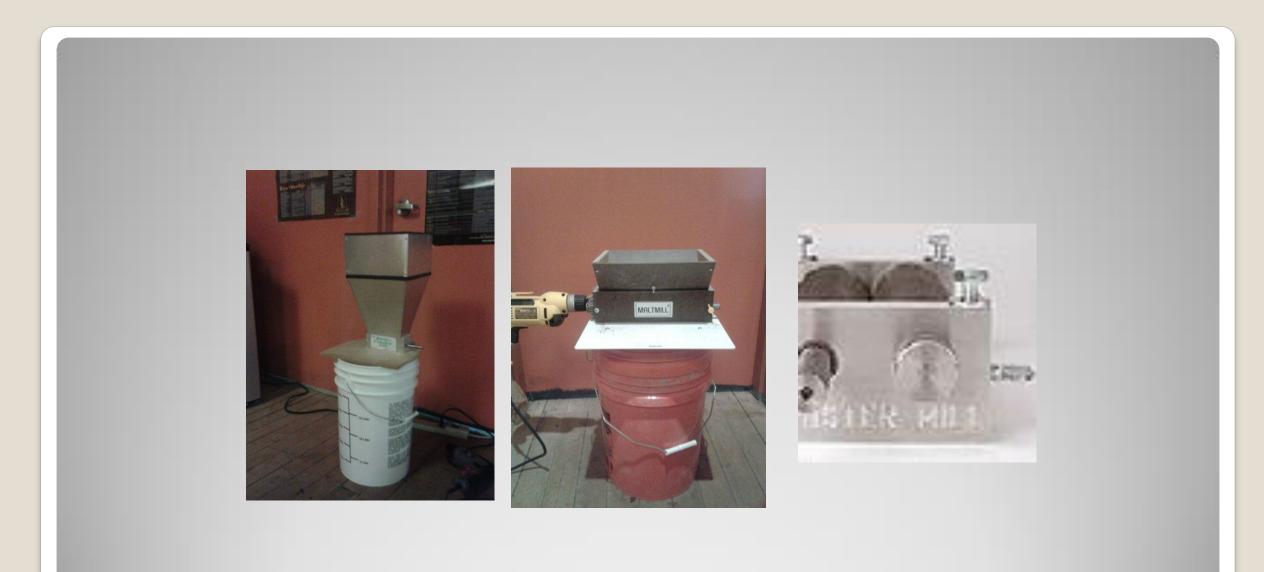
Mill(n) a machine or apparatus for grinding grain











Different homebrewer mills

Milling: Making the most of your Grist

0 0

Grain Type/Assortment

Mill settings

Grind Profile

Brewhouse Performance



PRODUCT INFORMATION

ENTS Co. 625 S Irish Road + PO Box 229 + Chillon, WI 53014-0229 + Phone (920) 849-7711 + Fax (920) 849-4277 + www.briess.com

UMK Pareve

KOSHER CERTIFICATION

All Natural Since 1876

Pilsen Malt WK

TYPICAL ANALYSIS

Mealy / Half / Glassy. 98% / 2% /0% Plump.. ..90% Thru.... ...2% .4.5% Moisture . Extract EC, Dev De 80.5% .78.0% Extract CG, Dry Basis Extract FG/CG Difference ..2.0% Protein S/T37.0 Alpha Amylase 45 Diastatic Power (Lintner)130 *Color1.0 *9Lovibond, Series 52, 1/2" Cell

ELAVOR Subtle Malty, Delicately Sweet	
DEM NUMBERS AND PACKAGING OPTIONS	
5200 Pilsen Malt, V	٧K
50-pound b	ag
Call for # Pilsen Malt, V	٧Ŕ
2,000-pound to	ote
Cal for # Pilsen Malt, V	٧K
Bu	ulk

STORAGE AND SHELF LIFE

Best if used within 6 months from date of manufacture. Store at temperatures of <90 °F.

CHARACTERISICS AND APPLICATIONS

- Very light colored base malt.
- Produces exceptionally clear, crisp wort.
- · Pilsen Malt has a slightly lower protein level than 2-Row Brewers Malt.
- · Produced from AMBA/BMBRI recommended 2-Row Malting Barley varieties.

The data listed under typical analysis are subject to the standard analytical deviations. They represent average values, not to be considered as guarantees, expressed or implied, nor as a condition of sale. The product information contained herein is correct, to the best of our knowledge. As the statements are intended only as a source of information, no statement is to be construed as violating any patent or copyright.

February 2004

Equipment Needed





Recommended Sieves

- No 14..... 1.40mm opening
- No 30..... 0.600mm opening
- No 60..... 0.250mm opening
- Pan
- Cover

Balances

- Portable Balance
- Capacity Minimum 500gms
- Readability 0.1g 1 g

Grist Profile Methods Standard Sieve Test

This procedure is for the classification of malt grist from mill grinding by sieve analysis. The method employs a mechanical shaker for sieving a quantity of grist through standard sieves





Ro-Tap Sieve Shaker The Rotap Testing Sieve Shaker accurately reproduces the circular and tapping motion given testing sieves in hand-sieving, but with a uniform, mechanical action assuring dependable, comparable tests.

Tyler Coarse Sieve Shaker

This low cost shaker is designed to be used in coarse testing application. Well suited for preground grist evaluation. A specially designed mechanism provides a shaking action resulting in consistent, accurate results.



	Standard Ro-Tap Method	Standard Shaker Method	Manual Sieve Method
Ro-Tap Shaker	\$1695.00		
Coarse Sieve Shaker		\$1000.00	
# 14 Sieve	\$29.99	\$29.99	\$29.99
# 30 Sieve	\$29.99	\$29.99	\$29.99
# 60 Sieve	\$29.99	\$29.99	\$29.99
Pan	\$19.70	\$19.70	\$19.70
Cover	\$14.95	\$14.95	\$14.95
Balance	\$144.00	\$144.00	\$144.00
Total Cost	\$1963.62	\$1268.62	\$268.62



Optimizing Example

	Roller Gap			Retained	l		
Mill settings	top	middle	bottom	14	30	60	pan
Coarse	13.0	10.5	11.0	78	14	4	4
Normal	10.0	8.0	6.0	53	28	11	8
Fine	6.5	3.3	2.8	25	25	31	20

		Brewhouse	Collection
	Yeild	efficiency	Time (min)
Coarse	64%	85%	96
Normal	68%	91%	94
Fine	69%	92%	143

Malt Grist by Manual Sieve Test

Subcommittee Members: J. Helber, Chair, J. Barr, T. Bird, M. Brynildson; S. Coon; J. Feiske; M. Henion; T. Kachier, G. Kelly; G. Kustelski; L. Laron; M. Long; T. Marti, L. Miller, E. Samg, J. Schier, A. Tveckern; K. Villa; B. Yawney; J. Zinanti; and P. Schwarz (ex officio). Keywords: Malt grind, Mill, Particle size

CONCLUSIONS

Mitteleuropäische Brautechnische Analysenkommission (MEBAK) (4) employs a mechanical test sieve shaker, such as the Tyler Ro-Tap or Pfungstädter Plansichter. However, an informal survey of brewers in the craft-brewing segment indicated that while most performed some type of grist analysis, very few utilized a mechanical test sieve shaker. Schwarz et al (5) subsequently evaluated a modification of the newly adopted official ASBC method, which employed manual sieving rather than standard mechanical shaker. Results of this preliminary factory

Malt Grist by Manual Sieve Test / 11

gram. The percentage of each fraction was calculated using the weight of the individual fractions divided by the sum of all of the fractions and multiplied by 100 (3).

Statistical Analyses

5

Results of manual grist analysis were evaluated using the Youden unit block design (1). The data were screened for outlier using Dixon's ratio tests as described in Statistical Analysis-4 (1) Results of mechanical and manual grist analyses were compare by the paired t-test for differences in means as described i Statistical Analysis-5 (1). Because the mechanical test was per formed only once at each laboratory, data from the mechanical te were compared with the means of the manual data for each labora tory. Outliers were not included in the calculation of means.

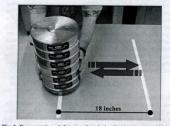


Fig. 1. Representation of the manual analysis of malt grist using U.S. test sieves. The sieve stack and receiving pan are shaken back and forth on a smooth flat surface, traveling 18 in. (45.7 cm) before the direction is reversed.

	Oper	ning ^a	
U.S. Sieve	Microns	Inches	Grist Fractions
No. 10	2,000	0.0787	Husksb held
No. 14	1,410	0.0555	Husks held
No. 18	1,000	0.0394	Husks held
No. 30	594	0.0234	Coarse grits held
No. 60	250	0.0098	Fine grits held
No. 100	150	0.0059	Ordinary flour held
Pan			Fine flour
^a Information fro ^b Information fro		internetion of Full Net de log (GLAINES)	e Konseler van Gale 19 - Den DOrges I al Kongeler Niel and

RESULTS AND DISCUSSION The size of the opening and characteristics of particles retained for each sieve used are shown in Table I. Mills used in this study

were selected to provide a range of malt grist particle-size

dia dia	's ratio tests as d). The data w	ere screened for outliers Statistical Analysis-4 (1).	TABLE II Summary Data ^a (% w/w) for Malt Grist Analysis ^b by Manual Sieve Test					
the pair	nechanical and n ed t-test for dif	nanual grist fferences in	analyses were compared means as described in	Fraction/Sample	Mean	Maxi- mum	Mini- mum	Standard Deviation	
tistical A	nalysis-5 (1). Be	ecause the n	nechanical test was per-	Grist retained on U.S. No. 10	2.00	Transition 1			
ned only	once at each labe	oratory, data	from the mechanical test	A	24.4	31.2	20.5	3.1	
e compar	red with the mean	ns of the mar	ual data for each labora-	В	27.6	52.8	20.4	9.4	
Outliers	were not includ	ed in the cal	culation of means.	С	62.4	64.5	60.5	1.2	
. Outliers	s were not merud	eu in the can	cutation of means.	D	61.9	64.1	58.7	1.6	
				E	3.4	3.9	2.8	0.4	
-		Provide State	Contract of the local division of the local	F	4.2	5.6	3.2	0.8	
100		104 75		G	18.7	22.5	16.3	2.1	
ALC: N				Н	17.7	20.7	15.0	1.8	
Contra-	State State	Contraction of the local division of the loc	Contraction of Contraction	Grist retained on U.S. No. 14				AND.	
1000	and the second second			A	38.4	42.3	35.6	2.0	
Sec. 1			A CONTRACTOR OF	В	36.3	40.9	17.3	6.8	
	A A	134	and the second se	С	17.9	19.4	16.6	0.8	
	- and the second		ALL'ON DESCRIPTION OF ALL OF	D	18.6	19.6	17.0	0.9	
1	- marter	+	A CONTRACT OF A	Е	11.0	12.2	9.3	1.0	
- Constant		ALC: NO.		F	11.0	12.3 .	9.1	1.0	
1000				G	25.8	27.6	23.3	1.3	
	1. 5.00			Н	19.2	20.2	17.6	1.0	
	9 EEEE			Grist retained on U.S. No. 18					
- Sold of the	EE		Section States and	A	15.0	18.7	11.9	1.8	
				В	14.8	18.5	11.7	1.8	
			Contraction of the local distance	С	6.5	7.5	6.0	0.4	
	CONTRACTOR DESCRIPTION	18 incl	Constanting and a second	D	6.6	8.0	6.1	0.5	
- Catholic Col		18 Inci	les	E	18.0	19.4	16.9	0.9	
Sectorial.	ALCONG AND ADDRESS	a second and a		F	17.8	19.5	16.6	1.1	
1 Damener	natation of the man	and such as a	· · · · · · · · ·	G	28.1	31.1	27.0	1.5	
1. Represe	intation of the man	iuai analysis o	f malt grist using U.S. test	Н	14.7	16.3	13.6	0.8	
s. The sie			haken back and forth on a	Grist retained on U.S. No. 30					
oth flat surf	ace, davening 18 in.	(45.7 cm) befo	re the direction is reversed.	А	9.9	10.7	8.3	0.8	
oth flat surf	ace, uavening 18 in.	(45.7 cm) befo	re the direction is reversed.	A B	9.4	10.7 10.6	8.3 7.3	0.8 1.1	
oth flat surf		(45.7 cm) befo ABLE I	re the direction is reversed.	A B C					
xh flat surf		ABLEI		A B	9.4 5.4 5.4	10.6	7.3 5.0 4.9	1.1	
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oth flat surf	т	ABLE I of Standard U		A B C D E F	9.4 5.4 5.4	10.6 5.8 5.9	7.3 5.0 4.9	1.1 0.3 0.4	
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Sieve 0 4 8 10 10 10 10 10 10 10	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G Tist retained on U.S. No. 60 A B C D E F G G Tist retained on U.S. No. 100 G Tist retained on U.S. No. 100	9.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 6.8 18.5	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ \end{array}$	
Sieve 0 4 8 00 00 00 9 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G H H H H H G G H C D E F G G H G G H G G H C S. No. 60 A B G G G H G G H H G G H H H G G H H H G G H H H G H H H H H H H H H H H H H H H H H H H H	9.4 5.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 6.8 18.5 2.2	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4 2.4	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ \end{array}$	
Sieve 0 4 8 00 00 00 9 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G H G G G G G G G G G G G G G G G G	9.4 5.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 22.8 22.4 4.2 22.8 22.4 18.5 2.2 2.1	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4 2.4 2.5	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0 1.9	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ \end{array}$	
Sieve 0 4 8 00 00 00 9 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G H H Crist retained on U.S. No. 60 A B C D D E F F G G H G G I S T C D U S No. 60 A B C D D C D C D C D C D C D C D C D C D	9.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 6.8 18.5 2.2 2.1 1.3	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4 2.4 2.5 1.7	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ \end{array}$	
Sieve 0 4 8 00 00 00 9 7 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G Grist retained on U.S. No. 60 A B C D E F F G G G G G G G G G G G G G G G G G	9,4 5,4 30,0 29,6 18,6 16,1 7,5 7,3 4,2 22,8 22,4 2,4 2,4 2,8 18,5 2,2 2,1 1,3 1,3	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4 2.4 2.5 1.7 1.6	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1 1.2	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2$	
Sieve 0 4 8 00 00 00 9 7 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G H H Crist retained on U.S. No. 60 A B C D D E F G G I S C C D D E E F G G C D C S No. 60 A B C D C S No. 60 A C C D C S No. 60 A C G G G G G G G G G G G G G G G G G G	9.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 6.8 18.5 2.2 2.1 1.3 1.3 6.6	10.6 5.8 5.9 31.9 30.9 23.3 17.6 8.4 8.7 4.4 4.5 24.2 23.4 7.2 19.4 2.4 2.5 1.7 1.6 7.8	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1 1.2 5.6	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.6\\ \end{array}$	
Sieve 0 4 8 00 00 00 9 7 mation fr	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G G G G G G G G G G G G G G G G G	9.4 5.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 22.8 22.4 6.8 18.5 2.2 2.1 1.3 1.3 6.6 7.1	$\begin{array}{c} 10.6\\ 5.8\\ 5.9\\ 31.9\\ 30.9\\ 23.3\\ 17.6\\ 8.4\\ 4.5\\ 24.2\\ 23.4\\ 7.2\\ 19.4\\ 2.4\\ 2.5\\ 1.7\\ 1.6\\ 7.8\\ 7.9\end{array}$	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1 1.2 5.6 6.2	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.1\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2$	
Sieve 0 4 8 0 0 0 0 0 0 0 0 0 0 0 0 0	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G H H G G H G G H G G H G G S No. 100 A B C D B F G G G G G G G G G G G G G G G G G G	9.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 22.8 822.4 6.8 18.5 2.2 2.1 1.3 6.6 7.1 1.1	$\begin{array}{c} 10.6\\ 5.8\\ 5.9\\ 31.9\\ 30.9\\ 23.3\\ 17.6\\ 8.4\\ 8.7\\ 4.4\\ 4.5\\ 24.2\\ 23.4\\ 7.2\\ 19.4\\ 2.5\\ 1.7\\ 1.6\\ 7.8\\ 7.9\\ 1.4\\ \end{array}$	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1 1.2 5.6 6.2 1.0	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ 0.1\\ 0.6\\ 0.6\\ 0.1\\ \end{array}$	
Sieve 0 4 8 0 0 0 0 0 0 0 0 0 0 0 0 0	T Characteristics of Oper Microns 2,000 1,410 1,000 594 250 150 om (5).	ABLE I of Standard U aing ⁴ Inches 0.0787 0.0555 0.0394 0.0234 0.0098	S. Sieves <u>Grist Fractions^b</u> Husks held Husks held Coarse grits held Fine grits held Fine grits held Ordinary flour held	A B C D E F G G G G G G G G G G G G G G G G G G	9.4 5.4 5.4 30.0 29.6 18.6 16.1 7.5 7.3 4.2 4.2 22.8 22.4 22.8 22.4 6.8 18.5 2.2 2.1 1.3 1.3 6.6 7.1	$\begin{array}{c} 10.6\\ 5.8\\ 5.9\\ 31.9\\ 30.9\\ 23.3\\ 17.6\\ 8.4\\ 4.5\\ 24.2\\ 23.4\\ 7.2\\ 19.4\\ 2.4\\ 2.5\\ 1.7\\ 1.6\\ 7.8\\ 7.9\end{array}$	7.3 5.0 4.9 28.3 28.0 14.8 14.7 6.9 6.4 3.9 3.9 22.1 20.8 6.5 17.5 2.0 1.9 1.1 1.2 5.6 6.2	$\begin{array}{c} 1.1\\ 0.3\\ 0.4\\ 1.3\\ 1.0\\ 2.4\\ 1.0\\ 0.5\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.1\\ 0.2\\ 0.7\\ 0.8\\ 0.3\\ 0.6\\ 0.1\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.2\\ 0.6\\ 0.6\\ \end{array}$	

12 **\$**



GRIST

A. BY STANDARD SIEVE TEST

This procedure is for the classification of malt grist from mill grindings by sieve analysis. The method employs a mechanical shaker for sieving a quantity of grist through six standard sieves.

Apparatus

- (a) Mechanical sieving device, designed for use with 8in-diameter standard testing sieves. See Malt-4, Standardization of Malt Setting, Sieving ground malt for types of mechanical sieving devices available.
- (b) Standard test sieves, 8-in. diameter, Nos. 10, 14, 18, 30, 60, 100, a cover, and bottom pan, or equivalent.
- (c) Brush, for cleaning the sieves.
 (d) Rubber balls, ⁵/8-in diameter, Screwballs (Sefar
- Filtration, Kansas City, MO, or equivalent).
- (e) Dark paper.
- (f) Analytical balance, accurate to 0.1 g.
 (g) Timer.

Method

Place three rubber balls on each of the U.S. standard test sieves Nos. 30, 60, and 100. Stack all six sieves in order with sieve No. 10 on top and sieve No. 100 on the bottom. Place the bottom pan under sieve No. 100. Obtain a sample of ground malt for analysis and reduce it to 100- to130-g by splitting or dividing. A "Jones-type" riffle sample splitter or divider is described in **Malt-1** and is useful for dividing malt grist. Place the 100-130 g sample of malt grist on the top of sieve No. 10, cover, and mechanically sieve for 5 min. Empty each individual sieve and the bottom pan onto dark paper and brush each one clean. Weigh the fractions, and record the net weight of the individual fractions to the nearest tenth of a gram.

Calculation

Calculate the percentage of malt grist retained for each fraction by dividing the weight of each fraction by the sum of the fraction weights and multiply by 100.

$$\mathscr{W}_x = \frac{W_x}{W_t} \times 100 \quad or \quad \frac{W_p}{W_t} \times 100$$

in which x = screen 10, 14, 18, 30, 60, or 100

p = pan

 $\sqrt[9]{x}$ = percent of malt grist for the fraction W_x = weight of individual fraction retained on sieve No. x (in g)

 W_p = weight of material passed through to the bottom pan (in g)

$$W_{t} = W_{10} + W_{14} + W_{18} + W_{30} + W_{60} + W_{100} + W_{100}$$

= sum of all fractions retained and passed through to the bottom pan (in g).

Report the percentage of malt grist retained for each fraction to the nearest tenth of a percent.

Example $W_{10} = 21.8 \text{ g}$

 $W_{14}^{10} = 41.4 \text{ g}$ $W_{14}^{1} = 16.6 \text{ g}$ $W_{30}^{1} = 10.9 \text{ g}$ $W_{60}^{10} = 6.9 \text{ g}$ $W_{100}^{1} = 8.0 \text{ g}$ $W_{100}^{1} = 8.0 \text{ g}$ $W_{100}^{1} = 8.0 \text{ g}$ $W_{100}^{1} = 41.4 + 16.6 + 10.9 + 6.9 + 8.0 + 4.3 = 109.9$ $W_{10}^{1} = \frac{21.8}{109.9} \times 100$

=19.8 %_p = $\frac{4.3}{109.9} \times 100$

= 3.9

Precision

Based on a collaborative study (1), repeatability and reproducibility coefficients of variation of 0.7–8.4% and 2.7–20.6%, respectively, can be expected for malt ground and passed through sieves 10–100. For malt grist retained on and passed through sieve No. 100, reproducibility coefficients of variation ranged from 6.8 to 15.2% and 11.0 to 20.6%, respectively, because of low mean values.

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 Mitteleuropaische Brautechnische Analysenkommission. Brautechnischen Analysenmethoden, Band II. MEBAK, Freising-Weihenstephan, Germany, 1979.
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B. BY MANUAL SIEVE TEST

This procedure is for the classification of malt grist from mill grindings by sieve analysis. The method employs manual shaking of U.S. standard test sieves for sieving a quantity of grist through four standard sieves.

doi: 10.1094/ASBCMOA-Malt-15

Malt-15	
Page 2 of 2	

Apparatus

Method

- (a) U.S. standard test sieves, 8-in. diameter, Nos. 10, 30, 60, 100, a cover, and bottom pan, or equivalent.
- (b) Brush, for cleaning the sieves.
 (c) Rubber balls, ⁵/8-in. diameter, Screwballs (Sefar
 - Filtration Kansas City MO or equivalent)

Place three rubber balls on each of the U.S. standard

test sieves Nos. 30, 60, and 100. Stack all four sieves,

Nos. 10, 30, 60, and 100 in order with sieve No. 10 on

top and sieve No. 100 on the bottom. Place the bottom pan under sieve No. 100. Obtain a sample of ground

malt for analysis and reduce it to 100-130 g by splitting

or dividing. A "Jones-type" riffle sample splitter or

divider is described in Matt-1 and is useful for dividing malt grist. Place the 100- to 130-g sample of malt grist

on the top of sieve No. 10, cover, and sieve for 3 min, sliding along a smooth surface for 18 in. per 0.5 sec, and

then reverse the direction (total cycle time 1.0 sec). After each 15-sec interval, tap the pan and sieve stack

sharply against a flat surface (see Note 1). Empty and

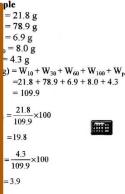
brush clean each individual sieve and the bottom pan

onto dark-colored paper. Weigh and record the net

weight of the individual fractions to the nearest 0.1 g.

 W_t = sum of all fractions retained and passed through to the bottom pan (in g)

Report the percentage of malt grist retained for each fraction to the nearest one-tenth of a percent.



ion

collaborative tests (1) repeatability and reprolity coefficients of variation for all sieve fractions 1 from 1.1 to 12.7% and 1.8 to 17.2%, respec-

Dark-colored paper is useful for ease of visualwhen emptying and brushing grist from the pans. 2. To mimic the mechanical shaker and effectively move fines to the lower pans, the tapping motion must produce a loud bang.

References

- American Society of Brewing Chemists. Report of Subcommittee on Malt Grist by Manual Sieve Test. *Journal* 61:246, 2003.
 Schwarz, P., Barr, J., Jovee, M., Power, J., and Horsley, R. J.
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2003, rev. 2009

Video illustrating technique for manual sieve analysis

100.

 $\mathcal{W}_x = \frac{W_x}{W_1} \times 100$

in which

 $\%_x$ = percent of malt grist for each fraction W_x = weight of individual fraction retained on sieve No. x (in g) W_p = weight of material passed through to the bottom pan (in g)

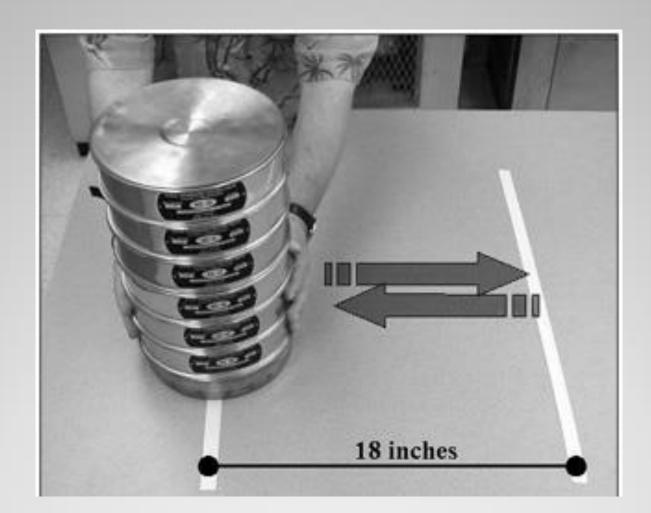
• TABLE I

Characteristics of Standard U.S. Sieves

- U.S. Sieve Microns Grist Fractions
- No. 10 Husks held
- No. 14 Husks held
- No. 18 Husks held
- No. 30 Coarse grits held
- No. 60 Fine grits held
- No. 100 Ordinary flour held
- Pan Fine flour

- Individual grist samples weighing between 100 and 130 g
- 8-in.-diameter U.S. Standard test sieves nos. 10, 30, 60, 100 and a receiving pan.
- The top sieve was covered and the sieve stack was manually shaken for 3 min back and forth on a smooth flat surface
- Traveling 18 in. (45.7 cm), and then reversing the direction in a cycle of 1 sec
- After each 15-sec interval, the pan and sieve stack were sharply tapped
- The individual fractions were then weighed and the weights were recorded to the nearest onetenth of a gram

Manual Method



Manual Sieve Method

How it's done--





Grist weighed from each sieve

Homebrew Club Exercise

ZZ Hops and KC Biermeisters



Shake it!



ZZ Hops Teamwork, 2012



Weighing Sieve Results

		Brewer A	%	Brewer B	%	Brewer C	%	Brewer D	%
	10	49.1	49.1	30.6	30.6	48.0	48	62.5	62.5
	30	40.4	40.4	54.8	54.8	47.2	47.2	33.5	33.5
	60	6.1	6.1	12.5	12.5	2.3	2.3	2.5	2.5
	100	1.1	1.1	0.6	0.6	0.3	0.3	1.0	1
	100	1.1	1.1	0.0	0.0	0.5	0.5	1.0	L
pan		2.6	2.6	1.3	1.3	1.7	1.7	0.5	0.5
total		99.3	99.3	99.8	99.8	99.5	99.5	100	100
		Monster 2	%	Monster 3	%	Schmidling		Barley Crusher	

KC Biermeisters sieve results



Compare Sieve Results with Gap Width

If your mill results are too coarse or too fine, adjust the gap between the rollers.

Check with feeler gauges.

Periodically check the gap on your mill.

Optimizing Example

Mill settings	top	10	30	60	100	pan
Coarse	0.055	78	14	4	1	4
Normal	0.045	53	28	11	2	8
Fine	0.025	22	23	30	5	20

The method employs manual shaking of U.S. standard test sieves for sieving a quantity of grist through four standard sieves.



Post-sieve analysis

Canadian Grain Commission canadienne Commission des grains Canadä

CGC > Grain quality > Harvest and export quality reports > Western Canadian malting barley > Methods

14.6

Malting barley methods used to measure quality

It the Grain Research Laboratory, unless otherwise specified, analytical results for barley and malt are eported on a dry weight basis. The ASBC methods cited are those of the *American Society of Brewing Chemists*, Ninth Edition, (2009).

ist of western Canadian malting barley methods and tests.

-Amylase activity

a-Amylase activity is determined using ASBC method MALT 7B automated to run on a Skalar segmented flow analyser, using ASBC dextrinized starch as the substrate, and calibrated with standards that have been determined by method ASBC Malt 7A.

-Glucan content

 β -Glucan content is determined in malt extract by Skalar segmented flow analysis using Calcofluor staining of soluble, high molecular weight β -glucan (ASBC Wort-18).

iastatic power

Diastatic power is determined on a Skalar segemented flow analyzer, using an automated neocuproin assay for reducing sugars, which is calibrated using malt standards analysed using the official ferricyanide reducing sugar method, (ASBC Malt 6A).

ockage and assortment

Dockage - Dockage-free barley is obtained by passing an uncleaned sample through a Carter Dockage Tester arranged as described in the Canadian Grain Commission's Official Grain Grading Guide for dockage determination. This involves passing the barley over a no. 6 riddle, no. 6 and no. 5 Buckwheat sieves. Material retained above the no. 5 sieve is considered to be dockage-free.

Assortment - All samples are passed through a Carter Dockage Tester equipped with a no. 6 riddle to remove foreign material and two slotted sieves to sort the barley. Heavy Grade barley is the material retained on a 6/64" (2.38 mm) \times 3/4" slotted sieve. Intermediate Grade is barley that passes through the

ine-grind and coarse-grind Extracts

Extracts are prepared using an Industrial Equipment Corporation (IEC) mash bath and the Congress mashing procedure from 45°C to 70°C. Specific gravities are determined at 20°C with an Anton Paar DMA 5000 digital density meter (ASBC Malt-4).

ree amino nitrogen is determined on the fine extract according to the official ASBC method Wort-12, automated to run on a Skalar segmented flow analyzer.

ermination energy

Germination energy is determined by placing 100 kernels of barley on two layers of Whatman No. 1 filter paper, in a 9.0 cm diameter petri dish, and adding 4.0 ml of purified water. Samples are controlled at 20 degrees Celcius and 90% relative humidity in a germination chamber. Germinated kernels are removed after 24 and 48 hours and a final count is made at 72 hours (ASBC Barley 3C, IOB, and EBC procedure).

Ibach index (Ratio S/T)

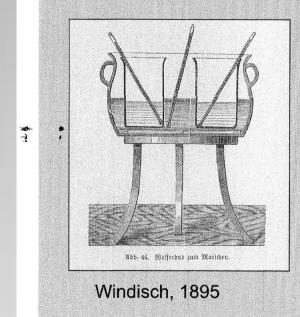
Kolbach index is calculated from the formula, (% Soluble protein/% Malt protein) x 100.

cromalting

Valts are prepared using an Automatic Phoenix Micromalting System designed to handle twenty-four 500 samples of barley per run.

It mille

Barley Malt Quality Methods



Also need to consider that many standard methods are old!

- <u>Extract</u> (Congress Mash), origins are in late 1800's
 - Original intent was only to determine maximum theoretical extract.
 - However, Congress wort is now used for all standard wort analyses.
 - Non-ideal mash conditions.
- Origins of ASBC alpha-amylase and DP methods is prior to 1920

How will these differ in a "Congress Wort"?

- Named for the standardized process instituted by the European Brewing Congress (EBC) in 1875.
- A standard weight of finely ground malt is multi-infusion mashed over a period of nearly 2 hours.
- The mash is filtered thru a paper filter for a period of 1 hour and the specific gravity is measured. The % Extract, Fine Grind, As-Is is calculated from the ASBC Table for Extract Determination in Malt.





100 grams of milled malt — Sample B on left Sample D on right

300 mL strike water at 120F; held for 60 minutes (stirring every 15 minutes)

Temperature increased to 160F over 60 minutes (stirring every 15 minutes)

At the end of 2 hours, samples filtered through coffee filters

Specific Gravity checks

Kitchen Congress Wort, using an induction hotplate

Sieve 30	Sieve 30
54.8 %	33.5 %
1.072 SG	1.065 SG

Finer vs Coarser

Coarser grind exposes less of the endosperm—

Less contact with heated water—

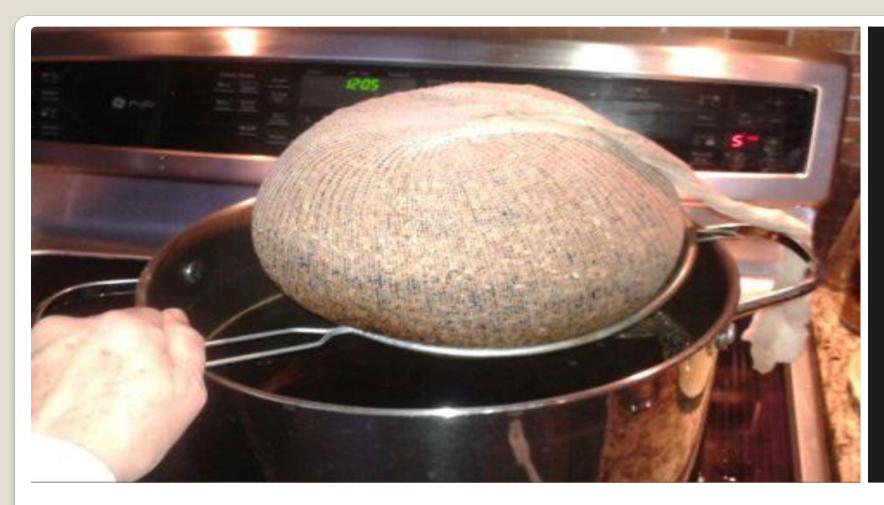
Less enzyme activation—

Less conversion to sugar



Sieves are something a good homebrew supply shop should have!

Not only to check customers' mills, but their own!



Proper grind is important not only to all-grain brewing, but also to partial-mash brewing

When malt is a major part of a recipe, the coarseness of the grind is important

 Milling consistently is important in making consistent beers

 Optimizing mill settings is beneficial in achieving efficient extraction of sugars and avoiding stuck mashes



 Efficient extraction from proper mill settings saves on malt bill and makeup additions of DME to achieve desired target Original Gravity

 Adjustable mills should be periodically checked; gap setting can be measured with feeler gauges—and compared with sieve results



<u>References</u>

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THANKS, AND COME SEE!