

REPORT On COLLABORATIVE TRIAL RESULTS

To The

74th MEETING

Of The

EVALUATION TEAM On BARLEY QUALITY

PRAIRIE RECOMMENDING COMMITTEE
For OAT And BARLEY (PRCOB)

Winnipeg 2017

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2016 BMBRI Collaborative Test Entries (from February 24, 2016 ETBQ Meeting)
Second Year Two Row

Entry #	Breeder/Sponsor	Quality Comments from Evaluation Team on Barley Quality (ETBQ)
TR14146	CDC	<p>2014 Highlights: higher plumpness and kernel weight than checks at 2 stations. Higher friability than checks at 2 stations. Concerns: lower extract than checks at 1 station. High S/T at 2 stations. Other comments: similar to Metcalfe, low protein</p> <p>2015 crop year Highlights: on average higher k. wt. than checks; friability higher than all checks. Extract higher than AC Metcalfe and CDC Copeland at all stations and slightly lower than AAC Synergy at 2 stations. Concerns: BG higher than checks at 4 out of 5 stations in the Collab trials Other comments: higher DP than CDC Copeland and AAC Synergy at all stations and higher than AC Metcalfe at 1 station. Alpha-amylase higher than CDC Copeland at 3 stations and higher than AAC Synergy at 2 stations –higher enzyme line</p>
TR14150	CDC	<p>2014 Highlights: higher kernel weight than checks at 2 stations. Lower beta glucan than checks. Concerns: Extract inconsistent among stations. Other comments: no concerns with DP; higher S/T probably contributes to higher extract, but this extract is not fermentable</p> <p>2015 crop year Highlights: Higher kernel weight than 3 checks at 1 station Concerns: Higher malt P&B and PUG than checks at 1 station. Higher malt P&B than checks at 1 station in the Collab. Other comments: Lower DP than AAC Synergy and AC Metcalfe at 3 stations, lower DP than CDC Copeland at 2 stations. Low enzyme and low BG line</p>
TR14617	FCDC	<p>2014 Highlights: Similar to checks: Concerns: higher protein than checks and water sensitive at one station. Other comments: this line was preferred over TR14616 by one member because of good proteolytic/glycolytic modification and good S/T index</p> <p>2015 crop year Highlights: On average higher k. wt. than checks –higher kernel weight than all checks at 1 station. On average higher plumpness than checks – higher plumpness than all checks at 2 stations. On average higher extract than CDC Copeland and AC Metcalfe but lower than AAC Synergy (extract higher than CDC Copeland and AC Metcalfe at 3 stations, higher than AAC Synergy at 1 station). Concerns: much higher grain protein than all checks at 1 station. Other comments: KI lower than checks at 3 stations. Variable BG -- lower than all checks at 1 station (Co-op), higher than all checks at another station (Co-op). Collab trial: on average (mean of 5 stations) slightly higher BG than all checks.</p>
TR14815	CDC/Sapporo	<p>2014 Highlights: higher kernel weight than checks. Higher extract than checks at 2 stations. Concerns: higher protein and lower friability than checks at 1 station. Comments: Slightly lower FAN than checks, DP similar to Metcalfe</p> <p>2015 crop year Highlights: Plumpness and kernel weight consistently higher than all checks at 3 stations. Higher extract than all checks at 3 stations Concerns: malt P&B higher than all checks at 1 station. Other comments: Good control on BG, total protein OK. Collab trial: malt P&B OK in the Collab trial</p>
TR14927	Syngenta	<p>2014 Highlights: lower protein and higher friability than checks. Higher extract than checks at one station. Concerns: Slightly lower kernel weight than checks at 2 stations. Other comments: Low germination energy and low 8 ml germination – European-type quality; lower enzymes and lower soluble protein & FAN than checks might be good for craft brewing; lower protein maybe good for producers</p> <p>2015 crop year Highlights: Plumpness higher than all checks at 3 stations. On average higher kernel weight than AC Metcalfe and CDC Copeland but lower than AAC Synergy. On average higher extract than all 3 checks --higher extract than all checks at 1 station, similar to the checks at the other 2 locations. Concerns: Water sensitive at 3 stations – discussion about specific and not fully understood water sensitivity of TR927 and TR928 – ‘European-type’ barley Other comments: lower grain protein than checks at 3 stations. Lower enzyme, lower soluble protein and FAN than checks in both Coop and Collab trials</p>
TR14928	Syngenta	<p>2014 Highlights: Slightly higher plumpness and kernel weight than checks. Higher extract and higher friability than checks at 1 station. Lower beta glucan than checks. Other comments: Slightly lower enzymes. Soluble protein and FAN inconsistent among stations. In general similar comments to TR 14927</p> <p>2015 crop year Highlights: Plumpness higher than all checks at 3 stations. On average k. wt. higher than checks –k. wt. higher than 3 checks at 1 station. Concerns: more water sensitive than all checks at 3 stations (same as TR14927) Other comments: Consistently lower DP and alpha-amylase than all checks at 3 stations. Lower soluble protein, KI and FAN than all checks at 3 locations. European-type quality. Higher peeling than checks.</p>

**2016 BMBRI Collaborative Test: From Feb 2, 2016 ETBQ Meeting
First Year Two Row**

TR15152	CDC	<p>2015 crop year Highlights: On average higher plumpness than all checks. Higher extracts than all checks at two stations, at third station extract lower than AAC Synergy.</p> <p>Concerns: higher malt P&B than checks at 1 station –should be tested for another year. Higher PUG at 1 station (higher wort viscosity)</p> <p>Other comments: Inconsistency in kernel weights. Higher kernel weight than checks at one station, lower kernel weights than checks in second station)</p>
TR15155	CDC	<p>2015 crop year Highlights: extract higher than Metcalfe and Copeland at 2 stations</p> <p>Concerns: Plumpness lower than AC Metcalfe and AAC Synergy at 3 stations.</p> <p>Other comments: Copeland-type with low BG, lower protein and low P&B; good balance</p>
TR15242	AAFC	<p>2015 crop year Highlights: On average higher kernel weight than checks. On average higher plumpness than checks Good extract, higher than all checks in Neapolis, higher than Copeland and Metcalfe in Kernen. On average lower BG than checks</p> <p>Concerns: inconsistency in kernel size</p> <p>Other comments: lower P&B than AAC Synergy</p>
TR15245	AAFC	<p>2015 crop year Highlights: k. wt. higher than checks; lower BG than checks (especially Copeland and Metcalfe) On average extract higher than Copeland and Metcalfe but sl. lower than Synergy</p> <p>Concerns: on average plumpness lower than Metcalfe and Synergy but higher than Copeland</p> <p>Other comments: good characteristics, higher grain protein but Copeland-like; able to keep KI and soluble protein in good range</p>
TR15405	AB/InBev	<p>2015 crop year Highlights: on average higher plump and k. wt. than checks</p> <p>Concerns:</p> <p>Other comments: potentially high enzyme line, high FAN</p>
TR15818	Sapporo/PM L/CDC	<p>2015 crop year Highlights: higher k. wt. than checks at 3 stations; higher extracts than checks at all 3 stations (associated with P&B?)</p> <p>Concerns: higher P & B at both stations</p> <p>Other comments: good balance, good extract</p>

Two Row Checks

AC Metcalfe
CDC Copeland
AAC Synergy

BMBRI Collaborative Malting Trials 2016

Station: Vulcan

Process Conditions:

Processor: Fort Collins Global Barley Research

Steeping:

Wet Stage 1 15C 7 hours, Air Rest 12 hours with 30% air flow, Wet Stage 2 for 5 hours at 15C

Germination:

17C for 96 hours with 30% air in the first 48 and 50% air in the last 48 hours

Kilning:

45C for 6 hrs, 55C for 6 hours, 60C for 3 hours, 68C for 2 hours, 80C for 2 hours, 90C for 1 hour, 40% air fl

Varieties	Barley										Processing				
	1000	Plump		Moisture	Protein	Barley	Germination			Steep-out	Germ-out		Malt		
	KWT g.	% >7/64	% >6/64	%	%	P & B %	4ml %	8ml %	Chitting %	Moisture %	Moisture %	Yield %	Roots %	P & B %	
AC Metcalfe - CK	41.5	41.2	98.8	8.0	10.6		98	86		42.3	45.7	85.2			
CDC Copeland-CK	44.0	52.7	99.1	8.1	10.1		97	92		41.6	45.1	85.5			
AAC Synergy -CK	42.3	57.0	98.7	7.8	10.2		100	95		43.1	44.7	85.7			
TR14146 (2nd yr)	43.4	39.4	98.9	8.1	10.0		96	92		42.7	45.0	84.6			
TR14150 (2nd yr)	41.2	60.8	98.7	8.1	10.1		92	95		43.7	46.9	81.1			
TR14617 (2nd yr)	42.3	38.6	98.2	8.2	13.7		94	97		41.8	44.6	86.2			
TR14815 (2nd yr)	43.3	61.7	98.5	7.9	11.1		89	89		42.6	44.6	85.8			
TR14927 (2nd yr)	41.0	69.4	97.6	7.8	9.4		96	45		43.3	45.7	86.9			
TR14928 (2nd yr)	42.2	70.2	98.3	7.8	11.0		100	41		42.8	46.6	85.0			
TR15152 (1st Yr)	41.8	62.0	98.4	7.7	10.0		97	93		42.9	46.6	83.5			
TR15155 (1st Yr)															
TR15242 (1st Yr)	43.0	30.6	97.1	7.9	13.5		96	95		42.8	45.1	85.0			
TR15245 (1st Yr)	41.9	13.0	98.3	7.5	10.4		98	88		42.5	46.5	84.2			
TR15405 (1st Yr)	41.7	48.6	98.5	7.8	10.1		98	84		43.2	46.9	84.3			
TR15818 (1st Yr)	43.7	40.3	98.3	8.1	9.6		94	98		42.4	44.7	83.7			

Variety	Malt Analysis															
	Extract	Extract	F/C	Protein	Soluble	S/T	Diastatic	Alpha	B-Glucan			Viscosity	Friability	DMS	DMSP	FAN
	Fine Gr. %	Coarse Gr. %	Gr. Difference %	Protein %	Protein %	%	Power deg L	Amylase D.U.	ppm	ppm	cps	%	ppm	ppm	mg/L	
AC Metcalfe - CK	83.0	82.2	0.75	9.78	4.79	46.6	184.6	102.5	48.1	1.41	95.8				186.5	
CDC Copeland-CK	82.8	82.2	0.6	9.14	4.47	46.4	149.7	73.8	27.3	1.39	98.8				156.8	
AAC Synergy - CK	82.8	82.5	0.2	10.21	4.78	44.7	163.3	82.9	30.8	1.37	97.6				178.1	
TR14146 (2nd yr)	83.4	83.0	0.5	9.56	4.85	48.2	188.9	97.9	37.7	1.37	98.2				193.7	
TR14150 (2nd yr)	84.5	83.2	1.2	9.30	4.47	45.6	160.8	87.8	38.4	1.38	97.6				170.6	
TR14617 (2nd yr)	80.2	79.0	1.2	11.84	4.83	39.1	199.6	92.9	80.1	1.38	85.2				168.1	
TR14815 (2nd yr)	84.1	83.2	0.9	9.94	4.51	43.2	174.7	84.4	61.8	1.41	94.8				152.2	
TR14927 (2nd yr)	84.1	83.8	0.4	9.13	4.12	42.7	137.7	64.6	35.7	1.38	98.2				143.9	
TR14928 (2nd yr)	83.4	83.0	0.4	10.08	4.57	43.2	164.8	72.6	27.7	1.36	97.8				176.4	
TR15152 (1st Yr)	84.5	84.0	0.5	9.27	4.69	48.0	166.7	94.4	30.8	1.38	96.2				182.7	
TR15155 (1st Yr)																
TR15242 (1st Yr)	81.1	79.9	1.2	11.8	5.24	42.5	252.3	101.6	58.6	1.38	81.6				188.3	
TR15245 (1st Yr)	82.7	81.9	0.8	9.9	4.38	42.0	145.7	72.9	48.5	1.39	97.6				143.0	
TR15405 (1st Yr)	82.6	81.5	1.1	9.5	4.52	45.2	193.0	103.2	23.5	1.37	98.0				182.0	
TR15818 (1st Yr)	85.0	84.4	0.6	9.4	4.63	46.9	151.3	82.1	39.9	1.39	97.8				189.2	

BMBRI Collaborative Malting Trials 2016

Station: Lacombe

Process Conditions:

Processor: Rahr Shakopee

Steeping: _____

Germination: _____

Kilning: _____

Varieties	Barley										Processing				
	1000	Plump		Moisture	Protein	Barley	Germination			Steep-out	Germ-out		Malt		
	KWT	% >7/64	% >6/64	%	%	P & B	4ml	8ml	Chitting	Moisture	Moisture	Yield	Roots	P & B	
	g.	%	%	%	%	%	%	%	%	%	%	%	%	%	
AC Metcalfe - CK			81.3	7.7	11.0	0.0			92	35.8	38.8			3.0	
CDC Copeland-CK			63.8	7.7	11.9	0.0			94	35.2	38.1			1.0	
AAC Synergy -CK			71.3	7.6	11.2	0.6			80	35.6	39.3			1.0	
TR14146 (2nd yr)			79.2	7.6	11.1	2.0			70	35.3	38.7			3.0	
TR14150 (2nd yr)			53.3	7.8	11.3	1.2			74	38.5	41.5			0.0	
TR14617 (2nd yr)			68.5	7.7	12.7	3.2			64	36.9	38.3			3.0	
TR14815 (2nd yr)			72.1	7.7	12.1	0.6			62	34.9	38.0			1.0	
TR14927 (2nd yr)			81.8	7.5	9.9	1.0			10	39.8	43.9			0.0	
TR14928 (2nd yr)			87.5	7.6	11.0	0.0			24	33.2	38.1			1.0	
TR15152 (1st Yr)			76.2	7.7	10.9	1.4			82	36.1	39.6			6.0	
TR15155 (1st Yr)			69.9	7.8	10.5	0.6			76	34.9	38.7			1.0	
TR15242 (1st Yr)			81.1	7.7	11.3	0.1			72	35.1	38.9			0.0	
TR15245 (1st Yr)			68.7	7.5	12.3	0.1			56	36.4	39.9			3.0	
TR15405 (1st Yr)			75.3	7.6	11.2	0.8			88	37.8	40.5			6.0	
TR15818 (1st Yr)			82.9	7.7	11.0	0.9			94	34.3	37.7			6.0	

Variety	Malt Analysis														
	Extract	Extract	F/C	Soluble		S/T	Diastatic	Alpha	B-Glucan	Viscosity	Friability	DMS	DMSP	FAN	
	Fine Gr.	Coarse Gr.	Difference	Protein	Protein	%	Power	Amylase							
%	%	%	%	%	%	deg L	D.U.	ppm	cps	%	ppm	ppm	mg/L		
AC Metcalfe - CK	81.5	80.9	0.7	11.63	6.12	52.66	172	94.2	75	1.44	81.0			248	
CDC Copeland-CK	80.5	79.8	0.7	11.69	6.19	52.97	149	67.5	87	1.42	88.0			205	
AAC Synergy - CK	80.9	79.9	1.0	12.03	6.63	55.14	149	72.2	111	1.44	91.4			229	
TR14146 (2nd yr)	81.4	80.2	1.2	11.95	6.50	54.43	180	78.7	157	1.44	87.5			227	
TR14150 (2nd yr)	79.5	79.1	0.4	12.77	6.71	52.51	174	81.6	65	1.41	88.0			243	
TR14617 (2nd yr)	81.5	80.3	1.2	11.98	6.28	52.44	172	77.7	139	1.45	85.0			217	
TR14815 (2nd yr)	80.3	79.3	1.0	13.52	6.75	49.96	147	81.6	153	1.44	84.7			240	
TR14927 (2nd yr)	81.3	80.5	0.8	10.78	5.14	47.65	111	57.1	176	1.44	78.1			203	
TR14928 (2nd yr)	81.2	80.5	0.7	11.16	5.36	48.06	139	62.4	97	1.42	94.3			224	
TR15152 (1st Yr)	82.3	80.9	1.4	10.84	6.01	55.43	151	88.1	85	1.44	90.0			247	
TR15155 (1st Yr)	82.3	81.1	1.2	10.27	5.62	54.71	135	87.2	108	1.44	93.0			222	
TR15242 (1st Yr)	81.5	80.8	0.7	11.09	5.81	52.33	188	87.7	156	1.47	89.2			221	
TR15245 (1st Yr)	80.0	78.7	1.3	12.77	5.97	46.74	149	77.9	104	1.46	85.0			217	
TR15405 (1st Yr)	79.9	79.3	0.6	11.32	6.28	55.50	187	103.2	98	1.43	91.0			303	
TR15818 (1st Yr)	82.7	82.0	0.7	10.85	5.73	52.81	158	77.5	155	1.45	85.9			278	

2016 BMBRI COLLABORATIVE TRIALS
 Mean of All Stations (Neapolis,Vegreville,Saskatoon, Kamsack,Vulcan,Lacombe)

	7/64- Plump %	6/64- Plump %	Protein %	4ml %	8ml %	Barley P & B %	Malt P & B %	Extract Fine Gr. %	Malt Protein %	Soluble Protein %	S/T %	Diastatic Power deg L	Alpha Amylase D.U.	B-Glucan ppm	Viscosity cps	Friability %	FAN mg/L
Two Row																	
AC Metcalfe - CK	52.7	92.8	11.4	98.2	82.2	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
CDC Copeland-CK	63.4	90.6	10.9	98.0	77.0	1.3	2.3	81.9	10.3	5.3	50.3	145	74.2	81	1.42	91.0	199
AAC Synergy -CK	66.0	91.4	11.0	97.8	85.2	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR14146 (2nd yr)	55.1	93.6	10.9	96.4	87.6	2.9	4.5	82.0	10.9	5.5	49.9	169	84.7	117	1.41	87.2	228
TR14150 (2nd yr)	63.6	88.8	11.1	96.6	84.6	3.2	5.1	81.5	11.1	5.3	47.3	165	81.2	90	1.41	85.8	216
TR14617 (2nd yr)	61.5	91.6	12.5	96.8	82.0	2.2	3.0	81.4	11.8	5.5	46.2	171	85.6	104	1.43	83.8	218
TR14815 (2nd yr)	65.6	92.0	11.8	94.4	77.4	3.1	7.0	82.4	11.6	5.4	46.2	165	80.7	114	1.44	82.2	215
TR14927 (2nd yr)	70.8	93.6	10.3	95.8	47.0	2.5	3.2	82.2	10.2	4.7	45.6	133	63.1	88	1.42	90.3	199
TR14928 (2nd yr)	75.7	96.0	11.1	97.4	47.0	2.9	4.8	82.3	10.8	4.9	44.4	140	66.6	70	1.41	90.8	206
TR15152 (1st Yr)	69.6	93.5	10.8	94.8	79.4	3.3	7.0	83.0	10.3	5.3	51.2	149	81.7	73	1.42	88.0	225
TR15155 (1st Yr)	56.4	90.2	10.8	94.0	77.0	1.6	3.1	82.3	10.4	5.4	51.9	121	72.3	91	1.42	89.9	226
TR15242 (1st Yr)	63.7	94.5	11.2	96.0	74.0	1.5	2.7	81.8	11.2	5.2	46.0	169	78.0	185	1.46	82.0	206
TR15245 (1st Yr)	52.7	91.6	11.3	96.0	77.6	1.8	3.9	81.9	11.2	5.0	44.5	130	72.9	98	1.43	88.0	194
TR15405 (1st Yr)	57.0	91.2	11.1	96.6	64.2	1.2	4.8	81.4	10.7	5.6	51.4	172	93.5	81	1.41	88.4	258
TR15818 (1st Yr)	60.1	94.2	10.6	97.0	75.2	2.3	6.7	83.6	10.2	5.2	50.3	138	76.6	100	1.42	87.1	234
Mean	62.2	92.4	11.1	96.4	74.5	2.2	4.3	82.1	10.8	5.3	48.3	152	78.8	98	1.42	87.6	219
Std Dev.	6.8	1.9	0.5	1.3	12.5	0.7	1.6	0.6	0.5	0.3	2.6	17	8.8	28	0.01	3.00	17

COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR14146
(2 Years of BMBRI Collaborative Tests)

	6/64- Plump %	Protein %	Barley P&B %	Malt P&B %	F. Ext. %	Malt Protein %	Soluble Protein %	S/T Ratio %	Diast. Power °L	Alpha- Amylase D.U.	Beta- Glucan ppm	Viscosity %	Friability %	FAN mg/L
2015														
Vegreville (Rahr)														
AC Metcalfe	99.0	14.7	7.5	18.0	79.3	13.9	5.53	37.7	220	79.3	75	1.45	61.8	215
CDC Copeland	94.0	12.2	2.7	5.0	79.6	12.2	5.89	45.8	183	63.4	59	1.45	83.7	208
AAC Synergy	99.3	10.6	4.9	2.0	81.9	10.2	5.39	49.9	159	76.4	54	1.44	84.6	197
TR14146	98.2	12.3	5.5	3.0	80.9	12.0	5.06	40.2	218	78.5	140	1.45	79.9	187
Brandon (Cargill PML)														
AC Metcalfe	96.7	11.0	1.2	0.3	83.5	11.7	5.87	50.2	165	77.6	37	1.44	72.8	254
CDC Copeland	96.3	12.0	1.0	0.3	81.7	10.9	5.82	53.5	126	66.8	60	1.42	84.8	245
AAC Synergy	98.2	11.0	0.0	0.2	82.9	10.5	5.68	54.4	138	72.1	48	1.41	94.0	231
TR14146	94.5	10.9	0.4	0.5	82.1	11.0	5.21	47.6	133	66.8	136	1.43	71.2	222
Saskatoon (GRL)														
AC Metcalfe	96.6	13.8	2.1	4.4	80.3	12.6	5.10	40.6	169	95.4	199	1.46	72.7	236
CDC Copeland	97.1	12.9	1.1	3.6	80.2	13.1	5.18	39.4	175	86.6	153	1.45	77.3	237
AAC Synergy	97.2	12.1	2.1	5.1	81.7	11.9	5.38	45.0	160	92.1	91	1.43	84.9	246
TR14146	97.4	12.4	2.3	5.6	82.2	11.6	5.00	43.2	176	99.2	246	1.46	81.5	232
Neapolis (BARI)														
AC Metcalfe	95.6	11.0	7.3		83.5	10.9	4.76	43.8	157	86.7	262	1.46	78.2	202
CDC Copeland	97.7	10.9	5.8		83.3	10.7	4.49	42.0	123	66.9	223	1.47	80.2	172
AAC Synergy	98.8	11.2	8.1		84.2	11.0	5.26	47.9	117	75.1	162	1.43	85.8	214
TR14146	98.1	11.4	8.5		83.4	11.0	5.1	46.2	144	80	334	1.48	78.4	205
Lethbridge (Canada Malt)														
AC Metcalfe	94.5	12.4	1.2		80.2	11.4	4.72	42	155	63.9	66	1.44	86.8	212
CDC Copeland	95.5	11.0	1.5		81.5	12.2	4.88	40	168	65.6	72	1.45	78.2	224
AAC Synergy	96.1	11.4	1.5		81.1	10.9	4.67	43	141	62.9	43	1.40	84.6	206
TR14146	93.7	10.1	3.1		82.0	10.3	4.54	44	133	61.8	57	1.42	92.4	201
2016														
Vegreville (Canada Malt)														
AC Metcalfe	96.7	11.4	2.6	3.3	81.4	11.40	5.56	48.8	146	62.9	85	1.45	84.2	277
CDC Copeland	97.6	10.1	3.0	2.1	83.1	10.59	5.59	52.8	130	63.7	55	1.44	94.7	264
AAC Synergy	94.8	11.6	1.4	5.1	82.7	12.0	6.15	51.1	135	60.2	111	1.46	81.1	313
TR14146	96.8	11.5	3.8	4.3	81.7	11.7	6.14	52.7	130	62.9	51	1.45	79.6	306
Lacombe (Rahr)														
AC Metcalfe	81.3	11.0	0.0	3.0	81.5	11.63	6.12	52.66	172	94.2	75	1.44	81.0	248
CDC Copeland	63.8	11.9	0.0	1.0	80.5	11.69	6.19	52.97	149	67.5	87	1.42	88.0	205
AAC Synergy	71.3	11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR14146	79.2	11.1	2.0	3.0	81.4	11.95	6.50	54.43	180	78.7	157	1.44	87.5	227
Neapolis (GRL)														
AC Metcalfe	93.8	10.2	3.5	6.3	82.4	9.9	4.51	45.5	157	124.3	140	1.51	82.8	207
CDC Copeland	94.7	9.6	1.9	4.6	82.0	9.7	4.10	42.4	114	75.0	172	1.46	82.3	186
AAC Synergy	95.6	10.0	6.9	6.0	82.9	9.7	4.58	47.2	124	96.4	140	1.45	87.9	212
TR14146	95.3	10.2	5.6	8.8	82.0	10.1	4.30	42.5	157	96.9	269	1.45	80.0	185
Vulcan (BARI)														
AC Metcalfe	98.8	10.6			83.0	9.8	4.79	46.6	185	102.5	48	1.41	95.8	186
CDC Copeland	99.1	10.1			82.8	9.1	4.47	46.4	150	73.8	27	1.39	98.8	157
AAC Synergy	98.7	10.2			82.8	10.2	4.78	44.7	163	82.9	31	1.37	97.6	178
TR14146	98.9	10.0			83.4	9.6	4.85	48.2	189	97.9	38	1.37	98.2	194
Kamsack (Malteurop)														
AC Metcalfe	93.5	12.4	0.3	0.5	81.8	11.0	5.85	53.2	155	90.8	60	1.38	98.6	246
CDC Copeland	92.6	12.4	0.2	1.6	81.1	10.5	6.00	57.1	183	91.1	62	1.37	91.2	183
AAC Synergy	90.4	11.8	0.4	1.0	82.0	10.9	5.57	51.1	155	70.3	66	1.37	96.7	235
TR14146	96.7	11.5	2.8	2.0	81.2	11.0	5.71	51.9	188	86.9	69	1.36	90.8	227
Saskatoon (Cargill Malt)														
AC Metcalfe	92.5	12.7	0.2											
CDC Copeland	96.0	11.3	1.4											
AAC Synergy	97.4	11.0	2.5											
TR14146	94.7	11.0	0.5											
2015 Mean														
Metcalfe	96.5	12.6	3.8	7.6	81.4	12.1	5.2	42.8	173	80.6	128	1.45	74.5	224
Copeland	96.1	11.8	2.4	2.9	81.3	11.8	5.3	44.2	155	69.9	113	1.45	80.8	217
AAC Synergy	97.9	11.3	3.3	2.5	82.4	10.9	5.3	48.0	143	75.7	80	1.42	86.8	219
TR14146	96.4	11.4	3.9	3.0	82.1	11.2	5.0	44.2	161	77.3	183	1.45	80.7	209
2015 Standard Deviation														
Metcalfe	1.7	1.6	3.2	9.3	2.0	1.2	0.5	4.7	27	11.7	97	0.01	9.1	21
Copeland	1.5	0.8	2.0	2.4	1.4	1.0	0.6	5.8	28	9.5	73	0.02	3.3	29
AAC Synergy	1.3	0.6	3.2	2.5	1.2	0.6	0.4	4.5	18	10.6	50	0.02	4.1	20
TR14146	2.1	1.0	3.1	2.6	0.9	0.6	0.3	2.8	36	14.5	108	0.02	7.6	18
2016 Mean														
Metcalfe	92.8	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	90.6	10.9	1.3	2.3	81.9	10.3	5.3	50.3	145	74.2	81	1.42	91.0	199
AAC Synergy	91.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR14146	93.6	10.9	2.9	4.5	82.0	10.9	5.5	49.9	169	84.7	117	1.41	87.2	228
2016 Standard Deviation														
Metcalfe	6.1	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	13.3	1.1	1.2	1.6	1.1	1.0	0.9	5.9	26	10.5	55	0.04	6.3	40
AAC Synergy	10.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.04	6.8	50
TR14146	7.2	0.6	1.9	3.0	0.9	1.0	0.9	4.7	25	14.5	97	0.05	7.8	48
2015-2016 Mean														
Metcalfe	94.5	11.9	2.6	5.1	81.7	11.4	5.3	46.0	168	87.8	105	1.44	81.5	228
Copeland	93.1	11.3	1.9	2.6	81.6	11.1	5.3	47.2	150	72.0	97	1.43	85.9	208
AAC Synergy	94.3	11.1	2.8	2.9	82.3	10.9	5.4	48.9	144	76.1	86	1.42	88.9	226
TR14146	94.9	11.1	3.4	3.9	82.0	11.0	5.2	47.1	165	81.0	150	1.43	84.0	219
2015-2016 Standard Deviation														
Metcalfe	4.8	1.4	2.8	6.1	1.4	1.2	0.6	5.2	21	18.3	73	0.03	11.0	28
Copeland	9.9	1.1	1.7	1.8	1.3	1.2	0.7	6.4	26	9.7	63	0.03	7.2	34
AAC Synergy	8.0	0.6	2.8	2.4	1.0	0.8	0.6	4.1	16	11.6	44	0.03	5.7	36
TR14146	5.5	0.8	2.5	2.7	0.8	0.8	0.7	4.8	30	14.2	103	0.04	8.1	35

COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR14150
(2 Years of BMBRI Collaborative Tests)

	6/64- Plump %	Protein %	Barley P&B %	Malt P&B %	F. Ext. %	Malt Protein %	Soluble Protein %	S/T Ratio %	Diast. Power °L	Alpha- Amylase D.U.	βeta- Glucan ppm	Viscosity %	Friability %	FAN mg/L
2015														
Vegreville (Rahr)														
AC Metcalfe	99.0	14.7	7.5	18.0	79.3	13.9	5.53	37.7	220	79.3	75	1.45	61.8	215
CDC Copeland	94.0	12.2	2.7	5.0	79.6	12.2	5.89	45.8	183	63.4	59	1.45	83.7	208
AAC Synergy	99.3	10.6	4.9	2.0	81.9	10.2	5.39	49.9	159	76.4	54	1.44	84.6	197
TR14150	99.0	13.4	9.0	3.0	79.6	13.5	5.40	37.7	175	70.4	74	1.43	75.6	177
Brandon (Cargill PML)														
AC Metcalfe	96.7	11.0	1.2	0.3	83.5	11.7	5.87	50.2	165	77.6	37	1.44	72.8	254
CDC Copeland	96.3	12.0	1.0	0.3	81.7	10.9	5.82	53.5	126	66.8	60	1.42	84.8	245
AAC Synergy	98.2	11.0	0.0	0.2	82.9	10.5	5.68	54.4	138	72.1	48	1.41	94.0	231
TR14150	98.1	11.1	0.0	0.2	82.2	10.9	5.42	49.6	132	65.9	50	1.44	86.4	127
Saskatoon (GRL)														
AC Metcalfe	96.6	13.8	2.1	4.4	80.3	12.6	5.10	40.6	169	95.4	199	1.46	72.7	236
CDC Copeland	97.1	12.9	1.1	3.6	80.2	13.1	5.18	39.4	175	86.6	153	1.45	77.3	237
AAC Synergy	97.2	12.1	2.1	5.1	81.7	11.9	5.38	45.0	160	92.1	91	1.43	84.9	246
TR14150	96.6	12.4	2.5	7.8	81.9	11.6	4.74	40.7	147	86.1	147	1.47	83.7	219
Neapolis (BARI)														
AC Metcalfe	95.6	11.0	7.3		83.5	10.9	4.76	43.8	157	86.7	262	1.46	78.2	202
CDC Copeland	97.7	10.9	5.8		83.3	10.7	4.49	42.0	123	66.9	223	1.47	80.2	172
AAC Synergy	98.8	11.2	8.1		84.2	11.0	5.26	47.9	117	75.1	162	1.43	85.8	214
TR14150	96.6	11.3	9.7		82.7	10.8	4.5	41.3	136	72	251	1.46	80.8	166
Lethbridge (Canada Malt)														
AC Metcalfe	94.5	12.4	1.2		80.2	11.4	4.72	42	155	63.9	66	1.44	86.8	212
CDC Copeland	95.5	11.0	1.5		81.5	12.2	4.88	40	168	65.6	72	1.45	78.2	224
AAC Synergy	96.1	11.4	1.5		81.1	10.9	4.67	43	141	62.9	43	1.40	84.6	206
TR14150	94.7	10.2	1.5		81.1	10.4	4.44	43	114	57.5	52	1.44	89.8	198
2016														
Vegreville (Canada Malt)														
AC Metcalfe	96.7	11.4	2.6	3.3	81.4	11.40	5.56	48.8	146	62.9	85	1.45	84.2	277
CDC Copeland	97.6	10.1	3.0	2.1	83.1	10.59	5.59	52.8	130	63.7	55	1.44	94.7	264
AAC Synergy	94.8	11.6	1.4	5.1	82.7	12.0	6.15	51.1	135	60.2	111	1.46	81.1	313
TR14150	95.3	11.8	3.0	6.3	81.2	12.3	5.67	46.2	175	69.0	106	1.43	82.5	261
Lacombe (Rahr)														
AC Metcalfe	81.3	11.0	0.0	3.0	81.5	11.63	6.12	52.66	172	94.2	75	1.44	81.0	248
CDC Copeland	63.8	11.9	0.0	1.0	80.5	11.69	6.19	52.97	149	67.5	87	1.42	88.0	205
AAC Synergy	71.3	11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR14146	53.3	11.3	1.2	0.0	79.5	12.77	6.71	52.51	174	81.6	65	1.41	88.0	243
Neapolis (GRL)														
AC Metcalfe	93.8	10.2	3.5	6.3	82.4	9.9	4.51	45.5	157	124.3	140	1.51	82.8	207
CDC Copeland	94.7	9.6	1.9	4.6	82.0	9.7	4.10	42.4	114	75.0	172	1.46	82.3	186
AAC Synergy	95.6	10.0	6.9	6.0	82.9	9.7	4.58	47.2	124	96.4	140	1.45	87.9	212
TR14150	94.3	10.0	6.4	9.7	82.0	9.9	4.61	46.3	129	82.6	175	1.46	79.7	212
Vulcan (BARI)														
AC Metcalfe	98.8	10.6			83.0	9.8	4.79	46.6	185	102.5	48	1.41	95.8	186
CDC Copeland	99.1	10.1			82.8	9.1	4.47	46.4	150	73.8	27	1.39	98.8	157
AAC Synergy	98.7	10.2			82.8	10.2	4.78	44.7	163	82.9	31	1.37	97.6	178
TR14150	98.7	10.1			84.5	9.3	4.47	45.6	161	87.8	38	1.38	97.6	171
Kamsack (Malteurop)														
AC Metcalfe	93.5	12.4	0.3	0.5	81.8	11.0	5.85	53.2	155	90.8	60	1.38	98.6	246
CDC Copeland	92.6	12.4	0.2	1.6	81.1	10.5	6.00	57.1	183	91.1	62	1.37	91.2	183
AAC Synergy	90.4	11.8	0.4	1.0	82.0	10.9	5.57	51.1	155	70.3	66	1.37	96.7	235
TR14150	96.8	11.8	3.1	4.5	80.5	11.2	5.14	45.9	186	85.0	65	1.36	81.4	195
Saskatoon (Cargill Malt)														
AC Metcalfe	92.5	12.7	0.2											
CDC Copeland	96.0	11.3	1.4											
AAC Synergy	97.4	11.0	2.5											
TR14150	94.6	11.4	2.3											
2015 Mean														
Metcalfe	96.5	12.6	3.8	7.6	81.4	12.1	5.2	42.8	173	80.6	128	1.45	74.5	224
Copeland	96.1	11.8	2.4	2.9	81.3	11.8	5.3	44.2	155	69.9	113	1.45	80.8	217
AAC Synergy	97.9	11.3	3.3	2.5	82.4	10.9	5.3	48.0	143	75.7	80	1.42	86.8	219
TR14150	97.0	11.7	4.5	3.7	81.5	11.5	4.9	42.4	141	70.4	115	1.45	83.3	178
2015 Standard Deviation														
Metcalfe	1.7	1.6	3.2	9.3	2.0	1.2	0.5	4.7	27	11.7	97	0.01	9.1	21
Copeland	1.5	0.8	2.0	2.4	1.4	1.0	0.6	5.8	28	9.5	73	0.02	3.3	29
AAC Synergy	1.3	0.6	3.2	2.5	1.2	0.6	0.4	4.5	18	10.6	50	0.02	4.1	20
TR14150	1.6	1.2	4.5	3.8	1.2	1.2	0.5	4.4	23	10.4	86	0.02	5.4	35
2016 Mean														
Metcalfe	92.8	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	90.6	10.9	1.3	2.3	81.9	10.3	5.3	50.3	145	74.2	81	1.42	91.0	199
AAC Synergy	91.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR14150	88.8	11.1	3.2	5.1	81.5	11.1	5.3	47.3	165	81.2	90	1.41	85.8	216
2016 Standard Deviation														
Metcalfe	6.1	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	13.3	1.1	1.2	1.6	1.1	1.0	0.9	5.9	26	10.5	55	0.04	6.3	40
AAC Synergy	10.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.04	6.8	50
TR14150	17.5	0.8	1.9	4.0	1.9	1.5	0.9	2.9	22	7.2	53	0.04	7.3	36
2015-2016 Mean														
Metcalfe	94.5	11.9	2.6	5.1	81.7	11.4	5.3	46.0	168	87.8	105	1.44	81.5	228
Copeland	93.1	11.3	1.9	2.6	81.6	11.1	5.3	47.2	150	72.0	97	1.43	85.9	208
AAC Synergy	94.3	11.1	2.8	2.9	82.3	10.9	5.4	48.9	144	76.1	86	1.42	88.9	226
TR14150	92.6	11.3	3.9	4.5	81.5	11.3	5.1	44.9	153	75.8	102	1.43	84.6	197
2015-2016 Standard Deviation														
Metcalfe	4.8	1.4	2.8	6.1	1.4	1.2	0.6	5.2	21	18.3	73	0.03	11.0	28
Copeland	9.9	1.1	1.7	1.8	1.3	1.2	0.7	6.4	26	9.7	63	0.03	7.2	34
AAC Synergy	8.0	0.6	2.8	2.4	1.0	0.8	0.6	4.1	16	11.6	44	0.03	5.7	36
TR14150	13.1	1.0	3.3	3.7	1.5	1.3	0.7	4.4	25	10.2	69	0.04	6.2	39

DC COPELAND AND TR14617 COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR14617 COMPARISON OF MALTING C
(2 Years of BMBRI Collaborative Tests)

	6/64- Plump %	Protein %	Barley P&B %	Malt P&B %	F. Ext. %	Malt Protein %	Soluble Protein %	S/T Ratio %	Diast. Power °L	Alpha- Amylase D.U.	βeta- Glucan ppm	Viscosity %	Friability %	FAN mg/L
2015														
Vegreville (Rahr)														
AC Metcalfe	99.0	14.7	7.5	18.0	79.3	13.9	5.53	37.7	220	79.3	75	1.45	61.8	215
CDC Copeland	94.0	12.2	2.7	5.0	79.6	12.2	5.89	45.8	183	63.4	59	1.45	83.7	208
AAC Synergy	99.3	10.6	4.9	2.0	81.9	10.2	5.39	49.9	159	76.4	54	1.44	84.6	197
TR14617	99.2	13.9	5.2	4.0	79.1	14.1	4.98	33.4	179	69.5	74	1.43	80.8	188
Brandon (Cargill PML)														
AC Metcalfe	96.7	11.0	1.2	0.3	83.5	11.7	5.87	50.2	165	77.6	37	1.44	72.8	254
CDC Copeland	96.3	12.0	1.0	0.3	81.7	10.9	5.82	53.5	126	66.8	60	1.42	84.8	245
AAC Synergy	98.2	11.0	0.0	0.2	82.9	10.5	5.68	54.4	138	72.1	48	1.41	94.0	231
TR14617	97.5	10.7	0.2	0.2	83.3	10.3	5.35	52.1	125	71.0	102	1.45	93.6	235
Saskatoon (GRL)														
AC Metcalfe	96.6	13.8	2.1	4.4	80.3	12.6	5.10	40.6	169	95.4	199	1.46	72.7	236
CDC Copeland	97.1	12.9	1.1	3.6	80.2	13.1	5.18	39.4	175	86.6	153	1.45	77.3	237
AAC Synergy	97.2	12.1	2.1	5.1	81.7	11.9	5.38	45.0	160	92.1	91	1.43	84.9	246
TR14617	98.3	12.5	1.4	3.1	81.7	12.6	5.31	42.3	158	96.8	123	1.45	87.3	262
Neapolis (BARI)														
AC Metcalfe	95.6	11.0	7.3		83.5	10.9	4.76	43.8	157	86.7	262	1.46	78.2	202
CDC Copeland	97.7	10.9	5.8		83.3	10.7	4.49	42.0	123	66.9	223	1.47	80.2	172
AAC Synergy	98.8	11.2	8.1		84.2	11.0	5.26	47.9	117	75.1	162	1.43	85.8	214
TR14617	97.9	12.2	4.8		82.6	11.6	4.7	41.0	141	77	273	1.45	79.2	191
Lethbridge (Canada Malt)														
AC Metcalfe	94.5	12.4	1.2		80.2	11.4	4.72	42	155	63.9	66	1.44	86.8	212
CDC Copeland	95.5	11.0	1.5		81.5	12.2	4.88	40	168	65.6	72	1.45	78.2	224
AAC Synergy	96.1	11.4	1.5		81.1	10.9	4.67	43	141	62.9	43	1.40	84.6	206
TR14617	92.3	11.1	2.4		81.8	11.2	4.33	39	116	60.0	87	1.45	86.0	197
2016														
Vegreville (Canada Malt)														
AC Metcalfe	96.7	11.4	2.6	3.3	81.4	11.40	5.56	48.8	146	62.9	85	1.45	84.2	277
CDC Copeland	97.6	10.1	3.0	2.1	83.1	10.59	5.59	52.8	130	63.7	55	1.44	94.7	264
AAC Synergy	94.8	11.6	1.4	5.1	82.7	12.0	6.15	51.1	135	60.2	111	1.46	81.1	313
TR14617	97.1	12.1	2.6	2.9	82.7	12.3	5.85	47.4	162	65.6	63	1.49	77.3	256
Lacombe (Rahr)														
AC Metcalfe	81.3	11.0	0.0	3.0	81.5	11.63	6.12	52.66	172	94.2	75	1.44	81.0	248
CDC Copeland	63.8	11.9	0.0	1.0	80.5	11.69	6.19	52.97	149	67.5	87	1.42	88.0	205
AAC Synergy	71.3	11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR14617	68.5	12.7	3.2	3.0	81.5	11.98	6.28	52.44	172	77.7	139	1.45	85.0	217
Neapolis (GRL)														
AC Metcalfe	93.8	10.2	3.5	6.3	82.4	9.9	4.51	45.5	157	124.3	140	1.51	82.8	207
CDC Copeland	94.7	9.6	1.9	4.6	82.0	9.7	4.10	42.4	114	75.0	172	1.46	82.3	186
AAC Synergy	95.6	10.0	6.9	6.0	82.9	9.7	4.58	47.2	124	96.4	140	1.45	87.9	212
TR14617	92.0	11.2	3.5	5.0	81.5	11.3	4.78	42.3	151	104.9	176	1.44	82.4	211
Vulcan (BARI)														
AC Metcalfe	98.8	10.6			83.0	9.8	4.79	46.6	185	102.5	48	1.41	95.8	186
CDC Copeland	99.1	10.1			82.8	9.1	4.47	46.4	150	73.8	27	1.39	98.8	157
AAC Synergy	98.7	10.2			82.8	10.2	4.78	44.7	163	82.9	31	1.37	97.6	178
TR14617	98.2	13.7			80.2	11.8	4.83	39.1	200	92.9	80	1.38	85.2	168
Kamsack (Malteurop)														
AC Metcalfe	93.5	12.4	0.3	0.5	81.8	11.0	5.85	53.2	155	90.8	60	1.38	98.6	246
CDC Copeland	92.6	12.4	0.2	1.6	81.1	10.5	6.00	57.1	183	91.1	62	1.37	91.2	183
AAC Synergy	90.4	11.8	0.4	1.0	82.0	10.9	5.57	51.1	155	70.3	66	1.37	96.7	235
TR14617	97.6	12.5	0.8	1.0	81.1	11.4	5.67	49.7	172	87.0	63	1.38	89.2	239
Saskatoon (Cargill Malt)														
AC Metcalfe	92.5	12.7	0.2											
CDC Copeland	96.0	11.3	1.4											
AAC Synergy	97.4	11.0	2.5											
TR14617	96.2	12.5	0.8											
2015 Mean														
Metcalfe	96.5	12.6	3.8	7.6	81.4	12.1	5.2	42.8	173	80.6	128	1.45	74.5	224
Copeland	96.1	11.8	2.4	2.9	81.3	11.8	5.3	44.2	155	69.9	113	1.45	80.8	217
AAC Synergy	97.9	11.3	3.3	2.5	82.4	10.9	5.3	48.0	143	75.7	80	1.42	86.8	219
TR14617	97.0	12.1	2.8	2.4	81.7	11.9	4.9	41.5	144	74.9	132	1.45	85.4	215
2015 Standard Deviation														
Metcalfe	1.7	1.6	3.2	9.3	2.0	1.2	0.5	4.7	27	11.7	97	0.01	9.1	21
Copeland	1.5	0.8	2.0	2.4	1.4	1.0	0.6	5.8	28	9.5	73	0.02	3.3	29
AAC Synergy	1.3	0.6	3.2	2.5	1.2	0.6	0.4	4.5	18	10.6	50	0.02	4.1	20
TR14617	2.7	1.3	2.2	2.0	1.6	1.5	0.4	6.8	25	13.7	81	0.01	5.7	33
2016 Mean														
Metcalfe	92.8	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	90.6	10.9	1.3	2.3	81.9	10.3	5.3	50.3	145	74.2	81	1.42	91.0	199
AAC Synergy	91.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR14617	91.6	12.5	2.2	3.0	81.4	11.8	5.5	46.2	171	85.6	104	1.43	83.8	218
2016 Standard Deviation														
Metcalfe	6.1	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	13.3	1.1	1.2	1.6	1.1	1.0	0.9	5.9	26	10.5	55	0.04	6.3	40
AAC Synergy	10.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.04	6.8	50
TR14617	11.5	0.8	1.3	1.7	0.9	0.4	0.7	5.4	18	14.9	51	0.05	4.4	33
2015-2016 Mean														
Metcalfe	94.5	11.9	2.6	5.1	81.7	11.4	5.3	46.0	168	87.8	105	1.44	81.5	228
Copeland	93.1	11.3	1.9	2.6	81.6	11.1	5.3	47.2	150	72.0	97	1.43	85.9	208
AAC Synergy	94.3	11.1	2.8	2.9	82.3	10.9	5.4	48.9	144	76.1	86	1.42	88.9	226
TR14617	94.1	12.3	2.5	2.7	81.5	11.9	5.2	43.9	158	80.2	118	1.44	84.6	216
2015-2016 Standard Deviation														
Metcalfe	4.8	1.4	2.8	6.1	1.4	1.2	0.6	5.2	21	18.3	73	0.03	11.0	28
Copeland	9.9	1.1	1.7	1.8	1.3	1.2	0.7	6.4	26	9.7	63	0.03	7.2	34
AAC Synergy	8.0	0.6	2.8	2.4	1.0	0.8	0.6	4.1	16	11.6	44	0.03	5.7	36
TR14617	8.8	1.0	1.7	1.7	1.2	1.0	0.6	6.3	25	14.6	65	0.03	4.9	31

DC COPELAND AND TR14928 COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR14928 COMPARISON OF MALTING C
(2 Years of BMBRI Collaborative Tests)

	6/64- Plump %	Protein %	Barley P&B %	Malt P&B %	F. Ext. %	Malt Protein %	Soluble Protein %	S/T Ratio %	Diast. Power °L	Alpha- Amylase D.U.	βeta- Glucan ppm	Viscosity %	Friability %	FAN mg/L
2015														
Vegreville (Rahr)														
AC Metcalfe	99.0	14.7	7.5	18.0	79.3	13.9	5.53	37.7	220	79.3	75	1.45	61.8	215
CDC Copeland	94.0	12.2	2.7	5.0	79.6	12.2	5.89	45.8	183	63.4	59	1.45	83.7	208
AAC Synergy	99.3	10.6	4.9	2.0	81.9	10.2	5.39	49.9	159	76.4	54	1.44	84.6	197
TR14928	99.1	10.6	3.8	2.0	81.9	10.2	4.07	37.7	128	53.6	73	1.43	90	157
Brandon (Cargill PML)														
AC Metcalfe	96.7	11.0	1.2	0.3	83.5	11.7	5.87	50.2	165	77.6	37	1.44	72.8	254
CDC Copeland	96.3	12.0	1.0	0.3	81.7	10.9	5.82	53.5	126	66.8	60	1.42	84.8	245
AAC Synergy	98.2	11.0	0.0	0.2	82.9	10.5	5.68	54.4	138	72.1	48	1.41	94.0	231
TR14928	99.4	11.1	0.8	0.4	82.5	11.0	5.25	47.7	114	56.1	63	1.43	87.6	224
Saskatoon (GRL)														
AC Metcalfe	96.6	13.8	2.1	4.4	80.3	12.6	5.10	40.6	169	95.4	199	1.46	72.7	236
CDC Copeland	97.1	12.9	1.1	3.6	80.2	13.1	5.18	39.4	175	86.6	153	1.45	77.3	237
AAC Synergy	97.2	12.1	2.1	5.1	81.7	11.9	5.38	45.0	160	92.1	91	1.43	84.9	246
TR14928	98.4	12.8	2.7	3.8	80.6	12.4	4.38	35.2	138	71.9	219	1.45	79.1	184
Neapolis (BARI)														
AC Metcalfe	95.6	11.0	7.3		83.5	10.9	4.76	43.8	157	86.7	262	1.46	78.2	202
CDC Copeland	97.7	10.9	5.8		83.3	10.7	4.49	42.0	123	66.9	223	1.47	80.2	172
AAC Synergy	98.8	11.2	8.1		84.2	11.0	5.26	47.9	117	75.1	162	1.43	85.8	214
TR14928	98.5	12.2	9.7		81.5	11.9	4.3	35.7	129	55	279	1.44	76.0	152
Lethbridge (Canada Malt)														
AC Metcalfe	94.5	12.4	1.2		80.2	11.4	4.72	42	155	63.9	66	1.44	86.8	212
CDC Copeland	95.5	11.0	1.5		81.5	12.2	4.88	40	168	65.6	72	1.45	78.2	224
AAC Synergy	96.1	11.4	1.5		81.1	10.9	4.67	43	141	62.9	43	1.40	84.6	206
TR14928	97.8	10.5	2.6		81.6	10.7	3.48	33	107	50.0	106	1.47	84.1	146
2016														
Vegreville (Canada Malt)														
AC Metcalfe	96.7	11.4	2.6	3.3	81.4	11.40	5.56	48.8	146	62.9	85	1.45	84.2	277
CDC Copeland	97.6	10.1	3.0	2.1	83.1	10.59	5.59	52.8	130	63.7	55	1.44	94.7	264
AAC Synergy	94.8	11.6	1.4	5.1	82.7	12.0	6.15	51.1	135	60.2	111	1.46	81.1	313
TR14928	98.7	11.1	4.8	5.0	82.6	11.9	5.57	46.7	133	59.8	61	1.49	73.9	263
Lacombe (Rahr)														
AC Metcalfe	81.3	11.0	0.0	3.0	81.5	11.63	6.12	52.66	172	94.2	75	1.44	81.0	248
CDC Copeland	63.8	11.9	0.0	1.0	80.5	11.69	6.19	52.97	149	67.5	87	1.42	88.0	205
AAC Synergy	71.3	11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR14928	87.5	11.0	0.0	1.0	81.2	11.16	5.36	48.06	139	62.4	97	1.42	94.3	224
Neapolis (GRL)														
AC Metcalfe	93.8	10.2	3.5	6.3	82.4	9.9	4.51	45.5	157	124.3	140	1.51	82.8	207
CDC Copeland	94.7	9.6	1.9	4.6	82.0	9.7	4.10	42.4	114	75.0	172	1.46	82.3	186
AAC Synergy	95.6	10.0	6.9	6.0	82.9	9.7	4.58	47.2	124	96.4	140	1.45	87.9	212
TR14928	96.4	10.4	5.8	9.2	82.6	10.1	4.42	44.0	124	63.1	98	1.42	91.2	206
Vulcan (BARI)														
AC Metcalfe	98.8	10.6			83.0	9.8	4.79	46.6	185	102.5	48	1.41	95.8	186
CDC Copeland	99.1	10.1			82.8	9.1	4.47	46.4	150	73.8	27	1.39	98.8	157
AAC Synergy	98.7	10.2			82.8	10.2	4.78	44.7	163	82.9	31	1.37	97.6	178
TR14928	98.3	11.0			83.4	10.1	4.57	43.2	165	72.6	28	1.36	97.8	176
Kamsack (Malteurop)														
AC Metcalfe	93.5	12.4	0.3	0.5	81.8	11.0	5.85	53.2	155	90.8	60	1.38	98.6	246
CDC Copeland	92.6	12.4	0.2	1.6	81.1	10.5	6.00	57.1	183	91.1	62	1.37	91.2	183
AAC Synergy	90.4	11.8	0.4	1.0	82.0	10.9	5.57	51.1	155	70.3	66	1.37	96.7	235
TR14928	98.2	11.9	2.3	4.2	81.8	10.9	4.34	39.8	142	75.2	66	1.36	96.8	161
Saskatoon (Cargill Malt)														
AC Metcalfe	92.5	12.7	0.2											
CDC Copeland	96.0	11.3	1.4											
AAC Synergy	97.4	11.0	2.5											
TR14928	96.6	11.4	1.7											
2015 Mean														
Metcalfe	96.5	12.6	3.8	7.6	81.4	12.1	5.2	42.8	173	80.6	128	1.45	74.5	224
Copeland	96.1	11.8	2.4	2.9	81.3	11.8	5.3	44.2	155	69.9	113	1.45	80.8	217
AAC Synergy	97.9	11.3	3.3	2.5	82.4	10.9	5.3	48.0	143	75.7	80	1.42	86.8	219
TR14928	98.6	11.4	3.9	2.1	81.6	11.2	4.3	37.8	123	57.3	148	1.44	83.4	173
2015 Standard Deviation														
Metcalfe	1.7	1.6	3.2	9.3	2.0	1.2	0.5	4.7	27	11.7	97	0.01	9.1	21
Copeland	1.5	0.8	2.0	2.4	1.4	1.0	0.6	5.8	28	9.5	73	0.02	3.3	29
AAC Synergy	1.3	0.6	3.2	2.5	1.2	0.6	0.4	4.5	18	10.6	50	0.02	4.1	20
TR14928	0.6	1.0	3.4	1.7	0.7	0.9	0.6	5.8	12	8.5	96	0.02	5.8	32
2016 Mean														
Metcalfe	92.8	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	90.6	10.9	1.3	2.3	81.9	10.3	5.3	50.3	145	74.2	81	1.42	91.0	199
AAC Synergy	91.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR14928	96.0	11.1	2.9	4.8	82.3	10.8	4.9	44.4	140	66.6	70	1.41	90.8	206
2016 Standard Deviation														
Metcalfe	6.1	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.0	8.1	36
Copeland	13.3	1.1	1.2	1.6	1.1	1.0	0.9	5.9	26	10.5	55	0.0	6.3	40
AAC Synergy	10.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.0	6.8	50
TR14928	4.2	0.5	2.4	3.4	0.9	0.8	0.6	3.2	15	6.8	29	0.1	9.8	40
2015-2016 Mean														
Metcalfe	94.5	11.9	2.6	5.1	81.7	11.4	5.3	46.0	168	87.8	105	1.4	81.5	228
Copeland	93.1	11.3	1.9	2.6	81.6	11.1	5.3	47.2	150	72.0	97	1.4	85.9	208
AAC Synergy	94.3	11.1	2.8	2.9	82.3	10.9	5.4	48.9	144	76.1	86	1.4	88.9	226
TR14928	97.2	11.3	3.4	3.7	82.0	11.0	4.6	41.1	132	62.0	109	1.4	87.1	189
2015-2016 Standard Deviation														
Metcalfe	4.8	1.4	2.8	6.1	1.4	1.2	0.6	5.2	21	18.3	73	0.0	11.0	28
Copeland	9.9	1.1	1.7	1.8	1.3	1.2	0.7	6.4	26	9.7	63	0.0	7.2	34
AAC Synergy	8.0	0.6	2.8	2.4	1.0	0.8	0.6	4.1	16	11.6	44	0.0	5.7	36
TR14928	3.3	0.8	2.8	3.0	0.8	0.8	0.6	5.6	16	8.8	78	0.0	8.5	39