

REPORT On
COLLABORATIVE TRIAL RESULTS

To The

75th MEETING

Of The

EVALUATION TEAM On
BARLEY QUALITY

PRAIRIE RECOMMENDING COMMITTEE
For OAT And BARLEY (PRCOB)

Banff 2018

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Entry #	Breeder/Sponsor	Quality Comments from Evaluation Team on Barley Quality (ETBQ)
TR15155	CDC	<p>2015 crop year Highlights: extract higher than Metcalfe and Copeland at 2 stations Concerns: Plumpness lower than AC Metcalfe and AAC Synergy at 3 stations. Other comments: Copeland-type with low BG, lower protein and low P&B; good balance</p> <p><u>2016 Crop</u> Highlights: grain protein < than checks (lower at 2 stations, but in between at 3rd station); extract : than checks at all 3 stations (fermentable extract); Sol. prot., KI, FAN < than checks Concerns: plumpness < than checks at all 3 stations; k.wt < than Copeland and Synergy – lower than Metcalfe at 2 stations, but higher than Metcalfe at 3rd station Comments: generally low BG and low viscosity (lower viscosity than checks at 1 station) Collab Report: Plumpness = to Metcalfe, but lower than Copeland and Synergy; malt P&B sl. higher than checks; extract higher than Copeland, but lower than Metcalfe and Synergy;</p>
TR15245	AAFC BRC	<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 Concerns: on average plumpness lower than Metcalfe and Synergy but higher than Copeland Other comments: good characteristics, higher grain protein but Copeland-like; able to keep KI and soluble protein in good range</p> <p><u>2016 Crop</u> Highlights: malt P&B < than checks Concerns: plumpness < than checks at 3 stations; k. wt. lower than Copeland & Synergy at 3 stations – sl. lower than Metcalfe at 1 station Collab report: DP and alpha lower than checks; sol. prot, KI, FAN lower than checks Comments: good BG and extract, low DP but high alpha; generally average line – extract average</p>
TR15405	AB/InBev	<p>2015 crop year Highlights: on average higher plump and k. wt. than checks Concerns: Other comments: potentially high enzyme line, high FAN</p> <p><u>2016 Crop</u> K.wt and plumpness < than checks at all stations (except k.wt and plump higher than Metcalfe in IH). Grain protein < than checks (esp. at 2 stations) High enzymes line, high FAN , high sol. protein line; BG < than checks Extract lower than checks at 2 stations – higher than Copeland in IH Collab Report: plumpness < than checks; extract < than checks; sol. prot, KI, FAN higher than checks; low BG</p>
TR15818	Sapporo/PML/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?) Concerns: higher P & B at both stations Other comments: good balance, good extract</p> <p><u>2016 Crop</u> Highlights: K.wt. > than checks (Higher k. wt. especially at 2 stations); grain protein < than checks; Extract > than checks (P&B?) Concerns: higher malt P&B than checks at all (2 tested) stations Collab report: plumpness > than checks; malt P&B > than checks; extract > than checks; DP lower than checks</p>

Checks: AC Metcalfe, CDC Copeland, AAC Synergy

Entry #	Breeder/Sponsor	Quality Comments from Evaluation Team on Barley Quality (ETBQ)
TR16156	CDC	<u>2016 Crop</u> Comments: plumpness higher than Metcalfe but lower than Synergy and Copeland; malt P&B lower than checks. Neutral; water sensitive but still equal to checks
TR16629	FCDC	<u>2016 Crop</u> Comments: plumpness and k.wt. sl lower than checks; KI> than checks Highlights: extract > than checks
TR16631	FCDC	<u>2016 Crop</u> Concerns: plumpness and k.wt. < than checks; Comments: sol. prot, FAN < than checks; extract slightly low Highlights: BG< than checks
TR16929	Syngenta	<u>2016 Crop</u> Highlights: plumpness and k.wt. >> than checks; grain protein < than checks; extract >> than checks Comments: low enzymes, low sol. prot, low FAN line

Checks: AC Metcalfe, CDC Copeland, AAC Synergy

BMBRI Collaborative Malting Trials 2017

Station: Lacombe

Process Conditions:

Processor: Rahr Malting Shakopee

Steeping: 14h wet, 9h air, 11h wet, 9h air all at 11°

Germination: 24h@15°C, 24h @ 16°C, 48h @ 17°C

Kilning: 2h ramp, then 3h@57°C, 3h@60°C, 6h@63°C, 4h@68°C, 2h@71°C, 3h@85°C

Varieties	Barley									Processing				
	1000 KWT	Plump % >7/64	Plump % >6/64	Moisture %	Protein %	Barley P & B %	Germination 4ml %	Germination 8ml %	Chitting %	Steep-out Moisture %	Germ-out Moisture %	Yield %	Roots %	Malt P & B %
External Check	44.1	66.8	96.7	11.9	9.8	0.7	99	84	96.0	43%	44%			0.2
AC Metcalfe - CK	48.8	85.7	97.6	9.1	12.4	1.5	100	80	100	42%	41%			0.8
CDC Copeland-CK	52.9	89.8	98.7	9.0	11.8	1.1	100	81	100	41%	41%			0.2
AAC Synergy -CK	56.5	86.1	98.6	9.3	11.9	1.1	95	81	100	42%	42%			1.6
TR15155 (2nd Yr)	49.7	77.2	98.6	9.3	11.5	0.7	99	79	100	42%	42%			1.4
TR15245 (2nd Yr)	50.9	63.2	97.9	9.2	11.8	0.3	97	60	98	42%	42%			1.2
TR15405 (2nd Yr)														
TR15818 (2nd Yr)	55.9	84.9	98.4	9.2	10.6	2.1	100	81	100	41%	41%			0.2
TR16156 (1st Yr)	49.7	71.8	97.3	9.1	11.5	0.1	96	41	96	43%	43%			1.2
TR16629 (1st Yr)	47.5	73.3	97.8	9.0	11.1	0.3	89	88	100	40%	41%			4.6
TR16631 (1st Yr)	50.3	86.4	98.8	8.9	11.3	0.5	90	88	100	41%	41%			6.4
TR16929 (1st Yr)	55.4	90.6	98.5	9.4	12.0	1.4	94	62	98	41%	41%			1.2

Variety	Malt Analysis													
	Extract Fine %	Extract Coarse %	F/C Gr. Difference	Protein %	Soluble Protein %	S/T %	Diastatic Power deg L	Alpha Amylase D.U.	B-Glucan mg/L	Viscosity cP	Friability %	DMS µg/g	DMSP µg/g	FAN mg/L
External Check	82.3	82.0	0.33	10.03	5.07	50.6	171	75.3	28	1.42	99.5	13	187	
AC Metcalfe - CK	83.3	83.1	0.24	11.11	3.94	35.5	168	67.8	169	1.47	87.7	15.09	167	
CDC Copeland-CK	79.9	79.9	-0.1	11.70	4.08	34.9	196	63.9	178	1.47	84.4	12.25	151	
AAC Synergy - CK	79.3	78.3	1.0	14.05	4.17	29.7	209	63.0	266	1.49	78.8	14.11	149	
TR15155 (2nd Yr)	81.0	80.5	0.4	11.69	4.43	37.9	200	69.9	157	1.44	87.2	12	138	
TR15245 (2nd Yr)	79.6	80.2	-0.5	12.71	3.32	26.1	180	69.5	113	1.44	90.2	9.92	150	
TR15405 (2nd Yr)														
TR15818 (2nd Yr)	80.8	80.4	0.4	12.78	4.15	32.5	234	82.1	176	1.47	79.6	17.00	174	
TR16156 (1st Yr)	80.6	80.7	-0.1	12.02	4.46	37.1	200	81.1	95	1.42	92.6	13.50	161	
TR16629 (1st Yr)	81.5	81.2	0.3	11.80	4.01	34.0	185	59.3	258	1.51	85.1	11.19	126	
TR16631 (1st Yr)	81.8	80.6	1.2	10.09	3.68	36.5	134	52.4	408	1.56	81.0	10.99	116	
TR16929 (1st Yr)	81.2	81.0	0.2	11.50	4.59	39.9	178	84.6	106	1.47	93.5	15.34	171	

2017 BMBRI COLLABORATIVE TRIALS
 Mean of Stations (Neapolis,Redvers,Lacombe,Brandon)

	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 mg/L	Viscosity cP	Friability %	FAN mg/L	DMS µg/g	DMSP µg/g	
Two Row																				
AC Metcalfe - CK	72.8	96.7	13.1	99.0	87.5	2.4	1.8	81.4	12.0	5.3	43.9	183	69.2	119	1.43	82.7	215	11.2	9.1	
CDC Copeland-CK	78.7	97.3	12.3	95.2	91.8	1.1	1.9	80.5	11.8	5.0	42.3	180	64.5	104	1.44	87.3	195	11.1	9.5	
AAC Synergy -CK	79.1	96.4	12.4	96.0	88.8	0.9	2.8	80.4	12.3	5.3	43.8	195	69.9	112	1.41	83.1	205	10.5	9.7	
TR15155 (2nd Yr)	65.5	96.5	11.2	97.8	86.5	0.5	2.4	81.6	11.2	5.2	46.1	166	76.6	86	1.42	93.2	193	9.7	8.5	
TR15245 (2nd Yr)	63.7	96.6	11.8	96.5	80.3	0.6	1.7	81.2	11.7	4.7	41.0	154	65.2	73	1.41	92.6	191	10.4	8.0	
TR15405 (2nd Yr)	63.6	96.7	12.9	95.0	86.0															
TR15818 (2nd Yr)	74.1	95.9	11.3	95.8	87.5	4.1	5.8	82.6	11.4	5.1	45.3	172	68.2	95	1.44	88.9	219	11.5	10.1	
TR16156 (1st Yr)	59.6	96.0	11.5	97.3	72.3	0.8	1.2	81.4	11.6	5.2	44.9	159	76.1	66	1.40	93.9	216	9.9	8.9	
TR16629 (1st Yr)	72.0	97.2	11.6	92.8	85.0	0.8	4.3	81.4	11.6	4.9	41.6	151	62.4	114	1.44	89.2	193	9.8	7.3	
TR16631 (1st Yr)	72.7	96.0	11.3	95.3	92.5	0.8	4.5	81.4	10.7	4.4	41.9	160	65.5	140	1.47	87.4	167	9.0	6.9	
TR16929 (1st Yr)	76.0	97.7	11.5	93.5	79.5	1.3	2.3	81.9	11.4	4.7	40.8	146	74.4	69	1.45	94.7	186	8.4	8.6	
Mean	70.7	96.6	11.9	95.8	85.2	1.3	2.9	81.4	11.6	5.0	43.2	166	69.2	98	1.43	89.3	197.9	10.2	8.7	
Std Dev.	6.6	0.6	0.7	1.8	5.9	1.1	1.5	0.6	0.4	0.3	1.9	16	5.0	25	0.02	4.29	16	1.01	1.02	

OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR15155 COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND
(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 mg/L	Viscosity cP	Friability %	FAN mg/L
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
TR15155	94.0	10.7	2.2	4.6	81.4	10.8	6.29	58.2	114	58.5	50	1.44	87.4	272
Lacombe (Rahr)														
AC Metcalfe		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		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		11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR15155		10.5	0.6	1.0	82.3	10.27	5.62	54.71	135	87.2	108	1.44	93.0	222
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
TR15155	95.6	10.1	1.7	4.3	83.2	9.4	4.46	47.3	120	70.5	128	1.43	87.7	201
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
TR15155														
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
TR15155	95.5	11.4	2.4	2.7	82.3	11.1	5.25	47.3	115	73.0	76	1.39	91.6	208
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											
TR15155	95.9	11.2	0.9											
2017														
Neapolis (BARI)														
AC Metcalfe	96.6	15.5			79.7	13.35	6.24	46.7	238	87.0	145	1.40	62.0	230
CDC Copeland	96.3	14.6			79.5	12.97	5.92	45.7	235	80.3	81	1.39	75.2	222
AAC Synergy	98.2	14.7			79.2	12.81	6.06	47.3	260	87.8	67	1.36	60.6	228
TR15155	96.9	12.3			81.5	11.22	5.89	52.5	178	82.0	76	1.41	88.6	206
Redvers (Malteurop)														
AC Metcalfe	97.5	12.5	5.3	3.9	81.6	11.2	5.99	53.5	189	52.7	70	1.38	97.2	252
CDC Copeland	96.4	11.9	1.7	4.7	81.6	11.4	5.34	46.8	177	65.6	82	1.39	96.8	217
AAC Synergy	94.8	12.5	0.9	6.0	81.7	11.6	6.05	52.2	186	57.1	68	1.37	98.0	243
TR15155	92.8	11.0	0.6	4.9	82.1	11.5	5.68	49.4	161	65.3	68	1.39	98.5	229
Lacombe (Rahr Malt)														
AC Metcalfe	97.6	12.4	1.5	0.8	83.3	11.1	3.94	35.5	168	67.8	169	1.47	87.7	167
CDC Copeland	98.7	11.8	1.1	0.2	79.9	11.7	4.08	34.9	196	63.9	178	1.47	84.4	151
AAC Synergy	98.6	11.9	1.1	1.6	79.3	14.1	4.17	29.7	209	63.0	266	1.49	78.8	149
TR15155	98.6	11.5	0.7	1.4	81.0	11.7	4.43	37.9	200	69.9	157	1.44	87.2	138
Brandon (GRL)														
AC Metcalfe	95.2	12.0	0.3	0.6	80.9	12.2	4.9	40.1	135	69.4	94	1.47	83.7	211
CDC Copeland	97.7	10.7	0.6	0.7	81.1	11.2	4.68	41.8	114	48.1	75	1.49	92.9	192
AAC Synergy	94.2	10.5	0.7	0.9	81.5	10.8	4.95	45.9	124	71.7	46	1.44	95.0	200
TR15155	97.6	9.8	0.3	0.8	82.0	10.3	4.61	44.6	123	89.1	43	1.42	98.4	198
2016 Mean														
Metcalfe	95.1	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	96.0	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	95.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR15155	95.2	10.8	1.6	3.1	82.3	10.4	5.4	51.9	121	72.3	91	1.42	89.9	226
2016 Standard Deviation														
Metcalfe	2.6	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	2.5	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	3.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.04	6.8	50
TR15155	0.8	0.5	0.8	1.6	0.7	0.7	0.8	5.5	10	11.8	34	0.02	2.8	32
2017 Mean														
Metcalfe	96.7	13.1	2.4	1.8	81.4	12.0	5.3	43.9	183	69.2	119	1.43	82.7	215
Copeland	97.3	12.3	1.1	1.9	80.5	11.8	5.0	42.3	180	64.5	104	1.44	87.3	195
AAC Synergy	96.4	12.4	0.9	2.8	80.4	12.3	5.3	43.8	195	69.9	112	1.41	83.1	205
TR15155	96.5	11.2	0.5	2.4	81.6	11.2	5.2	46.1	166	76.6	86	1.42	93.2	193
2017 Standard Deviation														
Metcalfe	1.1	1.6	2.6	1.9	1.5	1.0	1.1	7.9	43	14.0	45.4	0.05	14.9	36
Copeland	1.1	1.7	0.5	2.5	1.0	0.8	0.8	5.4	50	13.2	49.4	0.05	9.6	32
AAC Synergy	2.3	1.8	0.2	2.8	1.4	1.4	0.9	9.8	56	13.4	103.3	0.06	17.2	41
TR15155	2.5	1.1	0.2	2.2	0.5	0.6	0.7	6.4	33	10.9	49.4	0.02	6.1	39
2016-2017 Mean														
Metcalfe	95.8	12.1	1.7	2.6	81.7	11.3	5.3	46.9	172	83.5	98.4	1.43	85.9	225
Copeland	96.6	11.4	1.2	2.1	81.3	11.0	5.2	46.7	161	69.9	91.1	1.42	89.4	197
AAC Synergy	95.9	11.5	1.8	3.1	81.4	11.6	5.4	47.1	167	73.5	100.6	1.42	87.5	221
TR15155	95.9	10.9	1.2	2.8	82.0	10.8	5.3	49.0	143	74.4	88.3	1.42	91.6	209
2016-2017 Standard Deviation														
Metcalfe	2.1	1.5	1.9	2.1	1.1	1.1	0.8	6.1	30	22.4	42.4	0.04	11.2	35
Copeland	2.0	1.5	1.0	1.8	1.2	1.2	0.8	6.8	40	12.1	51.0	0.04	7.6	35
AAC Synergy	2.7	1.4	2.2	2.5	1.4	1.3	0.8	7.4	45	13.2	71.0	0.05	12.3	46
TR15155	1.9	0.8	0.8	1.8	0.7	0.8	0.7	6.3	33	10.8	39.5	0.02	4.7	37

DC COPELAND AND TR15245 COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR15245 COMPARISON OF MALTING QI
(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 mg/L	Viscosity cP	Friability %	FAN mg/L
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
TR15245	97.3	11.2	1.8	4.6	81.9	11.5	5.32	46.3	120	61.4	43	1.43	86.9	230
Lacombe (Rahr)														
AC Metcalfe		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		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		11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR15245		12.3	0.1	3.0	80.0	12.77	5.97	46.74	149	77.9	104	1.46	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
TR15245	95.2	9.9	3.1	4.5	83.2	9.8	4.08	41.8	104	71.4	203	1.47	87.7	170
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
TR15245	98.3	10.4			82.7	9.9	4.38	42.0	146	72.9	48	1.39	97.6	143
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
TR15245	95.0	12.3	2.5	3.6	81.9	11.8	5.41	45.8	129	80.8	90	1.39	82.8	209
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											
TR15245	95.0	11.9	1.6											
2017														
Neapolis (BARI)														
AC Metcalfe	96.6	15.5			79.7	13.35	6.24	46.7	238	87.0	145	1.40	62.0	230
CDC Copeland	96.3	14.6			79.5	12.97	5.92	45.7	235	80.3	81	1.39	75.2	222
AAC Synergy	98.2	14.7			79.2	12.81	6.06	47.3	260	87.8	67	1.36	60.6	228
TR15245	96.9	12.4			80.9	10.87	5.76	53.0	160	71.0	50	1.39	89.0	227
Redvers (Malteurop)														
AC Metcalfe	97.5	12.5	5.3	3.9	81.6	11.2	5.99	53.5	189	52.7	70	1.38	97.2	252
CDC Copeland	96.4	11.9	1.7	4.7	81.6	11.4	5.34	46.8	177	65.6	82	1.39	96.8	217
AAC Synergy	94.8	12.5	0.9	6.0	81.7	11.6	6.05	52.2	186	57.1	68	1.37	98.0	243
TR15245	94.2	11.8	1.2	3.1	82.6	11.4	5.35	48.5	166	62.2	74	1.38	96.0	230
Lacombe (Rahr Malt)														
AC Metcalfe	97.6	12.4	1.5	0.8	83.3	11.1	3.94	35.5	168	67.8	169	1.47	87.7	167
CDC Copeland	98.7	11.8	1.1	0.2	79.9	11.7	4.08	34.9	196	63.9	178	1.47	84.4	151
AAC Synergy	98.6	11.9	1.1	1.6	79.3	14.1	4.17	29.7	209	63.0	266	1.49	78.8	149
TR15245	97.9	11.8	0.3	1.2	79.6	12.7	3.32	26.1	180	69.5	113	1.44	90.2	150
Brandon (GRL)														
AC Metcalfe	95.2	12.0	0.3	0.6	80.9	12.2	4.9	40.1	135	69.4	94	1.47	83.7	211
CDC Copeland	97.7	10.7	0.6	0.7	81.1	11.2	4.68	41.8	114	48.1	75	1.49	92.9	192
AAC Synergy	94.2	10.5	0.7	0.9	81.5	10.8	4.95	45.9	124	71.7	46	1.44	95.0	200
TR15245	97.6	11.4	0.4	0.9	81.5	11.8	4.28	36.3	108	58.1	54	1.44	95.0	157
2016 Mean														
Metcalfe	95.1	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	96.0	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	95.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR15245	96.2	11.3	1.8	3.9	81.9	11.2	5.0	44.5	130	72.9	98	1.43	88.0	194
2016 Standard Deviation														
Metcalfe	2.6	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	2.5	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	3.2	0.7	2.7	0.8	1.1	0.9	4.0	16	16	13.8	43	0.04	6.8	50
TR15245	1.5	1.0	1.1	0.8	1.2	1.3	0.8	2.4	19	7.5	65	0.04	5.7	36
2017 Mean														
Metcalfe	96.7	13.1	2.4	1.8	81.4	12.0	5.3	43.9	183	69.2	119	1.43	82.7	215
Copeland	97.3	12.3	1.1	1.9	80.5	11.8	5.0	42.3	180	64.5	104	1.44	87.3	195
AAC Synergy	96.4	12.4	0.9	2.8	80.4	12.3	5.3	43.8	195	69.9	112	1.41	83.1	205
TR15245	96.6	11.8	0.6	1.7	81.2	11.7	4.7	41.0	154	65.2	73	1.41	92.6	191
2017 Standard Deviation														
Metcalfe	1.1	1.6	2.6	1.9	1.5	1.0	1.1	7.9	43	14.0	45	0.05	14.9	36
Copeland	1.1	1.7	0.5	2.5	1.0	0.8	0.8	5.4	50	13.2	49	0.05	9.6	32
AAC Synergy	2.3	1.8	0.2	2.8	1.4	1.4	0.9	9.8	56	13.4	103	0.06	17.2	41
TR15245	1.7	0.4	0.5	1.2	1.2	0.8	1.1	12.2	31	6.1	29	0.03	3.5	43
2016-2017 Mean														
Metcalfe	95.8	12.1	1.7	2.6	81.7	11.3	5.3	46.9	172	83.5	98	1.43	85.9	225
Copeland	96.6	11.4	1.2	2.1	81.3	11.0	5.2	46.7	161	69.9	91	1.42	89.4	197
AAC Synergy	95.9	11.5	1.8	3.1	81.4	11.6	5.4	47.1	167	73.5	101	1.42	87.5	221
TR15245	96.4	11.5	1.4	3.0	81.6	11.4	4.9	43.0	140	69.5	87	1.42	90.0	193
2016-2017 Standard Deviation														
Metcalfe	2.1	1.5	1.9	2.1	1.1	1.1	0.8	6.1	30	22.4	42	0.04	11.2	35
Copeland	2.0	1.5	1.0	1.8	1.2	1.2	0.8	6.8	40	12.1	51	0.04	7.6	35
AAC Synergy	2.7	1.4	2.2	2.5	1.4	1.3	0.8	7.4	45	13.2	71	0.05	12.3	46
TR15245	1.5	0.8	1.1	1.5	1.2	1.1	0.9	7.9	27	7.6	51	0.03	5.1	37

OF MALTING QUALITY OF AC METCALFE, CDC COPELAND AND TR15405 COMPARISON OF MALTING QUALITY OF AC METCALFE, CDC COPELAND
(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 mg/L	Viscosity cP	Friability %	FAN mg/L
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
TR15405	96.1	12.2	2.2	9.1	81.9	11.9	6.51	54.7	132	64.6	52	1.45	80.4	312
Lacombe (Rahr)														
AC Metcalfe		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		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		11.2	0.6	1.0	80.9	12.03	6.63	55.14	149	72.2	111	1.44	91.4	229
TR15405		11.2	0.8	6.0	79.9	11.32	6.28	55.50	187	103.2	98	1.43	91.0	303
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
TR15405	94.9	10.0	2.1	3.4	82.7	9.7	4.67	48.0	157	112.8	165	1.45	88.2	224
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
TR15405	98.5	10.1			82.6	9.5	4.52	45.2	193	103.2	23	1.37	98.0	182
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
TR15405	91.2	11.9	0.2	0.7	80.2	11.1	5.94	53.5	193	83.8	64	1.37	84.4	270
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											
TR15405	91.3	11.1	0.5											
2017														
Neapolis (BARI)														
AC Metcalfe	96.6	15.5			79.7	13.3	6.24	46.7	238	87.0	145	1.40	62.0	230
CDC Copeland	96.3	14.6			79.5	13.0	5.92	45.7	235	80.3	81	1.39	75.2	222
AAC Synergy	98.2	14.7			79.2	12.8	6.06	47.3	260	87.8	67	1.36	60.6	228
TR15405	96.7	12.9												
Redvers (Malteurop)														
AC Metcalfe	97.5	12.5	5.3	3.9	81.6	11.2	5.99	53.5	189	52.7	70	1.38	97.2	252
CDC Copeland	96.4	11.9	1.7	4.7	81.6	11.4	5.34	46.8	177	65.6	82	1.39	96.8	217
AAC Synergy	94.8	12.5	0.9	6.0	81.7	11.6	6.05	52.2	186	57.1	68	1.37	98.0	243
TR15405														
Lacombe (Rahr Malt)														
AC Metcalfe	97.6	12.4	1.5	0.8	83.3	11.1	3.94	35.5	168	67.8	169	1.47	87.7	167
CDC Copeland	98.7	11.8	1.1	0.2	79.9	11.7	4.08	34.9	196	63.9	178	1.47	84.4	151
AAC Synergy	98.6	11.9	1.1	1.6	79.3	14.1	4.17	29.7	209	63.0	266	1.49	78.8	149
TR15405														
Brandon (GRL)														
AC Metcalfe	95.2	12.0	0.3	0.6	80.9	12.2	4.9	40.1	135	69.4	94	1.47	83.7	211
CDC Copeland	97.7	10.7	0.6	0.7	81.1	11.2	4.68	41.8	114	48.1	75	1.49	92.9	192
AAC Synergy	94.2	10.5	0.7	0.9	81.5	10.8	4.95	45.9	124	71.7	46	1.44	95.0	200
TR15405														
2016 Mean														
Metcalfe	95.1	11.4	1.3	3.3	82.0	10.7	5.4	49.3	163	94.9	82	1.44	88.5	233
Copeland	96.0	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	95.4	11.0	2.4	3.3	82.2	11.0	5.5	49.8	145	76.4	92	1.42	90.9	233
TR15405	94.4	11.1	1.2	4.8	81.4	10.7	5.6	51.4	172	93.5	81	1.41	88.4	258
2016 Standard Deviation														
Metcalfe	2.6	1.0	1.6	2.4	0.6	0.9	0.7	3.5	15	22.2	36	0.05	8.1	36
Copeland	2.5	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	3.2	0.7	2.7	2.7	0.8	1.1	0.9	4.0	16	13.8	43	0.04	6.8	50
TR15405	3.2	0.9	0.9	3.6	1.3	1.1	0.9	4.5	27	19.3	54	0.04	6.7	55
2017 Mean														
Metcalfe	96.7	13.1	2.4	1.8	81.4	12.0	5.3	43.9	183	69.2	119	1.43	82.7	215
Copeland	97.3	12.3	1.1	1.9	80.5	11.8	5.0	42.3	180	64.5	104	1.44	87.3	195
AAC Synergy	96.4	12.4	0.9	2.8	80.4	12.3	5.3	43.8	195	69.9	112	1.41	83.1	205
TR15405	96.7	12.9												
2017 Standard Deviation														
Metcalfe	1.1	1.6	2.6	1.9	1.5	1.0	1.1	7.9	43	14.0	45	0.05	14.9	36
Copeland	1.1	1.7	0.5	2.5	1.0	0.8	0.8	5.4	50	13.2	49	0.05	9.6	32
AAC Synergy	2.3	1.8	0.2	2.8	1.4	1.4	0.9	9.8	56	13.4	103	0.06	17.2	41
TR15405														
2016-2017 Mean														
Metcalfe	95.8	12.1	1.7	2.6	81.7	11.3	5.3	46.9	172	83.5	98	1.43	85.9	225
Copeland	96.6	11.4	1.2	2.1	81.3	11.0	5.2	46.7	161	69.9	91	1.42	89.4	197
AAC Synergy	95.9	11.5	1.8	3.1	81.4	11.6	5.4	47.1	167	73.5	101	1.42	87.5	221
TR15405	94.8	11.3	1.2	4.8	81.4	10.7	5.6	51.4	172	93.5	81	1.41	88.4	258
2016-2017 Standard Deviation														
Metcalfe	2.1	1.5	1.9	2.1	1.1	1.1	0.8	6.1	30	22.4	42	0.04	11.2	35
Copeland	2.0	1.5	1.0	1.8	1.2	1.2	0.8	6.8	40	12.1	51	0.04	7.6	35
AAC Synergy	2.7	1.4	2.2	2.5	1.4	1.3	0.8	7.4	45	13.2	71	0.05	12.3	46
TR15405	3.0	1.1	0.9	3.6	1.3	1.1	0.9	4.5	27	19.3	54	0.04	6.7	55

