



**VA**

***Varietal Accreditation Evaluation 2013  
Stage 1 of 2***

**Skipper (trial) and Gairdner (control) Malts  
Sugar Adjunct Brew**

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## **1. Variety Trial Outcomes and Overview**

Pilot brewing trials were carried out using Skipper malt and compared with a control malt, Gairdner from the 2012 season. The Gairdner control malt represents domestic quality malt.

<b>Trial variety description</b>	Skipper is an early to mid-maturity tall barley type, similarly yielding to Commander, suited to southwest New South Wales and the Mallee region of Victoria and South Australia. It may also be adapted to lower rainfall areas of Western Australia. Its diastase and fermentability levels are in the mid-range. It is also likely to have demand for Schochu production.
<b>Breeding origin</b>	University of Adelaide WI 4446
<b>Target malt markets</b>	Domestic brewing and opportunities for export potential in markets currently serviced by Gairdner.
<b>Competing varieties in same growing regions</b>	Schooner and Sloop

<b>Assessment</b>	<b>Comments</b>
<b>Malt</b>	Malt quality was generally good for the Skipper malt. All parameters were within specification for sugar brewing.
<b>Milling and mashing</b>	There were no problems encountered during milling and mashing and its performance was comparable with the Gairdner controls.
<b>Lautering</b>	In general lautering performance of the Skipper wort was good, although wort run-off to kettle took about 10 minutes longer. Wort run-off was consistent.
<b>Wort clarity</b>	Wort clarity during run-off was good. Wort colour was similar to the Gairdner wort.
<b>Fermentation</b>	Fermentation of the Skipper wort was very good and completed after 6 days.
<b>Beer quality</b>	The Skipper beer had a similar pale straw colour to the Gairdner controls. Initial stability data and long-term stability data was good. The beer foam stability was good but filterability was significantly below the controls.

## 2. Results and Discussion

### 2.1 Malt Analysis

Barley samples were commercially malted and analysis results are outlined in Table 1. Refer to Appendix A for the malting schedule.

**TABLE 1 - Malt Analysis**

Parameter	Gairdner control malt (GL6308)	Gairdner 5 year average	Skipper trial malt (A16463)	Specification Sugar
Moisture %	4.4	4.2	4.6	5.0 max
Fine Extract d.b.%	82.8	81.8	81.0	80.0 min
Fine-coarse	1	1.2	1.1	
Colour EBC	3.9	3.7	4.2	3.0 – 4.5
Total Nitrogen %	1.66	1.63	1.60	1.44 – 1.89
Total Protein d.b.%	10.4	10.2	10.1	9.0 – 11.8
Soluble Nitrogen d.b.%	0.77	0.72	0.67	
Soluble Protein d.b.%	4.81	4.52	4.21	
Kolbach Index %	<b>46.5</b>	44.2	41.7	37 - 46
Diastase WK	296	260	264	175 - 300
Viscosity mPa.sec	1.56	1.51	1.58	1.58 max
Wort Beta Glucan mg/L	114	116	126	180 max
AAL %	80.8	81.2	81.1	82 max
FAN mg/L	187	171	164	150 min
Carlsberg modification %	94.9	93.7	91.4	
Carlsberg homogeneity %	80.4	81.0	80.7	
Alpha Amylase D.U.	48	43	49	
Friability %	88.5	88.8	81.6	80 min
DMS (total) ppm	11.6	10.4	6.4	
DMS precursor ppm	4.3	3.4	2.5	5 max
Malt screenings – Sortimat (>2.8,>2.5,>2.2,<2.2mm) %	83.7/15.6/3.4/0.9	81.4/15.0/3.4/0.8	83.7/13.9/2.6/0.3	

Out of specification parameters are marked in **red bold type**.

Malt analyses represent a mean of 3 malting labs

## **2.2 Brewing Performance Analysis**

Beers were produced using the PBA sugar program. Refer to the PBA handbook for details of brewing and analysis. Brewing performance data is presented in Table 2.

**TABLE 2. Brewing Performance of Skipper Malt**

Parameter	Performance rating
Milling	Good
Mashing	Good
Lautering	Good
Wort Clarity	Good
Fermentation	Good

### **Definitions:**

Excellent = Performance significantly improved over the control

Good = Performance comparable with the control

Fair = Performance worse than the control but within plant capability

Unsatisfactory = Performance outside production capability and/or acceptability

Lautering Performance	Lauter time (all in lauter tun to all in kettle)	Wort run-off time
Gairdner control	70 ± 6	50 ± 4
Skipper trial	76	60
Av of last 5y control	89	69
SD of last 5y control	30	25

### **Comments:**

- The run-off performance was good. The Gairdner control brew had a run-off time of 50 minutes. The Trial variety, Skipper, had a run off time of 60 minutes.

## **2.3 Wort Analysis**

**TABLE 3. Data for Wort Samples**

Sample	Original Gravity °P	Limit Gravity °P	% AAL	pH	EBC Colour	FAN mg/L	β-glucan mg/L
Gairdner control	14.04	1.4	90.0	5.60	8.1	199	61
Skipper trial	14.19	1.6	88.7	5.37	7.4	199	43
Av of last 5y control	14.07	1.4	89.8	5.39	8.5	175	75
SD of last 5y control	0.11	0.3	2.1	0.15	1.2	16	43

**Comments:**

- The Skipper wort was slightly lower in pH and colour compared to the Gairdner controls (the Skipper wort was the darkest of the trial worts).
- The Skipper wort had a slightly higher limit gravity and its AAL was slightly lower than the Gairdner controls.
- Skipper had a similar FAN level compared to the controls while its beta-glucan level was slightly lower.

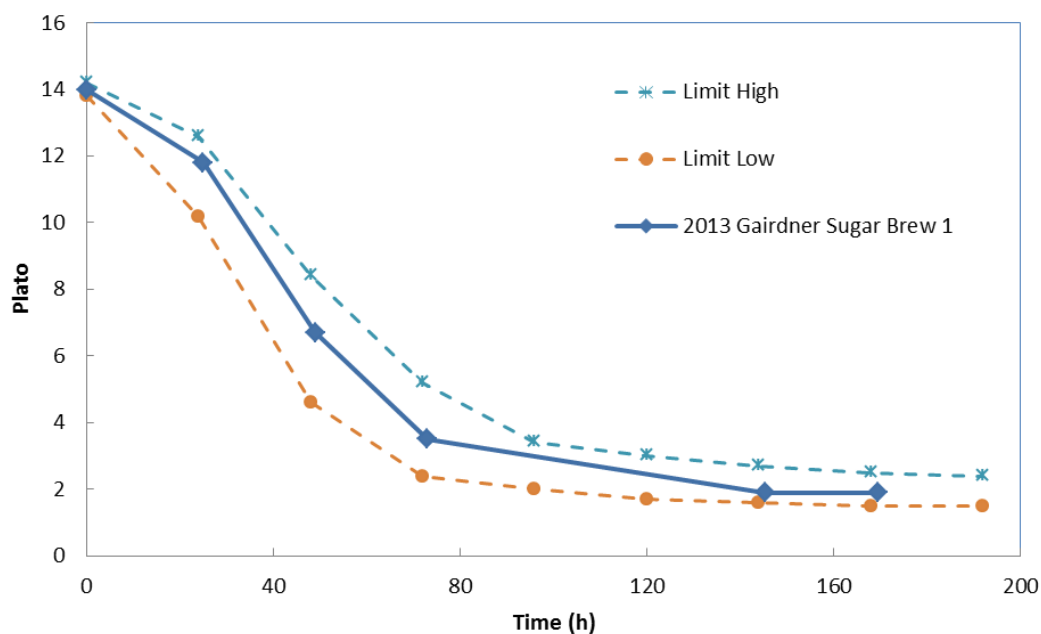
**2.4 Fermentation Analysis**

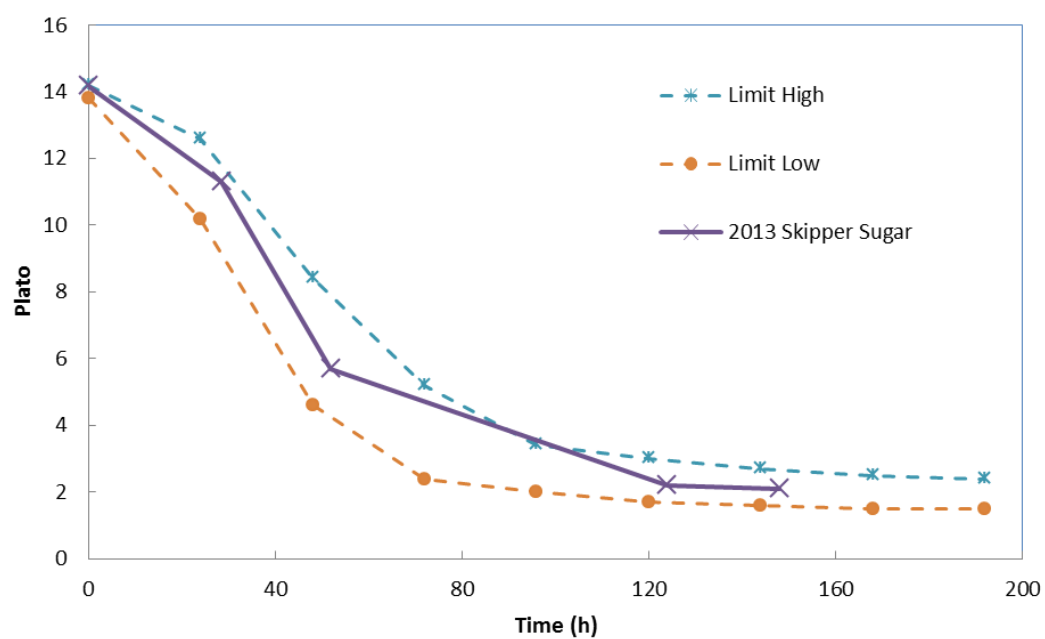
The time to reach constant gravities was between 144 and 168 hours (6-7 days).

**TABLE 4. Fermentation Data**

Sample	Present Gravity °P	Alcohol % v/v	pH
Gairdner control	1.6	6.89	4.4
Skipper trial	1.8	6.88	4.2
Av of last 5y control	1.6	6.87	4.3
SD of last 5y control	0.2	0.13	0.1

Figures 1 and 2 show the fermentation curves of the Gairdner brew and the Skipper brew.

**FIGURE 1. Fermentation Curve of the Gairdner Control Brew**

**FIGURE 2. Fermentation Curve of Skipper Trial Brew****Comments:**

- The fermentation curve of the Skipper wort was within acceptable limits for sugar brewing and was comparable with the Gairdner controls.
- Apparent gravity was reached within 6 days of fermentation.

## **2.5 Packaged Beer Analysis**

Packaged beer analysis is given in Table 5.

**TABLE 5. Packaged Beer Analysis**

Analysis #	Gairdner control malt (GL6308)	Skipper trial malt (A16463)	Av of last 5y control	SD of last 5y control
<b><i>Chemical</i></b>				
Original extract °P	10.5	10.6	10.4	0.2
Apparent extract °P	1.13	1.21	1.13	0.16
Alcohol %v/v	4.89	4.94	4.84	0.09
pH	4.43	4.29	4.31	0.10
Colour EBC	4.0	4.2	4.5	0.7
Bitterness B.U.	24.2	25.0	25.2	3.6
VDK mg/L	13	10	12	8
DMS µg/L	12	11	14	2
Total Esters mg/L	24.3	30.2	27.3	5.0
Total Alcohols mg/L	97.4	101.0	104.8	6.8
<b><i>Physical</i></b>				
Initial Stability FTU ASBC	0.84	0.66	1.03	0.81
Forced Stability FTU ASBC	2.17	1.90	2.48	0.98
8 week hot room at 25C Stability FTU ASBC	0.88	0.60	2.02	2.27
Foam stability by NIBEM seconds	248	271	262	20
Vmax L	0.56	0.20	0.40	0.23

Refer to the PBA handbook for analysis details.

**Note: In 2013, hot room stability samples were stored at 25°C for 8 weeks. This is approximately equivalent to the 4 weeks at 30°C used in the past and will be used going forward.**

### **Comments:**

- The Skipper beer was slightly lower in pH. Chemical parameters for the Skipper beer were generally comparable to the average of the two Gairdner controls.
- The Skipper beer had good foam stability but poor beer filterability.
- Initial beer stability results suggest that Skipper is comparable with the Gairdner controls.

## **2.6 Sensory Evaluation**

The expert taste panel described the Skipper beer as clean, slightly solventy, estery and slightly grainy.

The Gairdner 2013 control beer was assessed as clean with fruity esters, solventy palate and vanilla aroma.

Both beers were satisfactory with no malt related defects.

## **2.7 Conclusion**

Overall the Skipper malt was comparable to the Gairdner control malt throughout the entire brewing process. Lautering performance and fermentability were similar to the controls.

The Skipper brew had a slightly higher limit gravity and lower AAL. A slightly higher apparent extract was observed in the beer.

The Skipper beer had a similar pale straw colour to the controls. It also had good foam stability, however its filterability was well below the control performance.

Initial stability of the Skipper beer showed it was comparable to the controls. Long-term stability of the Skipper beer was also good.

This completes the 2013 pilot brewing evaluation for Skipper barley at stage1 and the report will now be forwarded to the MBIBTC for assessment as part of the BA accreditation process.

**Dr David Duan**  
**Facilitator – Pilot Projects**  
**Date: 31<sup>st</sup> January 2014**

### **33. Appendix A**

#### **Barley Quality – Gairdner control**

Parameter	Results
Barley Growing Location	Vic
Crop year	2012
Total Protein (dry basis) – NIR %	10.2
Total Protein %(dry basis) – DUMAS if new variety	-
Moisture %	10.4
Screenings (< 2.2 mm) %	1.8
Plump Grain (>2.5 mm) %	84.1

#### **Malting Protocol – Gairdner control**

<b>Date Malted</b>	19 July 2013				
<b>Malt Supplier</b>	BBM, Geelong				
<b>Steeping</b>	<b>First soak</b>	<b>Air rest</b>	<b>Second soak</b>	<b>Steep temp.</b>	<b>Other</b>
	<b>Hrs</b>	<b>Hrs</b>	<b>Hrs</b>	<b>°C</b>	
	9	11	8	17	
<b>Germination</b>	<b>Days</b>	<b>Air on temp °C</b>	<b>Other</b>		
	4	15			
<b>Kilning</b>	<b>Temp range °C</b>	<b>Total time</b>			
	61 - 89	<b>Hrs</b> 16			
<b>Gibberellic acid use (GA3)</b>	<b>GA3 applied</b>				
	<b>ppm</b> 0.5				

**Barley Quality – Skipper trial**

Parameter	Results
Barley Growing Location	Minyip, Vic
Crop year	2012
Total Protein (dry basis) – NIR %	10.1
Total Protein %(dry basis) – DUMAS if new variety	-
Moisture %	8.8
Screenings (< 2.2 mm) %	2.2
Plump Grain (>2.5 mm) %	95.7

**Malting Protocol – Skipper trial**

<b>Date Malted</b>	19/7/2013				
<b>Malt Supplier</b>	JWM, Delacombe				
<b>Steeping</b>	<b>First soak</b>	<b>Air rest</b>	<b>Second soak</b>	<b>Steep temp.</b>	<b>Other</b>
	<b>Hrs</b>	<b>Hrs</b>	<b>Hrs</b>	<b>°C</b>	
	8	10	3	16	-
<b>Germination</b>	<b>Days</b>	<b>Air on temp °C</b>	<b>Other</b>		
	4	18			
<b>Kilning</b>	<b>Temp range °C</b>	<b>Total time Hrs</b>			
	55-74	44			
<b>Gibberellic acid use (GA3)</b>	<b>GA3 applied ppm</b>				
	0.5				