BALANCED OAK AND WINE MATURATION MANAGEMENT

Profitable, Sustainable, Environmentally Responsible

STEM

Science, Technology, Engineering, Mathematics

THE UNIVERSITY of ADELAIDE

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OVERVIEW

"The primary objective…..is to demonstrate the impact of Oak Maturation on the costs of wine production and the importance of understanding the cost versus quality trade off when determining the targeted price point for wine. The use of oak for maturation can have a significant impact on the cost of production and this must be reflected in the targeted price point through commensurate quality gains."

Australian Wine & Brand Corp.

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HISTORICAL R&D

- 25 Years of research and trials

- Development of alternatives to:
  - wine storage
  - oak flavouring
  - maturation system

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STAKVAT WITH PE SIDES
and ‘OAK BAK’ (30 Reclaimed Oak Battons)

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FIRVIN
Mobile FIR Toaster

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STAKVAT WITH PE SIDES

(a sustainable wine maturation vessel)

- 2 doors with simple guide system
- Captures and holds in place 2 food grade exchangeable maturation membranes
- Membranes can be air permeable materials such as PE or stainless steel for inert environment or finished wines
- Wine maturation times for the 900 litre volume are directly proportional to the maturation membrane thickness.

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ENGINEERING MATERIALS

- PE materials in sheet form are suitable for the Stakvat doors because:
  - it is food safe
  - has oxygen permeability values in the desired range
  - PE is already used in the wine industry
- PE has an evaporation rate of less than 0.05% compared to oak, which has an evaporation rate of up to 5%
- Stainless Steel has a corrosion rate of .05mm every 500 years

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WINE MATURATION FIELD TRIAL

Length of wine maturation trial:
12 months

Trial wine:
2009 Longbottom Padthaway Cabernet Sauvignon

Oak treatment:
French oak chips applied at 2 grams per litre

Maturation vessels:
9 x 900 litre Stakvats Vats 1-9 inclusive. In addition new oak barrels replicate No. 10 and old oak barrels replicate No. 11.

Code	Longbottom PAD CAS 2009	Vint	Var	No.
TX01809	VAT 1 - Oak Sided Vat/No Mox	2009	CAS	10
TX01809	VAT 2 - Control Tank/2g/L FO Chips/No Mox	2009	CAS	1
TX01809	VAT 3 - 2g/L FO Chips/ 3-4 Months MOX	2009	CAS	7
TX01809	VAT 4 - 2g/L FO Chips/LD PDE 1.5mm	2009	CAS	5
TX01809	VAT 5 - 2g/L FO Chips/HD PDE 1.5mm	2009	CAS	9
TX01809	VAT 6 - 2g/L FO Chips/HD PDE 4.0mm	2009	CAS	2
TX01809	VAT 7 - 2g/L FO Chips/LD PDE 4.0mm	2009	CAS	11
TX01809	VAT 8 - 2g/L FO Chips/HD PDE 5.0mm	2009	CAS	6
TX01809	VAT 9 - 2g/L FO Chips/HD PDE 6.0mm	2009	CAS	3
TX11709	Barrel - New Oak 9WCFR2	2009	CAS	4
TX11709	Barrel - Old Oak 04CFIA21	2009	CAS	8

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TRIAL SETTINGS

TARGET APPLICATIONS	REQUIRED OXYGEN PERMEATION INTO A 900 LITRE VOLUME/MONTH
1 Mox setting as specified (by producer) (1.5mm HDPE Membranes) (accelerated wine maturation)	Equivalent for 900 litres = 4500-13500 m L pm (Passive Air Ingress)
2 New Barrel Maturation (4.0mm HDPE Membranes)	Equivalent for 900 litres = 1125-2520 m L pm
3 Old Barrel Maturation (6.0mm HDPE Membranes)	Equivalent for 900 litres = 500-600 m L pm
Micro-oxygenation (MOX) settings	Equivalent PE membrane requirement

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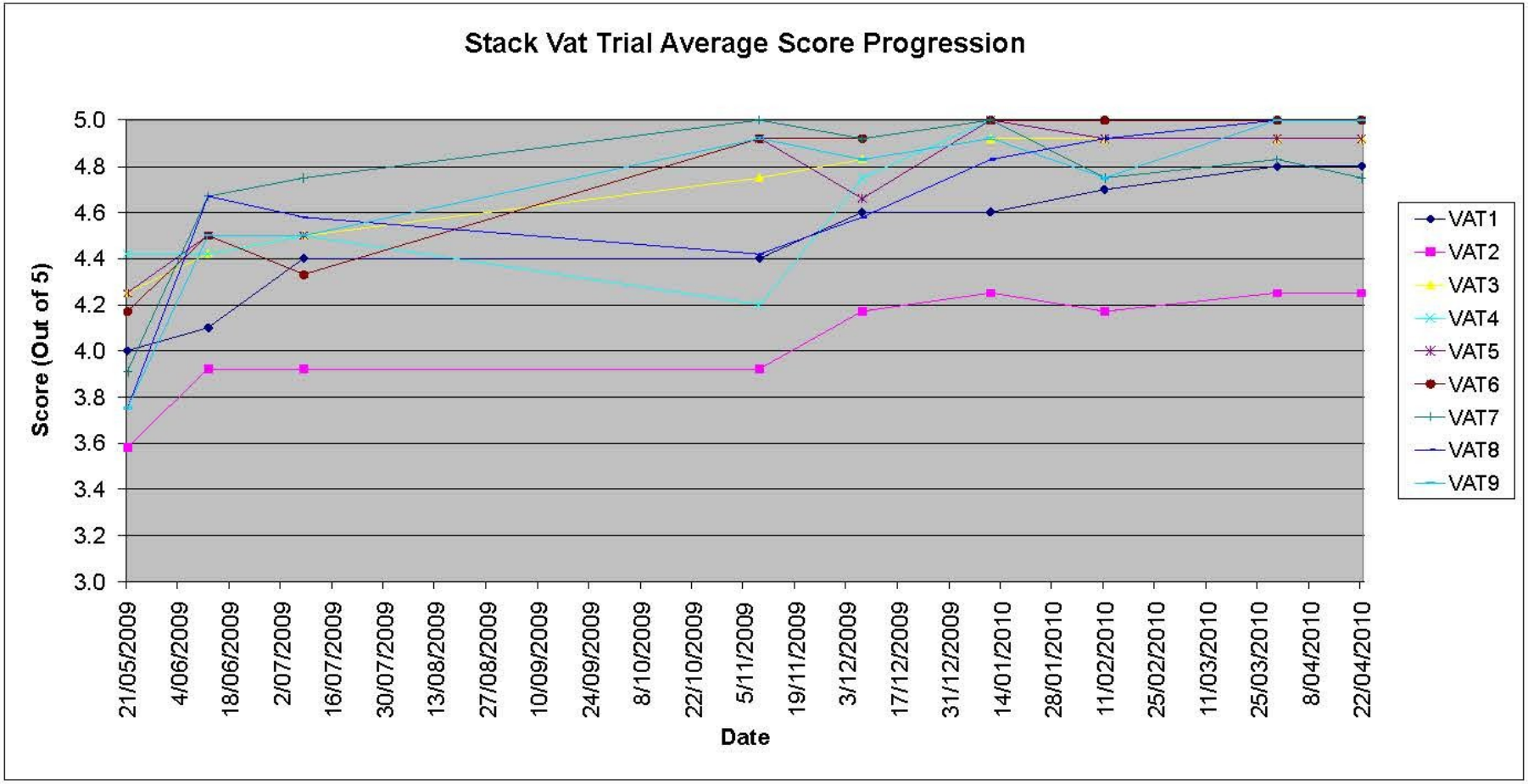

Sensory & Chemical Analysis conducted every two weeks
(12 months Time Trial)

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TASTING PANEL

- 11 Tasters (only 3 aware of trial protocols)
- Standard 20-point score rating looking at following characters:
  - colour retention/changes across time
  - tannin balance
  - oak integration
  - oak flavour and quality
  - hydrogen sulphide levels
  - oxidative characters

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WINEMAKER'S COMMENTS

"Looking at my scores across the 12 months, I reckon that the 1.5mm sheets hit an earlier peak back in July and continued to mature slowly during the preceding months to best in October, whereas the 4.0mm sheets peaked in November, but continued to improve to January and then stabilised. This is closer to the 12-month format I'm looking for to replicate oak barrel equivalent."

Notes: VAT 5 1.5mm H.D.P.E. Membranes (Highest Score on Tasting Notes page 10)

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NOTES

- Maturation of wine in the Stakvat – i Vat utilising barrel reclaimed oak, is 65% more cost effective than maturation of wine in new French oak hogsheads.

  SCIENTIFICALLY PROVEN AND MOST IMPORTANTLY FROM THE ADELAIDE UNIVERSITY CONSUMER ACCEPTANCE PROGRAM TRIAL (Part of PhD Students Thesis) PROVEN CONSUMER ACCEPTANCE OF WINES MADE USING ALTERNATIVES TO OAK BARREL MATURATION.

- Life expectancy of a Stakvat is 25 years and beyond with good maintenance.
- There is no wine loss through the PE Membranes. Wine evaporation loss is 5% to 7% per year from oak barrels.
- One Stakvat is equal to 3 hogsheads in volume, so approximately 3 times less handling costs of maturing wine for a 900 litre volume.
- 60% more maturing wine product can be stored in Stakvats in the identically same space as that occupied by an equal wine volume in oak casks.

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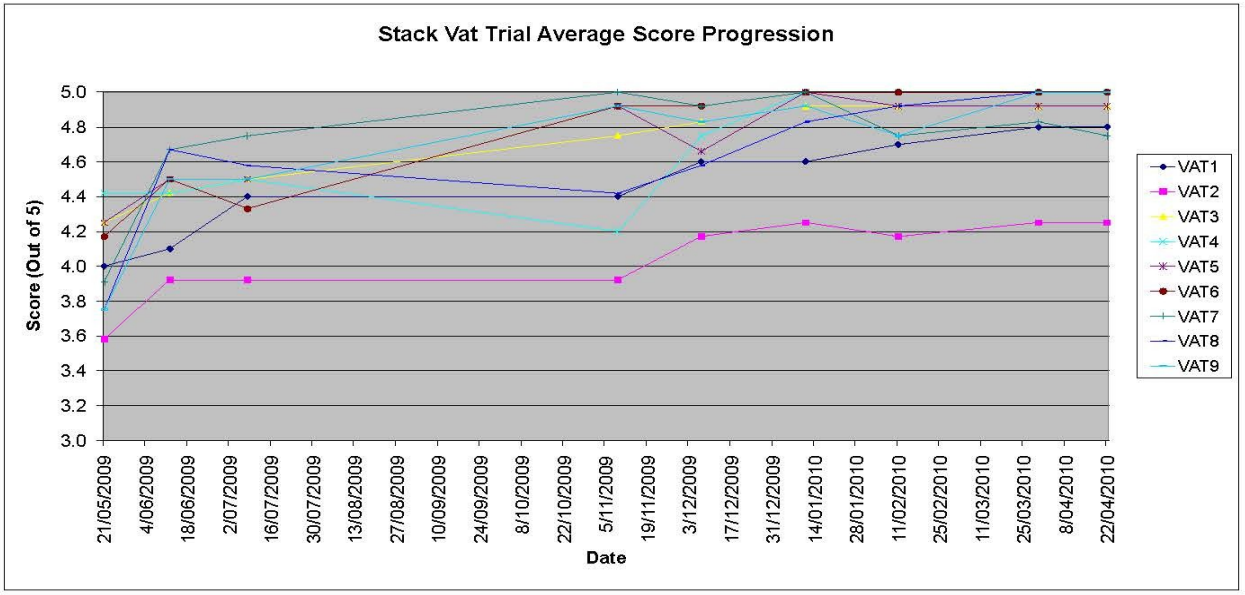
TRIAL TASTING SCORES (Blind Tasting)

Code	Longbottom PAD CAS 2009	Vint	Var	No.	SCR	NR	ND	HS	JM	SB	MRe	AB	MPo	MRo	PW	NH	Av
TX01809	VAT 1 - Oak Sided Vat/No Mox	2009	CAS	10		15.0	17.0	16.0	17.0	15.0	15.5	16.0	16.5	15.0	16.0	15.0	15.8
TX01809	VAT 2 - Control Tank/2g/L FO Chips/No Mox	2009	CAS	1		15.5	15.0	15.0	15.0	16.0	16.5	16.0	16.0	16.0	15.0	15.0	15.5
TX01809	VAT 3 - 2g/L FO Chips/ 3-4 Months MOX	2009	CAS	7		15.5	16.5	14.0	16.0	16.5	15.0	17.5	16.5	15.0	16.0	17.0	16.0
TX01809	VAT 4 - 2g/L FO Chips/LD PDE 1.5mm	2009	CAS	5		15.5	16.5	16.0	16.0	15.5	15.5	16.5	16.0	17.0	15.0	14.5	15.8
TX01809	VAT 5 - 2g/L FO Chips/HD PDE 1.5mm	2009	CAS	9		16.0	15.5	16.0	16.0	16.5	17.0	18.0	17.5	16.0	16.0	17.5	16.5
TX01809	VAT 6 - 2g/L FO Chips/HD PDE 4.0mm	2009	CAS	2		16.5	17.0	15.0	16.0	17.0	16.0	17.0	16.5	15.0	15.0	16.0	16.1
TX01809	VAT 7 - 2g/L FO Chips/LD PDE 4.0mm	2009	CAS	11		16.0	16.0	15.0	16.0	16.0	15.5	17.5	16.5	16.0	16.0	16.0	16.0
TX01809	VAT 8 - 2g/L FO Chips/HD PDE 5.0mm	2009	CAS	6		16.0	15.5	15.5	15.5	16.0	16.5	16.0	16.0	15.0	17.0	16.0	15.9
TX01809	VAT 9 - 2g/L FO Chips/HD PDE 6.0mm	2009	CAS	3		15.5	16.0	14.5	17.0	17.0	15.5	16.5	16.5	15.0	15.0	16.0	15.9
TX11709	Barrel - New Oak 9WCFR2	2009	CAS	4		15.0	17.5	14.0	15.0	15.0	15.5	17.5	17.5	16.0	15.0	15.0	15.7
TX11709	Barrel - Old Oak 04CFIA21	2009	CAS	8		15.0	17.0	17.5	16.5	15.5	17.0	17.0	16.5	15.0	15.0	16.0	16.0

NOTES: VAT 2 CONTROL (Stainless Steel Membranes) (No Air Ingress) (pink line on graph below)

Vat 5 1.5mm HDPE Membranes Highest Score Tasting Notes VAT 5 Cabernet Wine in this replicate matured in 6 months (see Winemakers Comments page 11)



NOTE: VAT 2 CONTROL (Pink Line on graph) STAINLESS STEEL MEMBRANES (Inert – Nil Air Ingress)

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