The Australian Wine
Research Institute

Wine Authentication

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APEC

Asia-Pacific
Economic Cooperation

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wine: old, safe and low risk product

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❖ Consumers, Producers & Brand Owners and Governments:

✓ Safety
✓ Quality
✓ Integrity
truthful and accurate labelling and advertising

❖ laws, food safety, regulatory requirements and quality
must never be compromised.

wine: old, safe and low risk product

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- **Safety**
  The AWRI help desk & problem solving services;
  technical information.

- **Quality**
  Focus of AWRI R&D:
  - *process & product innovation*
  - *maintaining and improving grape and wine quality*

➢ **Tools for verifying Integrity**

Wine: Integrity and Authentication

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Tools for verifying Integrity

1. *Audits of producers*
   Steve Guy & team, Wine Australia

2. *Authentication: comparison of a wine to a reference sample*

3. *Authentication: unknown wine samples*

Authentication:
comparison of a wine to a reference sample

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❖ **BevScan® - Tool for non-destructive testing**
   in-bottle wine analyser and classifier
   - Developed in collaboration with Jeffress Engineering (Adelaide) and CAMO (Norway).
   - Adjustable for most bottle sizes, clear or dark bottles, red or white wines, and many other beverages.
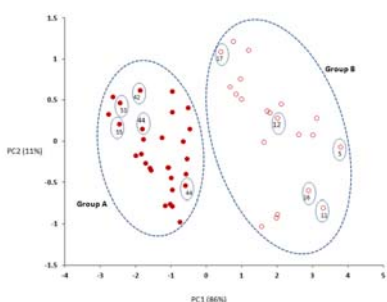
Authentication:
comparison of a wine to a reference sample

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❖ BevScan - Tool for non-destructive testing

❖ **Compositional analysis**
   - aroma compounds

   - ***non-volatile grape and yeast metabolites (anthocyanins and beyond...)***
   - metals
   - ❑ DNA

❖ Sensory analysis

Targeted analysis[1] of Australian Shiraz wine

- ESI positive and negative ionisation modes
- 47 compounds quantified
- Dynamic range of $10^{5.1}$

■ Malvidin-3-glucoside   ■ Acylated malvidin-3-glucoside
■ Procyanidin B2   ■ Procyanidin B1

Non-targeted analysis of Australian Shiraz wine
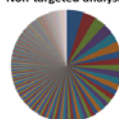
Number of BPs	380
Number of NDs	10
Dynamic range	$10^{3.8}$
CV median	0.08
CV 95th %	0.28
CV Max	1.16

Authentication:
unknown wine samples - origin verification and detection of counterfeit Australian wines

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❖ **Australian?**

❖ **Barossa Valley?**

❖ **Shiraz?**

A⁺ AUSTRALIAN WINE

2011
Barossa Valley
Shiraz

- *Australian Wine Labelling*
  (Wine Australia Compliance Guide 2015)
  Region (GI) , Variety, Vintage are optional,
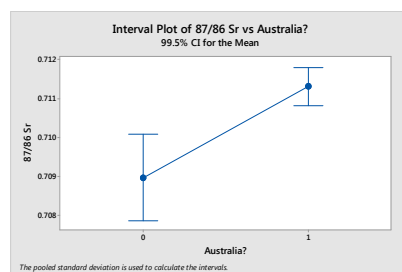 but must be 85% if claimed.

Authentication:
unknown wine samples - origin verification and detection of counterfeit Australian wines

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❖ **Australian?**

- **^{87}Sr/^{86}Sr isotopes**
  in Australian ('1') and non-Australian ('0') wines

A⁺ AUSTRALIAN WINE

2011
Barossa Valley
Shiraz

Interval Plot of 87/86 Sr vs Australia?
99.5% CI for the Mean

87/86 Sr

0.712
0.711
0.710
0.709
0.708

0   1
Australia?

The pooled standard deviation is used to calculate the intervals.

❑ **trace elements**
❑ **fermentation water:**
  $H_2{}^{18}O$
  $(D/H)_{II}$: H_3C-**CHD**-OH / H_3C-**CH$_2$**-OH

Authentication:
unknown wine samples - origin verification and detection of counterfeit Australian wines

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❖ **Barossa Valley?**

- trace elements: Ag, Al, B, Ba, Be, Co, Li, Mn, Mo, Ni, Pb, Rb, Se, Sn, Sr, V, Zn

- *LDA analysis of PLS-DA scores*

| Region (actual)	n	Barossa (zone)	Big Rivers (zone)	Central Ranges (zone)	Hunter Valley (GI)	Margaret River (GI)	McLaren Vale (GI)	Tasmania	Yarra Valley (GI)	% predicted to actual
					Predicted n (Quadratic LDA method)					
Barossa	26	20	0	0	0	0	4	0	2	77%
Big Rivers (zone)	15	0	14	0	0	0	1	0	0	93%
Central Ranges (zone)	27	1	0	20	2	0	2	2	0	74%
Hunter Valley	14	0	0	0	14	0	0	0	0	100%
Margaret River	28	0	0	0	0	28	0	0	0	100%
McLaren Vale	28	2	1	0	1	0	24	0	0	86%
Tasmania	28	1	0	1	0	0	0	25	1	89%
Yarra Valley	28	1	0	2	0	0	0	0	25	89%
other wines predicted to this region:		5	1	3	1	0	7	2	3	

❑ additional regions

❑ seasonal effects – rain vs irrigation

Authentication:
unknown wine samples – varietal identity

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❖ **anthocyane profiles (esp. Pinot Noir; red hybrids)**

❖ **aroma profiles**

❖ *grape PR proteins in white must & wine:*
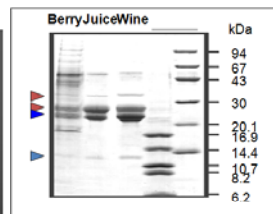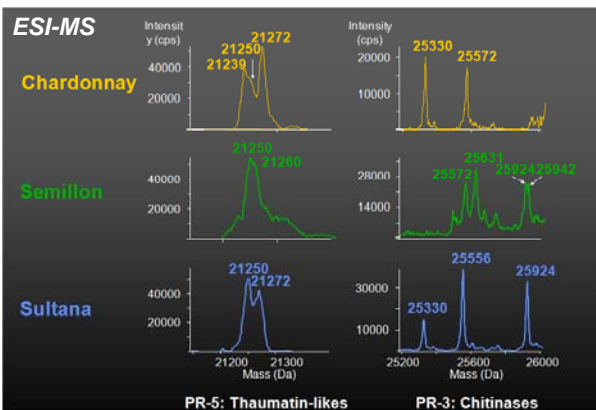
Authentication:
Australian Import Controls

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❖ Imported wine must comply with the Food Standards Code

❖ **Risk based inspection** at border – **Wine low risk,** therefore only **5%** of consignments are inspected (the lowest legislated rate).

❖ Microbiological: **None**

❖ Physical: **Label inspection** (mandatory items-standard drinks, importer details, country of origin etc)

❖ Chemical: Sulphur dioxide tested,**if not declared on label.**

➢ **Government focus: health risk**

➢ **Counterfeiting – brand owner**

➢ **Consumer deception – producer & importer**

➢ **ACCC, Australian Competition and Consumer Commission**

Consequences of consumer deception
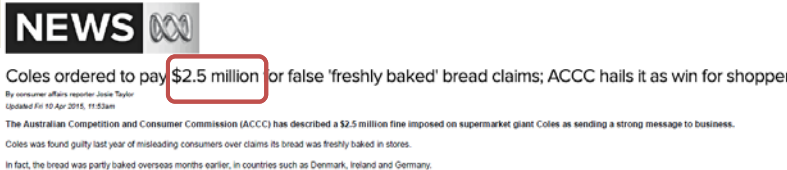
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Europe:

...between 2006 and 2008...

...sold 130,000 hectoliters..

..the highest penalty,**180,000 Euro.**

Australia: **NEWS**

Coles ordered to pay $2.5 million for false 'freshly baked' bread claims; ACCC hails it as win for shoppers

By consumer affairs reporter Josie Taylor
Updated Fri 10 Apr 2015, 11:53am

The Australian Competition and Consumer Commission (ACCC) has described a $2.5 million fine imposed on supermarket giant Coles as sending a strong message to business.

Coles was found guilty last year of misleading consumers over claims its bread was freshly baked in stores.

In fact, the bread was partly baked overseas months earlier, in countries such as Denmark, Ireland and Germany.

Wine Authentication - Summary

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❖ Counterfeiting, substitution and misleading information about wine affect producers and consumers in all Economies.

❖ *Integrity* as important as **Quality** and *Safety.*

➢ Best tackled by **international cooperation** between
        customers & consumers,
        producers & brand owners, and
        governments & regulators.

▪ *KPMG global head of agribusiness Ian Proudfoot:*
".. the only way to effectively tackle international food fraud is to establish a food integrity body..." (global role aka Interpol)
"....an international body such as the Asia Pacific Economic Cooperation could be a leader in driving action on this issue."