**Equipment evolution: Heating for rapid skin extraction in red wine production**

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**The Romans used heat to produce concentrate (sapa and defrutum) for sweetening wines**

Pliny (c. AD 80) and other agricultural authors of the era recommended this be done in lead vessels. Some researchers have suggested that lead poisoning contributed to the demise of the Roman empire (a theory refuted by others).

**Bad weather and high throughput equipment**

There were some disastrous vintages in France in the 1960s with some countries, around 500 ML of wine was made in France using these techniques in 2008.

**Thermovinification**

Thermovinified wines (minimal maceration period) can lack colour from the skins would diffuse inwards. Crushing, destemmed and drained with the juice being heated by steam in the device shown and added back into the tank with the skins. After sufficient contact time for colour extraction, juice was drained, cooled and the liquid fermented.

**Influence of heat treatments on wine style**

<table>
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<th>Treatment</th>
<th>Aroma</th>
<th>Palate</th>
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| Pre-fermentation heating | Fresh fruit | Ripe fruit | Takes a little longer to add up to finish
| Hot grape | Estery | No estery | Has a greater influence on anthocyanins, but also some influence on tannins
| Juicy | Ripe fruit | No estery | Needs aging, micro-oxygenation or wood
| Pivoting | Balanced | Balanced | Not very suitable for skin-type grapes
| Juice boiler | Ripe fruit | Ripe fruit | Used for blending of other wines

**California investigates heat extraction**

In the early 20th century heat extraction was investigated in California. Grapes were crushed, destemmed and drained with the juice being heated by steam in the device shown and added back into the tank with the skins. After sufficient contact time for colour extraction, juice was drained, cooled and the liquid fermented.

**RDV clarification to stabilise colour**

With thermovinification, colour is often high initially but then dissipates during fermentation and storage. This is a consequence of there not being enough tannins to stabilise anthocyanins and there also being lots of small particles that may fines out anthocyanins. Rotary drum vacuum (RDV) filtration provided a thorough clarification that minimised the latter effect.

**Australian Interest in thermovinification in the 1970s**

This is the 198th Australian Wine Industry Technical Conference. At the 2nd Wine Industry Technical Conference in 1973 there was a presentation on the use of heat extraction and are near their optimum activity at this temperature.

**In this variation on flash détente patented by INRA and Pera-Pelenc, the incoming grapes are drained by a rotary screen. They are then heated as they are conveyed in a hot juice bath before passing over a hot juice separating rotary screen as they exit.**

**Heat Extraction of Color From Red Grapes Of Increasing Importance**

*Dr R. H. Snippe* 1987. The importance of extraction and is near their optimum activity at this temperature.

**Thermo détente**

Thermovinified wines (minimal maceration period) can lack structure and colour stability because of a lack of tannins. Flash détente (patented by INRA in 1993) exposes heated grapes to a structure and colour stability because of a lack of tannins. Flash détente could be useful for some larger Australian producers to help manage compressed tank space or needing to be managed.

**Flash détente**

Heated grape enter bottles where they are pressurised to 100 to 400 kPa above atmospheric. The pressure is then released and the grapes enter a mixing vessel. Thermo détente is quite different to flash détente because there is no evaporative flash expansion of fluid from the skin cells, but the pressurisation and release does have a smaller effect on skin extractability.

**Industrial scale continuous immersion**

One of the industrial scale thermovinification systems developed in the 1970s was the INRCA continuous system. A portion of pre-drained juice was heated and sprayed on the grape solids. This hot juice bath was realted and recirculated.

**Flash détente**

Flash détente may be performed while filling a large membrane press. 1963

In Burgundy in the 1920s, researchers studied immersing whole grapes in hot juice for 4-5 minutes then draining and leaving the grapes for 12-24 hours. During this time the colour from the skins would diffuse inwards. Crushing, destemming, pressing and liquid fermentation followed.

**Heat Extraction From Red Grapes Of Increasing Importance**

*Dr. R. H. Snippe* 1987. The importance of extraction and is near their optimum activity at this temperature.

**Modern continuous immersion**

The modern immersion processes are more gentle. In this design from Peran-Pelenc, the incoming grapes are drained by a rotary screen. They are then heated as they are conveyed in a hot juice bath before passing over a hot juice separating rotary screen as they exit.

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**Modulated flash détente**

In this variation on flash détente patented by INRA and Peran-Pelenc in 2011, a slightly weaker vacuum is used that only cools the grapes to 55°C instead of 30°C. Enzymes are added to assist extraction and are near their optimum activity at this temperature. A bit can be achieved with a short contact time. This step can be performed while filling a large membrane press.