PALL Food and Beverage

Striving to be DE Free in the Winery

WEA 2018
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Filtration. Separation. Solution.SM

Wine Crossflow – Sustainability driven technology

- Diatomaceous Earth
  - Non-Renewable Resource
  - Disposal Issues
  - Health Implications

Wine Crossflow – Sustainability driven technology

ENVIROMENTAL BENEFITS OF CROSSFLOW:

- Replaces DE throughout the Winery (RDV and Earth Filter)

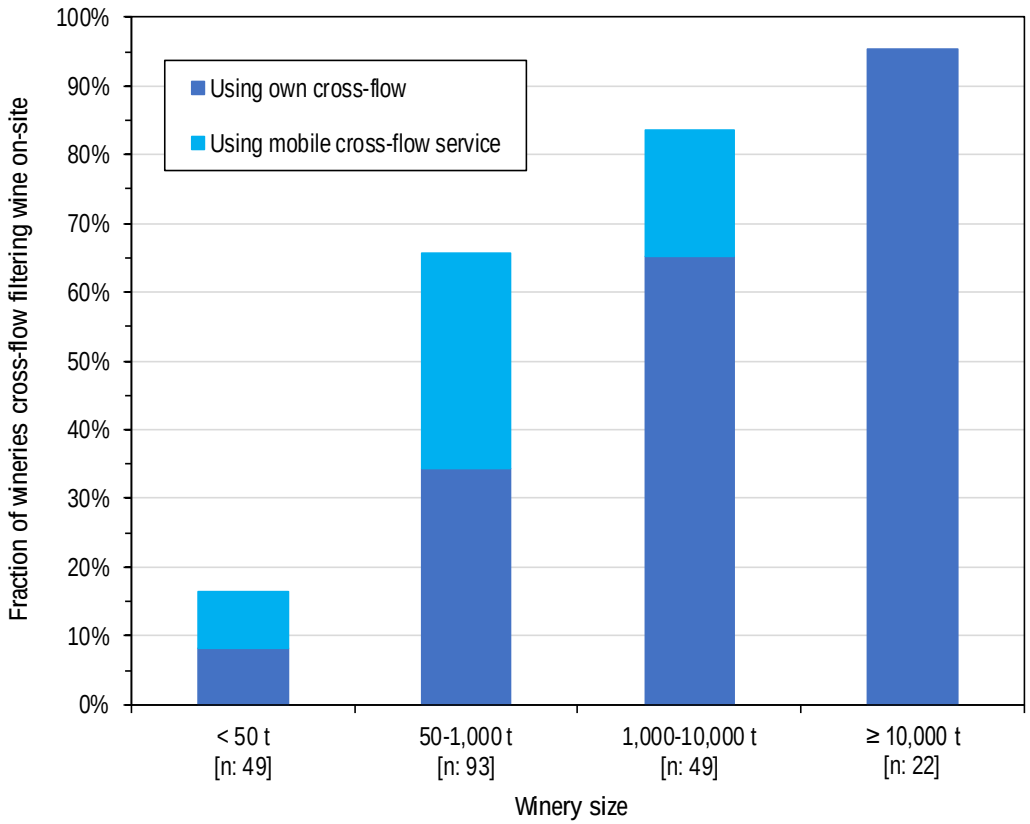
TO REDUCE:

- DE consumption
- Wine movements
- Disposal costs
- Labour

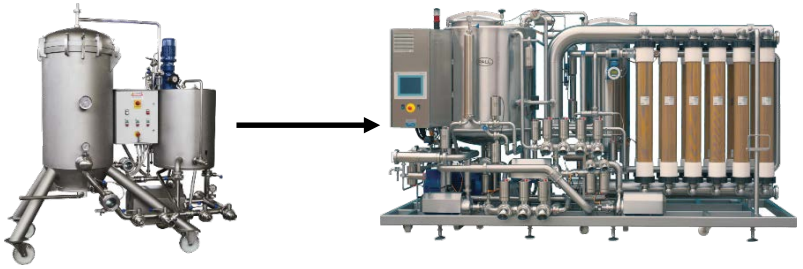
TO IMPROVE:

- Filtrate Quality (lower downstream filtration costs)
- Wine Value $$$
- Oxygen pick up
- Working conditions

Crossflow Filtration

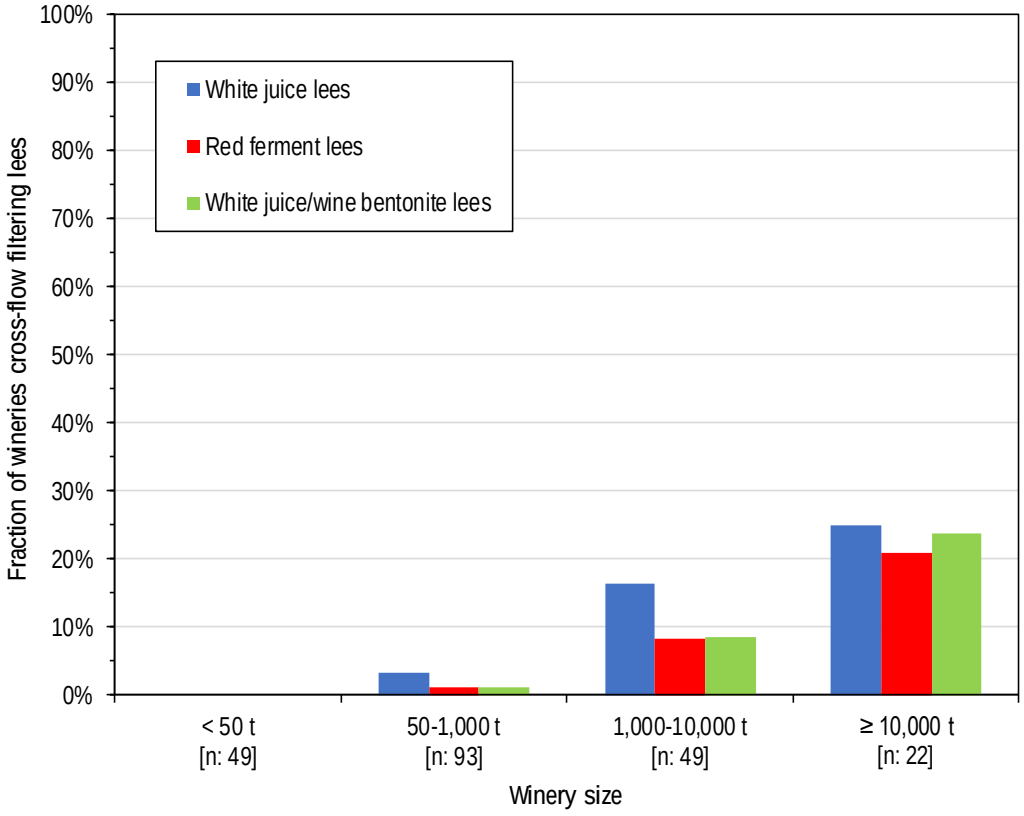


Data supplied by Simon Nordestgaard AWRI



"The biggest single advance we have made in quality improvement in the last 25 years"

High Solids Crossflow Filtration



Helps to avoid oxidation and product dilution common with rotary vacuum drum filters (RDV)
Therefore increasing value $$$

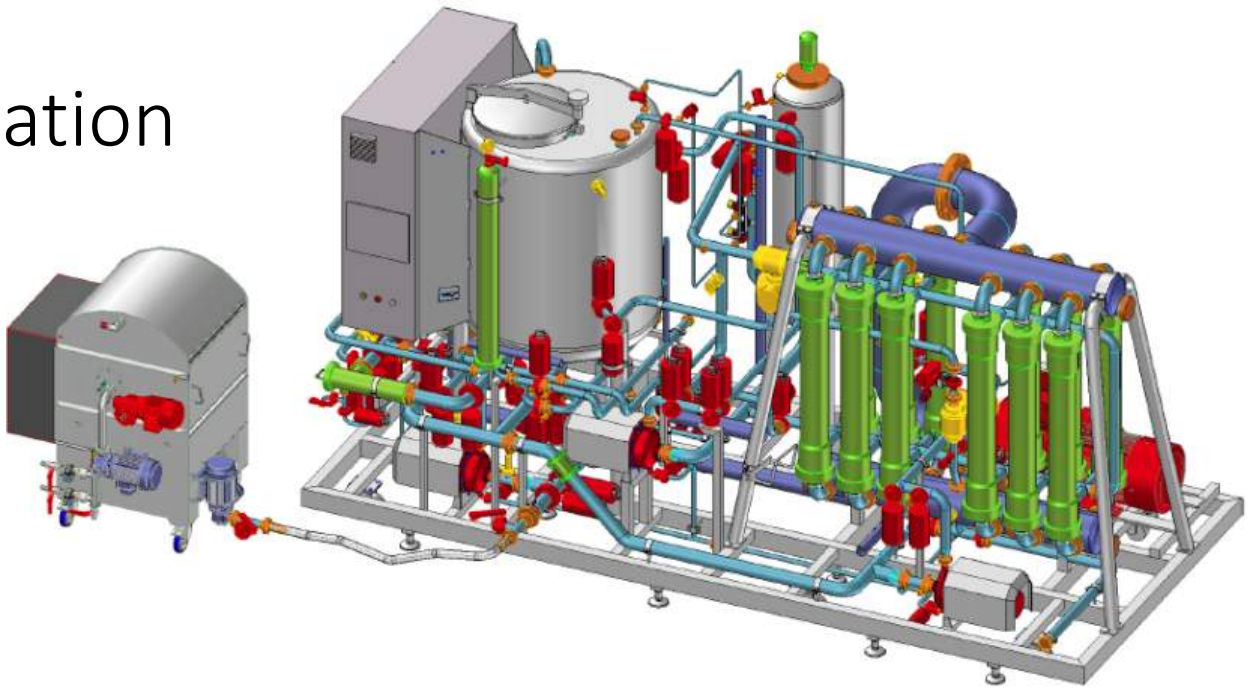
Data supplied by Simon Nordestgaard AWRI

PALL Crossflow Filtration

- Benefits
  - Eliminates use and disposal of filter aids
  - More consistent filtrate quality
  - Higher wine yields
  - Less labour and handling
  - More hygienic operation
  - Lower operating costs

PALL Oenoflow HS System

1. Juice Lees
2. Wine Lees
3. Wine Clarification



Hollow Fiber Filtration System

- Hollow Fiber Polyvinylidene fluoride (PVDF)
- 0.2 micron
- 2.6 mm fiber ID

- Fully Automated
- Batch Processing
- Enclosed system

Performance

Performance using Oenoflow HS System

- Average flux rate 30-50 LMH with lees
- Up to 85% solids
- Typical Permeate Turbidity < 1 NTU
- Less oxygen pick up than traditional RDV

Example Results – Trial with white wine lees

Analytical Parameters	Unit of measure	Untreated lees	RVD Filtrate	Oenoflow HS Filtrate	Oenoflow HS Retentate
Free Alcohol	%	12.36	10.90	11.95	14.8
Reducing sugars	g/l	1.80	1.30	1.70	2.00
Total alcohol	%	12.47	10.98	12.05	15.02
pH		3.26	3.30	3.31	-
Total acidity	g/l	5.71	4.95	5.48	-
Volatile acidity	g/l	0.23	0.18	0.21	-
Tartaric acid	g/l	2.10	2.00	2.00	-
Malic acid	g/l	2.10	1.70	1.80	-
Lactic acid	g/l	0.50	0.30	0.40	-
Total polyphenols	mg/l	<180	<180	224	240
OD 420nm		0.05	0.051	0.05	-
Oxygen	ppm	1.20	4.30	1.60	1.50
Turbidity	NTU	-	19	0.05	-
Suspended solids	%	32	0	0	80

Comparative figures must be validated on an individual application-specific basis. Variation will occur based on individual conditions.

Example Results – Trial with red wine lees

Analytical Parameters	Unit of measure	Untreated lees	RVD Filtrate	Oenoflow HS Filtrate	Oenoflow HS Retentate
Free Alcohol	% volume	12.38	11.93	12.40	14.2
Reducing sugars	g/l	3.20	3.20	3.30	3.55
Total alcohol	% volume	12.57	12.12	12.60	14.60
pH		3.41	3.45	3.46	-
Total acidity	g/l	5.11	4.86	5.02	-
Volatile acidity	g/l	0.36	0.35	0.38	-
Tartaric acid	g/l	2.00	2.00	2.00	-
Malic acid	g/l	<0.2	<0.2	<0.2	-
Lactic acid	g/l	1.50	1.50	1.60	-
Total polyphenols	mg/l	1496	1527	1552	1850
Intensity		5.27	6.22	5.99	-
Tonality		0.757	0.68	0.69	
Anthocyans	ppm	335	348	345	
Oxygen	ppm	1.20	4.90	1.25	1.50
Turbidity	NTU	-	18.90	0.60	-
Suspended solids	%	8	0	0	80

Cost of wine recovery with RDV filter

Basis: 2.6 million L/year (10% of volume)

Factor	Annual Cost ($)
Cost of DE	88,465
Cost of DE disposal	15,611
Labor and Electricity cost	15,000
Total Cost	119,076

Cost of wine recovery with Oenoflow HS System

Factor	Annual Cost ($)
Membrane cost (5years life)	28,800
Labor, Electricity & Chemical cost	12,120
Total Cost	40,920

Return on Investment

Value of recovered wine with DE filter (75% recovery at $1.66/L)	$3.237 Million
Value of recovered wine with Oenoflow HS (85% recovery at $1.84/L)	$3.588 Million
Annual recovered wine savings with Oenoflow HS	$351,000
Additional Oenoflow HS savings	$58,956
Total Crossflow savings	$409,956
Oenoflow HS Capital Cost	$405,000
Payback	12 months

Recovery of Wine from Lees

Feature	Benefit	Value
No filter aid requirement (DE)	-Less labor and handling -Lower disposal costs	- Lower operating costs - Environmentally friendly -Improved working conditions
Enclosed system design	- Higher quality, higher value wine - Minimal oxygen pick up - Hygienic operation	- Fast return on investment - Brand protection
Low hold-up Volume	- Processing of small batches - Reduced wine losses - Higher wine quality	- Less downtime - Brand protection
Wide bore hollow fibers	- Concentration up to 85% solids - Long module service life - Consistent filtrate quality (low turbidity)	-High wine yield - Lower operating costs -No further processing before bottling/packaging filtration
Fully automated working cycles	- Simple to use - Unattended operation	- Lower operating costs

Questions?

Thank you for your attention!