

Pacific Rim Oenology

Services & Supplies Since 1992



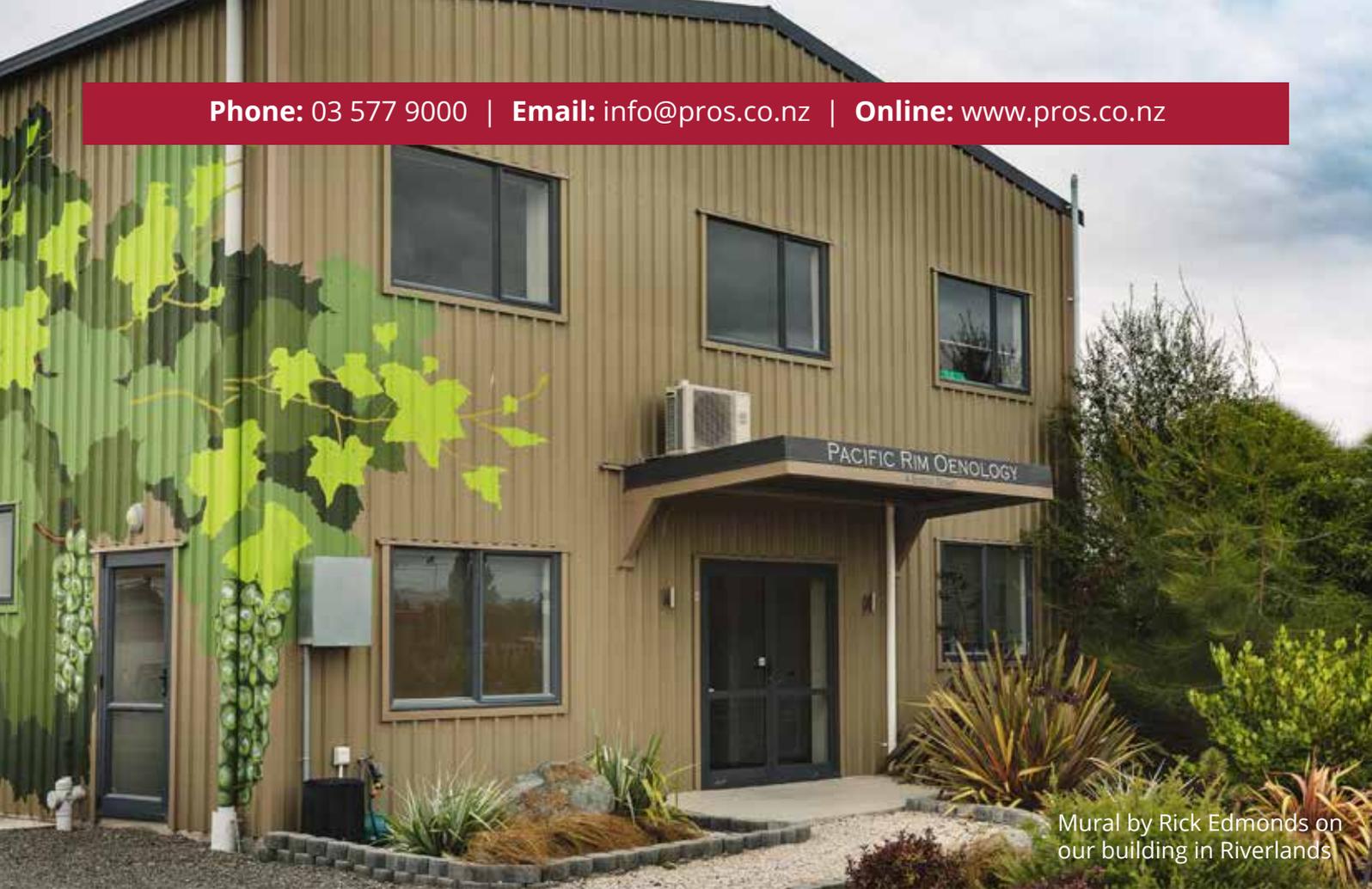
2018

**Products &
Services**

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Mural by Rick Edmonds on our building in Riverlands

PRODUCTS & SERVICES

Pacific Rim Oenology Services (2017) Ltd

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Welcome to Pacific Rim Oenology Services



Rebecca Allen,
Owner/General Manager

Rebecca Allen joined Pacific Rim in 2007, initially as Laboratory Analyst and progressing to Laboratory Manager, then General Manager in 2016. Having the opportunity to purchase Pacific Rim in 2017, Rebecca is now Owner & General Manager, with her partner Chris and their 2 beautiful daughters.

Rebecca's experience is working in ISO accredited laboratories involved with food and water microbiology. Rebecca has a National Diploma in Science and sound knowledge of various industry standards, ISO 17025, IANZ, FDA and NZFSA. Rebecca brings a wealth of knowledge of accreditation standards that will be relevant for wine analysis and is especially proficient in microbiology.

info@pros.co.nz or rebecca@pros.co.nz



Libby Gupta,
Laboratory Analyst

Libby joined Pacific Rim Oenology in November 2016. She has a Bachelor of Wine Science from EIT and has worked for 15 years in the wine industry, 10 in the cellar and vineyard with the last 5 years in the laboratory. Libby has enjoyed several international harvests bringing a strong understanding of laboratory practise and compliance within a winery specific background.

lab@pros.co.nz



Sarah Inkersell,
Oenologist

Sarah Inkersell rejoined Pacific Rim in 2017. Sarah's wine industry experience commenced in 1993, then she graduated from Charles Sturt University with a Bachelor of Applied Science(WineScience)bydistanceeducation.

During her 24 years, she has been worked various vintages for companies in NZ and Sancerre, France as well as winemaker for Soljans and Grove Mill, Quality Manager at Wine Bottlers Marlborough, Oenologist at Pacific Rim (8 years) and Market Development Manager for Enartis, whilst juggling her own successful wine company, Fairbourne.

Sarah's return brings a wide variety of knowledge from different areas of the industry especially bottling, QA and many other topics.

sarah@pros.co.nz



Anne McKenzie,
Laboratory Analyst

Anne McKenzie joined Pacific Rim in June 2017. Anne comes from a laboratory background in wine and dairy industries. She has a certificate in Wine (Grape growing and Winemaking), from EIT and NZ Dairy Industry Training Council Certificate (Laboratory practice stages 1-3), from Waikato and Taranaki Polytechnic. Anne provides vital support and expertise in all areas.

WHAT WE DO

Services

- Analysis of grapes wine, cider and beer
- Wine microbiology & fermentation
- Blending and wine adjustments
- Consultation on wine production techniques
- Problem solving and troubleshooting
- Advice for wine quality improvement
- Third party evaluation and insurance cases
- Bottling line evaluation
- Research on fermentation and microbiology

Education / Training Sessions

We hold technical seminars and workshops for wineries periodically, in Blenheim and in other academic or winery venues in New Zealand.

Some years we offer "Pre-Harvest" seminars on new developments in fermentation topics before harvest. During the winter or spring we focus on microbiology, and on cellaring and bottling issues. Guest speakers frequently join us.

Popular seminar topics:

- Wine microbe identification
- Management of Brettanomyces and other spoilage microbes
- Cellaring and Bottling
- Diagnosis and treatment of wine problems
- On-site training for winery staff in lab procedures
- Origins of wine aromas (good and bad)
- And more...

Products

- **Yeasts** - Renaissance, Chr-Hansen, Oenobrand
- **ML bacteria cultures** - Chr-Hansen
- **Nutrients** – Specialty blends:
For yeast: Superfood-Export, Superferm, Startup-Export, Vitamix, Supervit
For MLF: Leucofood, Leucovit, BactivAid
- **Enzymes** Oenobrand
- **Laboratory chemicals**
- **Cellar chemicals and supplies**
- **Microbiology lab supplies**
- **Textbooks** on oenology and grape growing

Consultants

Our colleagues and affiliates offer many services, including but not limited to:

Viticulture

- Vineyard planning and improvement
- Clonal and rootstock selection
- Water management
- Grape and trunk diseases

Winery Operations

- Cellar and operations management
- Bottling/packaging troubleshooting
- Quality Assurance and Quality Control
- And much more...

CONTACT AND ORDER INFORMATION



How to reach us - Hours

We may be in the lab at odd hours, including early in the morning and on weekends, particularly during harvest. Please ring if you want to arrange to meet us at the lab outside of normal hours.

If you have a problem fermentation, don't wait until Monday to try to reach us! Leave a message on our cell phone and we will do our best to contact you as soon as possible.

Our harvest hours:

Monday-Friday, 8:00 am-5:00 pm,
Mid February - May

Off season hours:

Monday-Friday 8:30 am-4:30 pm,
June - Mid February



How to reach us - Phones

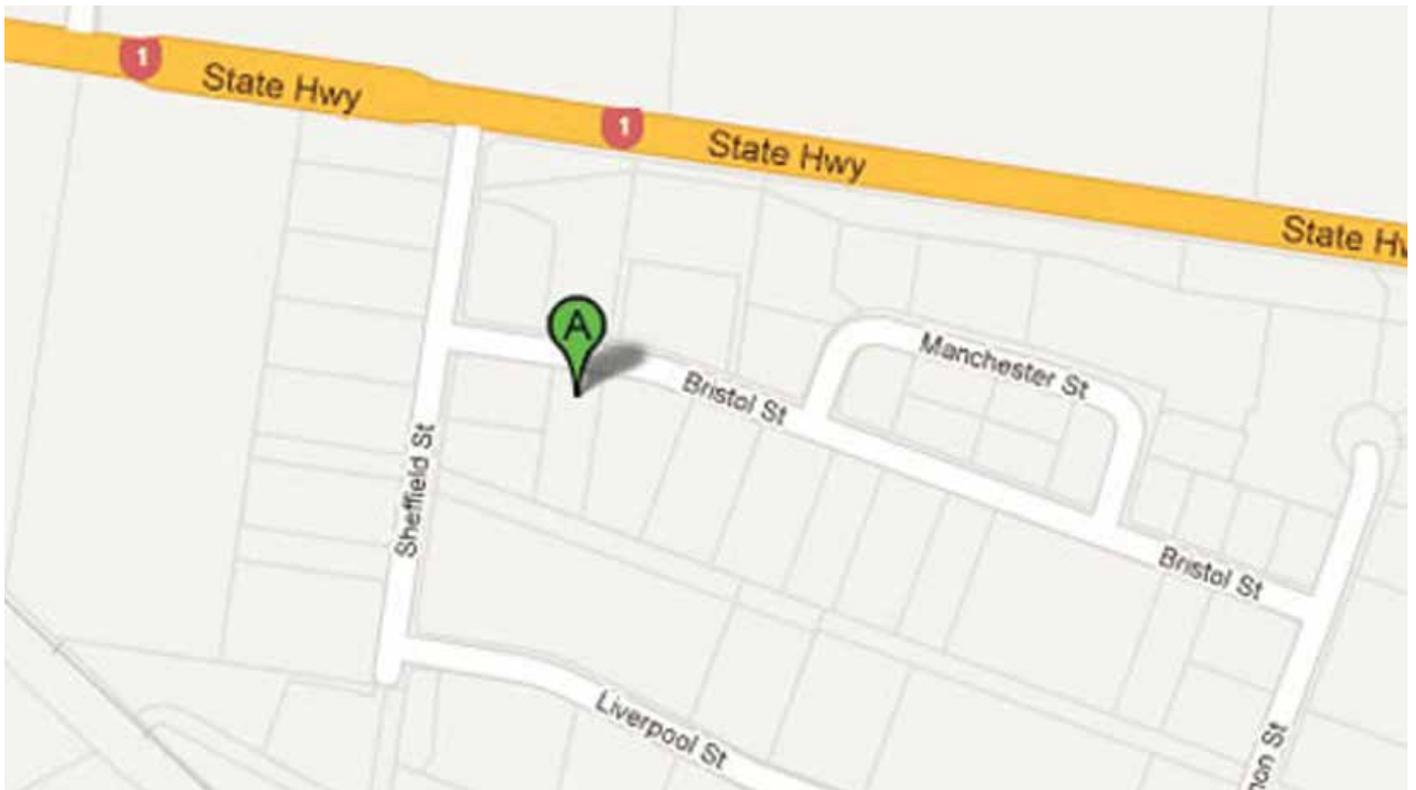
PLEASE ORDER BEFORE COMING IN TO PICK UP, so we can put your goods together, & make sure someone is here when you come (or we can leave your order in our drop-box outside).

0800 80 5779 or 03 577 9000



How to reach us - Online

Our website, www.pros.co.nz, presents information on our products and services in a clear, well organised format. MSDS & Product Data Sheets are on the website. Online ordering is not offered at this time. Look out for changes in 2017!



PRODUCTS

Fermentation Products:

- **Yeasts**
- **Yeast nutrients**
- **ML bacteria**
- **ML nutrients**

Liquid Oak Concentrate

Enzymes

Cellar chemicals and supplies

Lab chemicals and supplies

Microbiological supplies

YEASTS

Saccharomyces and/or non-Saccharomyces yeast?

Active dry wine yeast

Before 1962, when Dr Gerald Reed at Red Star produced the first two strains of active dry wine yeasts, wine was made by building up yeast cultures from agar slants, or by allowing fermentations to proceed on their own. Then, Red Star cultured the two most popular strains of

Saccharomyces cerevisiae, called Montrachet and Pasteur Champagne (times have changed) and offered them for sale in dry form to wineries.

Other strains were available in the 1970's as liquid or agar cultures, or by special order from Europe, until 1983 when Lallemand started importing their yeasts. Other companies followed suit in the 1990's and now the market is full of wine yeasts... but it was not always this way.

What yeasts do we want in our fermentations?

Even when they did not know that yeast was involved, it was obvious that some process was going on. It was also obvious that the process was complex and that although nasty products could result, alcoholic beverages that were palatable - maybe even pleasant - could be made. *Saccharomyces cerevisiae* is the only yeast species that can produce the alcohol levels present in today's table wines. Other species can add complexities, but it is essential that *Saccharomyces* dominates the fermentation after the first day or so.

Grapeskins host very, very few *Saccharomyces* yeasts. One exhaustive study in Perugia, Italy by Dr Alessandro Martini's lab tested more than 1000 samples until they found even one *Saccharomyces* cell.

If there is a completely new cellar with nothing at all brought in from another cellar - not a barrel, not a tank, not a hose, not even a squeegee used when delivering grapes to another winery - and if no yeast is used, the first fermentation may be, well, a little odd (or very odd), until the few *Saccharomyces* on the grapes take over. But after the very first fermentation, or if *Saccharomyces* comes in from another winery, *Saccharomyces* yeasts are resident in the cellar, which becomes filled with yeasts that are much more tolerant to alcohol than any other yeasts. They were naturally selected by the fermentation conditions, and so they successfully colonise the cellar.

What about the yeasts on grapes?

Grapes carry many non-*Saccharomyces* yeast species.

Kloeckera apiculata (and its teleomorph *Hanseniaspora uvarum*) are present on grapes in large numbers, and there are many other species as well. Most ferments without

added yeasts, and even ones in which the added yeasts die because of poor viability or mishandling, start with non-*Saccharomyces* yeasts, especially *Kloeckera*, from the grapes or from neighbouring fermentations. Although proponents of "natural" methods may welcome any and all yeasts, many species have negative effects.

Kloeckera tolerates 70+ mg/L SO₂, and is naturally cold-tolerant (*Saccharomyces* is not, it has to acclimate). Reds

soaking at temperatures higher than 10 °C, or juice warming up slowly after racking or cold-soaking, are prime candidates for vineyard yeast growth, including *Kloeckera*. *Kloeckera* can make ethyl acetate (smells like nail polish remover/airplane glue) or amyl acetate (banana peel) just before fermentation, but if a strong, clean-smelling fermentation ensues quickly, there may be little harm done (although some nutrients probably have been depleted).

If non-*Saccharomyces* species grow extensively, if an ethyl acetate or banana odor remains, if a bumpy, slimy scum or stringy, floating clumps form, the situation is more serious. Within hours, *Kloeckera* and other species deplete nitrogen and vitamins (particularly thiamine), leaving *Saccharomyces* without important nutrients unless more are added at just the right time (page 23). *Kloeckera* and other species also produce acetic acid, which acts synergistically with alcohol to cause stuck fermentations. Extensive growth of species that are not tolerant enough to alcohol may leave the must sweet, low-alcohol, nutrient-depleted, and with unpleasant sensory characteristics.

What about Non-Saccharomyces yeast cultures?

Non-*Saccharomyces* yeasts cultured by Chr. Hansen are very carefully selected to choose species/strains that can add complexity without taking over and dominating the fermentation.

THIS DIFFERENCE IS EXTREMELY IMPORTANT. WILD-TYPE VINEYARD YEASTS OFTEN CAUSE SPOILAGE, BUT THE SPECIFIC SPECIES/STRAINS SELECTED BY CHR. HANSEN DO NOT.

RENAISSANCE

Non H₂S-producing Yeast Strains



What is Renaissance Yeast?

In 2008, the American Vineyard Foundation (AVF) funded a research project by Dr Linda Bisson, professor at UC Davis Viticulture and Enology Department. The discovery of a natural *Saccharomyces* yeast strain (#932) that is incapable of producing hydrogen sulfide because of deficiencies at the Met-5 and Met-10 locations led Dr Bisson to investigate how this attribute could be applied to other strains of *Saccharomyces*. The results of cross-breeding have been outstanding, and UC Davis holds the patent on the resulting yeast technology.

Production rights have been licensed to Renaissance Yeast, which, with their classic cross-breeding program can apply this No-H₂S attribute to any compatible *Saccharomyces* yeast strain. **The strains below were developed using the art of classical breeding. This is NOT GMO technology.**

Ossia (ORGANIC)

For reds, whites, cider, and fruit wines

Characteristics

Fully certified as organic, Ossia has moderate fermentation rate and robust fermentation kinetics, with the ability to perform in diverse conditions. It enhances complexity and aromas in a broad range of wines.

Brioso

For Reds, especially Pinot Noir.

Characteristics

Brioso (bree-OH-so) is ideally suited to producing high quality, complex and spicy Pinot Noir. Best between 15 and 30 °C.

Vivace

For Whites, sparkling and high-Brix red table wines.

Characteristics

Vivace is ideal for artisan style-sparkling wines, fruit forward white grapes and high must weight red table wines. A rapid, clean fermenter characterised by its ability to ferment under diverse conditions, this yeast has strong fermentation kinetics while preserving fruit character. It is also an active competitor against other yeasts, so it is good for restarting stuck ferments.

Inoculation Rate - 20 - 30 g/hL (200 - 300 mg/L)

Allegro (Not Available in 2018)

For white grapes, great for fruit-forward wines

Characteristics

Allegro is good for white wine fermentations, and for aromatic expression of fresh, fruity wines. Allegro has soft mouthfeel characteristics, and excels at focusing the fruit in a wine, either alone or as part of a blend. Excellent for Chardonnay and Sauvignon Blanc.

Maestoso (Not Available in 2018)

For high sugar grapes, late harvest, restarting stuck ferments; high alcohol tolerant

Characteristics

This Rhone-style yeast is excellent for high sugar reds and late harvest grapes. With alcohol tolerance up to 18%, it is a fast fermenter with relatively high nutrient requirements. In red wines it offers good colour and structure, with aromas of black cherry and berries.

Andante

For Cabernet Sauvignon, Zinfandel, Syrah, Sangiovese and Chardonnay; rave reviews for Pinot Noir.

Characteristics

Ideal for red wines, Andante gives an intense fruit overture followed by mild spiciness, good mid-palate fruitiness, and smooth tannins in the finish. Colour and flavour stability are outstanding. It ferments at a moderate tempo and performs well in lower- to medium-nitrogen musts. Andante enhances varietal aromas and rich concentrated varietal flavours in reds It can also be used for Chardonnay.

NOTE: Renaissance yeasts cannot make H₂S, but if other yeast species/strains grow, those can easily produce H₂S!

To avoid H₂S, it is very important to prevent growth of other yeasts from vineyard or winery. Contact us for advice on how to inhibit growth of "volunteer" yeasts which may make H₂S.

Renaissance Yeast	Pack Size
Ossia - ORGANIC	500 g
Brioso - non-organic	500 g
Vivace - non-organic	500 g
Allegro - non-organic	500 g
Andante - non-organic	500 g
Maestoso - non-organic	500 g

Red Star Yeast



Red Star Yeasts are no longer available in 500 g packs.

PREMIER CUVÉE CONTINUES TO BE SOLD IN BULK-PACKED 10 kg BOXES.

PREMIER CUVÉE

(synonyms: PDM, EC1118, Prise de Mousse)

For: dry table wine, cuvee and tirage ferments

Its tenacity, however, makes it unsuitable for fermentations that will be chilled to stop them deliberately while still sweet.

A low-foaming, vigorous *Saccharomyces bayanus* strain, under its many brand names, is the world's most popular wine yeast. Its clean, slightly yeasty aroma is often considered too simple for reds and complex whites, but many winemakers use it for all wines because of its tendency to complete fermentation without sticking.

Note: ML bacteria may not compete well with this strain (under ANY of its brand names). If this strain is used, inoculate for MLF at the START of yeast fermentation, OR AFTER the end, NOT at mid-fermentation. BE SURE to use Leucofood to replace nutrients used up by the yeast!

Inoculation Rate - 25g/hL (250 mg/L)

Red Star (Lesaffre) Yeast	Pack Size
Premier Cuvee	10 Kg

Chr. Hansen Yeast Strains



Hansen *Saccharomyces* yeast strains are selected to ensure

optimal alcoholic fermentation and to facilitate better management of subsequent MLF.

Inoculation Rate - 25g/hL (250 mg/L)

MERIT.ferm is a robust *Saccharomyces cerevisiae* strain for heavier or high-alcohol reds and whites also fructophilic.

NSAC yeasts are specially selected pure non-*Saccharomyces* yeasts, or mixtures with *Saccharomyces* yeasts.

They cooperate in the fermentation instead of inhibiting it (as wild-type non-*Saccharomyces* species often do).

Many winemakers appreciate the complexity added by these controlled non-*Sacch.* species.

NSAC yeasts and SO₂ - Yeasts containing a non-*Saccharomyces* component are much less tolerant to SO₂ than pure strains of *Saccharomyces*. Check the Product Data Sheet for SO₂ tolerance before using NSAC yeasts.

Mixtures of *Saccharomyces* and non-*Saccharomyces* species

SYMPHONY.nsac is a mixture of *Sacch. cerevisiae* & *Kluveryomyces thermotolerans*, for fruity, complex white or lighter red wines.

RHYTHM.nsac offers a more pronounced effect compared to Symphony, and is good for medium to heavy reds.

MELODY.nsac provides more pronounced non-*Sacch.* yeast effects compared to Harmony, for oak aged whites & reds.

Pure cultures of non-*Saccharomyces* species

PRELUDE.nsac is a pure strain of *Torulospora delbreuckii*, to increase complexity. You MUST use your selected strain of *Saccharomyces* after 48 hours of Prelude inoculation. Maximum 25 mg/L total SO₂ added to the juice. Useful in masking greeners in red wines, high alcohol wines and stickies.

CONCERTO.nsac is a pure strain of *Kluveryomyces thermotolerans* which MUST be used with your choice of *Saccharomyces* yeast strain. It promotes complexity and mouthfeel, and complex aromas. Converts RS to lactic acid to lower alcohol. Maintains PH.

FROOTZEN.nsac is a FROZEN culture of a pure strain of *Pichia kluyveri*, to increase fruitiness and volatile thiols. It MUST be used with a selected strain of *Saccharomyces* yeast. For a more pronounced effect, wait for a drop of 6-7 Brix after adding FrootZen, before adding *Saccharomyces* yeast. **NOTE: FrootZen must be kept at or below -45 °C. It is shipped with dry ice and is sent for same-day or overnight delivery only.**

Inoculation Rate - 10g/hL (100 mg/L)

For more info see www.chr-hansen.com/wine or visit www.pros.co.nz

Chr. Hansen Yeast	Pack Size
MERIT	500 g
SYMPHONY, RHYTHM, HARMONY, MELODY	500 g
PRELUDE, CONCERTO	500 g
FROOTZEN, for 10,000L	1kg bag

Oenobrand Yeast Strains



FERMIVIN SM102 & FERMIVIN E73

For: white or red (respectively)

(formerly *Fermiblanc* & *Fermirouge*)

These strains' speciality is expression of fruity/variatal aromas, which are released naturally by beta-glucanase.

Fermivin SM102 (Not Available in 2018): Brings out a floral varietal complexity in aromatic whites, and enhances less aromatic varieties. Not very tolerant to alcohol, it can be chilled to leave some residual sugar. Low H₂S production.

Fermivin E73 (Not Available in 2018): For reds, particularly Cabernet Franc, Pinot noir and Merlot, where balance is important and fruity/berry aromas are desired. A slower, even fermenter, it manages cool temperatures and has high alcohol tolerance.

FERMIVIN STRAINS

VR-5 (Burgundy, France)

Suited for producing reds destined for aging, VR5 encourages extraction of polyphenolic tannins and anthocyanin, emphasizes spicy and fruity aromas, and releases mannoproteins through autolysis. Alcohol tolerance is good. Fermentation can be too rapid over 30 °C.

LVCB (Casablanca, Chile)

Brings out fruity, varietal characters of many white grapes, especially aromatics, Chardonnay aged on lees, and cuvee wines. Most useful at low temps (12-18 °C) or clarified juices. Low H₂S, VA, and SO₂ production.

4F9 (Nantes, France)

Especially suited to Sauvignon Blanc wines because it increases thiol aromas. Also releases mannoproteins to improve mouthfeel. A fast, steady fermenter, it is best at 15+ °C.

Low VA, H₂S, SO₂ production. Use this strain with Rapidase Expression Aroma enzyme.

XL (France)

For supple reds. XL absorbs polyphenols, reducing bitterness and astringency. Tolerates lower temperatures and produces high glycerol and lower alcohol. Use this strain in combination with Rapidase Extra Fruit enzyme.

FERMIVIN Champion (formerly *Fermichamp*)

For: reinoculating stuck wines, and for tirage

We have success with this yeast for reinoculating sluggish and stuck wines. It is also used for high alcohol wines and as a tirage yeast. More fructophilic than other strains, Fermivin Champion is also more resistant to alcohol, and tolerates higher VA. Not tolerant to low temperatures.

CEPAGE STRAINS:

Cabernet, Chardonnay, Merlot, Sauvignon, Pinot, Syrah
These ultra-premium specialty French strains were developed by ITV in Bordeaux for single-variety fermentations, producing fine wines with excellent concentration and complexity.

Cabernet (Strain UC331) (**Not Available in 2018**) - Enhances the varietal character of Cabernet, with aromas of blackberry, chocolate, and tobacco. Improves tannin extraction and polymerisation, making well-rounded wines. Best at 25-30 °C.

Chardonnay (Strain LW05) - Recommended especially for barrel-fermented whites, producing full-bodied wines with typical varietal citrusy aromas and excellent mouthfeel.

Merlot (Strain 4882) (**Not Available in 2018**) - Increases colour extraction, mouthfeel, and complex varietal aromas (berries, cherry, spices). This is a very popular yeast, consistently achieving excellent results with Cabernet as well as Merlot.

Sauvignon (Strain L2868) (**Not Available in 2018**) - Improves balance and varietal expression in Sauv. blanc, bringing out a depth of fruity aromas well suited to the NZ style. Best at 15-18 °C.

Use with Rapidase Expression Aroma enzyme.

Pinot (Strain LW06) - Selected to express the best qualities of Pinot noir, it produces well-balanced Pinot with rich red colour and red fruit notes.

Syrah (Strain LW07) (**Not Available in 2018**) - In cooler climates, the strain produces concentrated berry and lavender notes, with spicy pepper and liquorice flavours. A fast fermenter, it withstands warmer fermentation temperatures.

Inoculation Rate - 25g/hL (250 mg/L)

DSM Yeast	Pack Size
Fermivin SM102, Fermivin E73	500 g 20 x 500 g
Fermivin Range (VR5, 4F9, LVCB, XL)	500 g 20 x 500 g
Fermivin Champion	500 g 20 x 500 g
Cepage Strains Cabernet Chardonnay Merlot Sauvignon Pinot Syrah	500 g 20 x 500 g

YEAST NUTRIENTS

About Complex Nutrients

Today's winemakers see nutrient supplementation as a normal part of fermentation, and are on the lookout for danger signals that indicate high-risk musts likely to have trouble completing fermentation.

Cell numbers, growth and fermentation rate, protein synthesis (including the glucose transport proteins that bring sugar into the cell), & **alcohol resistance** all depend on the availability of nitrogen at the right time.

Sensory qualities are most positive with an appropriate balance of nitrogen sources.

What Do Complex Nutrient Supplements Do?

- Increase predictability of fermentation
- Balance the overstimulation of yeasts from inorganic nitrogen supplementation
- Improve alcohol tolerance
- Remove byproducts, such as short-chain fatty acids, that are toxic to yeasts
- Reduce yeast stress, which can lead to acetic acid & other unwanted metabolites
- Give better protection against sulphides than just DAP
- Improve aromas and flavours by allowing more balanced amino acid uptake

Research is investigating the effect of balanced nutrition on wine sensory aspects, with interesting results. Avoiding stuck fermentation is the primary reason for nutrient supplementations, but improved sensory qualities are playing an increasingly important role.



Yeast autolysis tanks



Drying yeast products

Autolysed Yeast: Full vs. Partial autolysates

Partial autolysates

To make **PARTIAL AUTOLYSATES**, the yeasts are heated for a few hours before they are killed and dried. A natural breakdown process called autolysis begins but does not proceed far.

Much of the nutrients then stay sequestered in clumps of cells, leaking out gradually over weeks, often too late to be useful for yeast fermentation.

Unfortunately, most autolysed yeast and other yeast products are only PARTIAL AUTOLYSATES.

Full autolysates

The products we use for yeast nutrients are all **FULL AUTOLYSATES**. In this procedure, temperature is increased in steps over time, to completely disrupt the cells and release the rich, fully soluble extract. Not surprisingly, full autolysis is much more costly than partial autolysis.

Analytical data does not reveal this difference, because cells often are completely digested in the tests. Those tests do not show how much of the nutrients are trapped within partly autolysed cells, nor how long the cells will take to release their nutrients into the must.

The degree of autolysis of a yeast product is very important to its effectiveness during fermentation. FULL AUTOLYSATES RELEASE MORE NUTRIENTS THAN PARTIAL AUTOLYSATES.

Primary Grown Yeast Products

Products derived from primary-grown yeasts are excellent nutrients for a wide variety of biological applications, including food flavours, pharmaceuticals, fertilisers... and wine fermentations. **These products supply amino acids, sterols, survival factors, natural vitamins, trace elements, micronutrients, and more.**

There is an incredibly wide variety of nutritive products for wineries, with very different ingredients but often bearing confusingly similar names (sometimes on purpose).

Some of these products are complex blends, but others are nothing more than DAP with a vitamin added (at a much higher price than either purchased separately), or a combination based on cellulose (for solids) plus DAP. Most of these materials are OK to use, but they do NOT contain the complex nutrition that can only be provided by a rich blend of natural, primary-grown yeast products.

"Primary grown" yeast products come from fresh, aerobically grown yeast cells that have not yet fermented, so they retain their full complement of nutrients. They provide 5+ times as much nutrition as spent yeasts left over from brewing ("brewers' yeast"), which have already used up much of their nutrients.

Primary grown yeast products also have less of the sour off-odours and bitter flavours associated with brewers' yeast, from which many yeast products are made.

NOTE: Yeast products are naturally tan-coloured. If a nutrient is white or cream-coloured, either it does NOT contain yeast products, or it contains products that have been over-purified and do not retain the full complement of natural nutrients. Add Yeast Extract and Yeast Hulls separately if using such products.



BSG YEAST NUTRIENT BLENDS

**Yeast nutrients are not the same. Many of them have widely different compositions
No GMO'S are used in preparing our fermentation products**

SUPERFOOD[®] EXPORT

**For the most successful yeast fermentations. Dose: 30-60+ g/hL (300-600+ mg/L)
Contains: Yeast Hulls, DAP, Yeast Extract, Minerals, Vitamins**

SUPERFOOD, provides complex supplements yeasts need for growth & survival during the anaerobic stress of fermentation. Hundreds of winemakers in several countries rely on Superfood for all their musts. Superfood solves their fermentation problems more readily than other products, because Superfood is different. Superfood works better than other blends because of its painstaking selection of highest quality ingredients, including ONLY primary-grown yeast products.

Superfood, with a variety of nitrogen sources, provides 50 mg/L YAN in 50 g/hL. It is MUCH better for yeasts than just DAP, and better than other competing blends.

Differences between Superfood Export and other nutrient blends

Superfood:

- only primary grown, fully autolysed yeast products.
- contains yeast extract, not just autolysed yeast
- has a LOWER percentage of DAP than other blends.
- has less flavour impact than other complex blends.
- has a HIGHER % of complex nutritive ingredients.
- contains a complex mineral blend designed specifically for fermenting yeast.
- has been milled and homogenised to distribute ingredients uniformly.
- Superfood has been used and trusted by premium wineries for over 30 years.

Superfood and DAP Content

- Superfood's unique formula includes 32.5 % DAP.
- Most blends have a much higher DAP content (45 %+ , sometimes to almost 100 %); others have none.

Superfood & Superfood Export

Suggested Dose:

See addition charts on page 19
Supplies 10 mg/L YAN @ 100mg/L



Regulations: Please check the regulations in countries where you export your wine. Some countries have restrictions that are NOT the same as for NZ wineries making wine for domestic sale. Refer to the current New Zealand Winegrowers International Winemaking Practices Guide.

STARTUP, STARTUP EXPORT

**Add to yeast rehydration water, or add for balance to musts that do not need extra nitrogen
OR ADD YOUR OWN DAP WHEN NEEDED**

Contains: Yeast hulls, yeast extract, complex minerals and vitamins. No inorganic nitrogen (DAP)

Startup Applications:

- rehydrating dry yeast
- you want all the 'goodies' in Superfood but want to use your own DAP
- your juice has enough natural nitrogen
- reinoculating stuck wnes

Note: Nitrogen **MUST** be measured and deficiency corrected during fermentation if ANY nutrient is added to the yeast rehydration water, or the fermentation can stick later on, when the stimulated yeasts get "hungry."

DAP MUST BE ADDED SEPARATELY TO NITROGEN- DEFICIENT JUICES

Suggested Dose: See addition charts on Page 19

In yeast rehydration water add 50 g/L of water In must add 25-30 g/hL (250-300 mg/L)

Supplies 5 mg/L YAN @ 100mg/L

Startup EXPORT Applications:

- used in the same manner as Startup, the EXPORT blend is used when you are you are exporting.

SUPERFERM®

The next generation of nutrients for today's Premium wines

Contains: Yeast Hulls & Yeast Extract, DAP, Complex Minerals, Vitamins.

Superferm Properites:

- has a higher percentage of minerals and vitamins than Superfood and less DAP
- compared to other blends, Superferm has MUCH less DAP
- extra vitamins are not needed when using Superferm
- designed for fermentations expected to be challenging
- formulated to help grapes ferment more completely, preserving their intense sensory qualities.
- Add EXTRA DAP depending on YAN.

Suggested Dose: See addition charts on page 19

Supplies 8 mg/L YAN @ 100 mg/L



Regulations: Please check the regulations in countries where you export your wine. Some countries have restrictions that are NOT the same as for NZ wineries making wine for domestic sale. Refer to the current New Zealand Winegrowers International Winemaking Practices Guide.

YAN? AMINO ACIDS? TOTAL NITROGEN? WHAT IS IMPORTANT?

Products made from yeasts are high in total nitrogen, but the form of the nitrogen is VERY important.

Nitrogen in amino acids contained in proteins (including mannoproteins in yeast hulls) is unavailable to yeasts.

However, these proteins are all digested during most testing procedures, so the results of total nitrogen in yeast nutrients, or even of total amino nitrogen, are not at all relevant to winemakers. Also, *Saccharomyces* yeasts cannot use proline (one of the two major amino acids in grapes), so any test that measures proline, such as total amino nitrogen, gives a very inflated number for available nitrogen. No matter how high a product's total nitrogen, or total amino nitrogen, the yeasts can 'starve' if it is not in a usable form.

Tests of YAN by enzymatic and NOPA procedures much more accurately reflect the actual YAN, but because digestion methods give much higher results, some suppliers/manufacturers use them. Ask your supplier what methods were used to test the YEAST-AVAILABLE nitrogen content of their nutrients.

Even the richest of yeast products, while providing many benefits to yeasts, do not contain as much amino nitrogen as DAP, **so if a complex blend is much higher in YAN than another, the one with the higher YAN is likely to contain more DAP**, or the test methods could have been inappropriate. Ask your supplier.

Vitamins

Vitamins are essential to yeasts for cell division, metabolism and survival, and can help prevent sulphide formation. Once it was assumed that all grapes contained sufficient vitamins, despite winemakers' observations that vitamin supplements often improve fermentation health. Research has confirmed that vitamins are important additions to wine yeast supplements.

Thiamine is routinely added to grape must, especially in Europe where it is the only legal vitamin addition. However, thiamine is not the only necessary vitamin! Fermentation specialists have known for many years that deficiency of both **pantothenate** AND nitrogen together produces H₂S.

Research in Dr Charles Edwards' lab at Washington State University now shows that **if there is a deficiency of pantothenate while at the same time there is ENOUGH nitrogen, even MORE sulphides are produced, and WORSE-smelling sulphides, at that!**

Minerals

Most mineral blends for yeast are based on requirements for growth in culture, not fermentation, but **our mineral blend was developed specially for alcoholic fermentations**. Minerals are very important for yeast growth and survival, and function as enzyme cofactors.

Diammonium Phosphate (DAP)

DAP is an excellent source of usable nitrogen for yeasts. It is the primary way to add nitrogen to fermentations. DAP contains 21 % ammonia nitrogen (26 % ammonia as NH₃):

100 mg/L DAP = 26 mg/L NH₃ = 21.2 mg/L N

So, if you add 300 mg/L DAP, a standard dose for some winemakers, this equates to ONLY 64 mg/L N! This is NOT enough for many musts.

TEST JUICE NITROGEN TO GET THE CORRECT DOSE.

DAP is best used in conjunction with yeast products, especially in complex blends like Superfood. Low-nitrogen

This explains the hitherto puzzling observation that when DAP alone is added to some musts, H₂S production is stimulated. It is not that the DAP caused the H₂S (as was once believed), but that DAP did not correct the pantothenate deficiency in the juice.

Other useful vitamins include biotin, inositol, and pyridoxine. Nicotinamide is sometimes added, but an Australian study saw stimulation of acetic acid production by certain yeasts, so we do not include nicotinamide in our blends..

In a survey also done by Dr Edwards' lab on Washington State grapes, they found 10 % of grapes to be deficient in pantothenate, but more than 50 % were deficient in biotin.

If any moulds, including *Botrytis*, have grown on the fruit, or if vineyard yeasts begin the fermentation in the winery, the natural vitamins may be severely depleted.

Unfortunately, testing juice vitamins is not feasible in terms of time or expense, so wineries often use vitamin supplements routinely, or at least in juice from mouldy grapes, straggling vines, or in others that may be at high risk.

musts need EXTRA DAP in addition to the amount contained in Superfood. See addition charts on **page 19**.

Balancing DAP and complex supplements: DAP has been called 'yeast candy' because ammonia is so easily used by yeasts, which deplete the available ammonia supply very early in the fermentation.

ADD DAP IN PORTIONS, NOT ALL AT ONCE!
See pages 19 for additions.

Suggested Dose: See page 19
DAP = 21.2 % ammonia N.

DAP 100 % has 21.2 mg/L N in 100 mg/L

VITAMIX® and SUPERVIT®

To promote yeast health & avoid sulphides: ADD VITAMINS WITH COMPLEX BLENDS, NOT ALONE!

Vitamins make yeasts healthier, promote survival, and have been known to be very useful in preventing sulphides for more than 50 years. Adding a vitamin supplement is good “insurance”.

What's the difference between Vitamix and Supervit?

Vitamix is pure vitamins for yeast.

Supervit has the same vitamins as Vitamix, but also has minerals and natural vitamins in a nutritive base.

Which should you add?

Supervit is best for difficult musts because of its extra minerals.

Vitamix is the choice if you want vitamins only.

- **Thiamine** needed for yeast growth, is very quickly depleted by grape moulds & by non-Sacch. vineyard yeasts.
- **Pantothenate** helps prevent sulphide formation, and plays a role in coenzyme synthesis.
- **Pyridoxine** should be added along with thiamine.
- **Inositol** is required for cell division and stimulates yeast growth rate.
- **Biotin** is crucial to cell survival and metabolism, but yeasts cannot synthesise it.

Vitamix: Pure vitamins

Suggested Dose: 0.1 g/hL (1 mg/L)

Supervit: Vitamin and mineral supplement together in a nutritive base

Suggested Dose: 2.5 g/hL (25 mg/L)

Regulations: Please check the regulations in countries where you export your wine. Some countries have restrictions that are NOT the same as for NZ wineries making wine for domestic sale. Refer to the current New Zealand Winegrowers International Winemaking Practices Guide.

Yeast Nutrient: ASK FOR QUANTITY DISCOUNTS

COMPLEX BLENDS

Item	Rec. Dose	Pack Size
Superfood® (complete yeast nutrient) BEST YEAST NUTRIENT! More effective than other blends in winery & lab trials. Add extra DAP to nitrogen-deficient must.	30-60+ g/hL (300-600 mg/L) (See pages 19 for dose rates)	1 kg 5 kg 25 kg
Superfood® Export Formulated with thiamine as the only added vitamin, to address some countries' restrictive import regulations.	same as Superfood	same as Superfood
Superferm® For high-risk fermentations (do not add extra vitamins)	30-60+ g/hL (300-600 mg/L) (See page 19 for dose rates)	same as Superfood
Startup Export Contains no inorganic nitrogen Add Startup to yeast rehydration water, or add to must with your own DAP, or use it to balance musts that have sufficient N	25-50 g/L IN YEAST REHYDRATION WATER (calculate on water volume not juice) 25-50 g/hL (250-500 mg/L) in juice/ must	1 kg 5 kg 25 kg

INGREDIENTS (available separately but also contained in blends above)

Item	Rec. Dose	Rec. Dose
Yeast Hulls (Nutrex 370) (yeast cell walls) For restarting sluggish ferments	6-12 g/hL (60-120 mg/L)	1 kg 5kg sack (22.7 kg)
Yeast Extract (T-154 aggl.) (primary grown extract) Very nutritious, full of amino acids; add separately if using most other nutrient brands, but not needed if using Superfood.	6-12 g/hL (60-120 mg/L)	1 kg 5 kg sack (18 kg)
DAP (Diammonium phosphate) Inorganic nitrogen source of yeast - NOT for ML bacteria DAP is 21% ammonia nitrogen (100 mg/L DAP = 21 mg/L N). Add in portions over the first half of ferment, not all at once! Calculate addition levels from YAN analysis (see p. 18 & 23).		1 kg 25 kg

VITAMINS

Highly recommended for promoting healthy ferments and preventing sulphides.

Item	Rec. Dose	Rec. Dose
Vitamix® (Pure yeast vitamin blend)	0.1 g/hL (1 mg/L)	100 g 1 kg
Supervit® (Vitamin & mineral blend) For best nutrition add along with complex yeast nutrient blends, including Superfood. Same vitamins as Vitamix.	2.5 g/hL (25 mg/L)	1 kg 10 kg
Thiamine or Pantothenate	0.05 g/hL (0.5 mg/L)	100 g

Nutrient Addition Charts

These charts are intended as general guidelines ONLY! We can recommend specific nutrient supplementation regimes for your wines, on request.

These charts are updated each year in response to new research.

Note that lower Brix grapes need less nitrogen, high Brix grapes more.

ADDITION AMOUNTS AND YAN ARE IN mg/L (100 mg/L = 0.10 g/L = 10 g/hL).

Test juice nitrogen (YAN) or if you cannot get YAN tested, use risk factors on page 21.

Use CHART C if no information on nitrogen content or fermentation history is available.

Use CHART A for cider, mead, perry and other materials with little natural nitrogen.

If nitrogen is adequate or high, use Startup™ to balance components.

ADD LAST DOSE BEFORE 10 °BRIX or test ability of yeasts to still pick up nitrogen (see page 22)

Vitamix (0.1 g/hL; 1mg/L) or Supervit (2.5 g/hL; 25 mg/L) is also recommended but see p. 16

STARTUP OR STARTUP EXPORT MAY ALSO BE ADDED TO YEAST REHYDRATION WATER.

**Recommended
TOTAL YAN levels
(YAN in grapes plus
YAN added)**

23 °Brix: 250 mg/L

25 °Brix: 300 mg/L

> 25 °Brix: 350 mg/L+

Stages of Fermentation

Fermentation Stages: For use with Nutrient Addition Charts on page 19

STAGE 1: At yeast inoculation, or when Saccharomyces yeasts start growing in uninoculated musts (instead of *Kloeckera* and other vineyard yeasts). Growing yeasts need a wealth of nutrients including nitrogen, mineral, vitamins, and survival factors. If nitrogen is limited during growth, fewer cells will be produced.

STAGE 2: Fermentation is fully active and Brix has dropped at least 2 to 3 degrees. At this point the yeasts should have taken up most of the nitrogen present in the juice, especially ammonia N.

STAGE 3: Mid-fermentation, around 10 °Brix. Yeast growth has stopped, but the alcohol is low enough that yeasts can still take up nitrogen. Adding nitrogen at this point helps replenish the supply in the existing cells without leading to production of more hungry cells.

Add nutrients in portions during the first half of the fermentation. **Not all at once!**

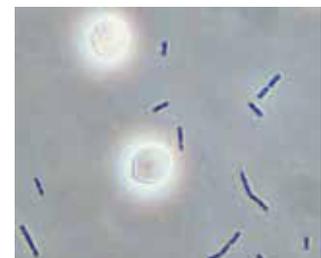
For risk factors, refer to page 21

Fermentation Problems



If any problems occur during fermentation, evaluate the must IMMEDIATELY. At the VERY FIRST SIGN OF SLUGGISHNESS, examine microscopically for bacteria and non-*Saccharomyces* yeasts and check for yeast clumps that could indicate cells in a 'prion' state

Test fermentable sugar (glucose and fructose separately), alcohol, VA, and pH. Do a sulphide trial (below) if there are off odours.



*Lactobacilli spoiling
a stuck wine*

DON'T WAIT! THE SOONER THAT PROBLEMS ARE ADDRESSED, THE MORE LIKELY IT IS THAT THEY CAN BE SOLVED SATISFACTORILY.

Please contact us immediately if you have stuck/sluggish wine.

Sulphide Trial During Fermentation

If sulphides form during active fermentation, do the following short, easy trial to determine whether some nutrient additions could help cure the problem.

Take out some must. Divide it into 4 portions, in containers that can be loosely covered.

Make the following additions:

1. Control – no addition
2. Nitrogen addition: Add a small amount of Superfood or DAP
3. Vitamin addition: Add a small amount of Vitamix or pantothenate
4. Nitrogen and vitamins: Add Superfood or DAP, AND Vitamix or pantothenate

Swirl all 4 samples equally, cover loosely and wait at least 1 hour.

Evaluate for reduction in H₂S and other sulphide odours.

Make any additions that noticeably reduce the sulphide odours.



High Risk

	Choose one Nutrient	Total Nutrient Dose (mg/L)	YAN (mg/L)	Total DAP Dose (mg/L)	YAN (mg/L)	Stages	Nutrient additions (mg/L)	DAP additions (mg/L)
Chart A	SUPERFERM	500 mg/L	42	500 mg/L	106	1	200	100
	FOR INITIAL JUICE YAN 100 mg/L (Also use this chart for 150 mg/L YAN @ 25+°Brix)					2	100	200
						3	200	200
	SUPERFOOD	500 mg/L	50	450 mg/L	95	1	200	100
	and Superfood Export					2	100	200
						3	200	150
	STARTUP	400 mg/L	24	625 mg/L	132	1	200	250
	and Startup Export					2	100	125
						3	100	250

Moderate Risk

	Choose one Nutrient	Total Nutrient Dose (mg/L)	YAN (mg/L)	Total DAP Dose (mg/L)	YAN (mg/L)	Stages	Nutrient additions (mg/L)	DAP additions (mg/L)
Chart B	SUPERFERM	400 mg/L	33	325 mg/L	69	1	100	0
	FOR INITIAL JUICE YAN 150 mg/L (Also use this chart for 200 mg/L YAN @ 25+ °Brix)					2	100	125
						3	200	200
	SUPERFOOD	400 mg/L	40	300 mg/L	64	1	100	0
	and Superfood Export					2	100	100
						3	200	200
	STARTUP	300 mg/L	18	400 mg/L	85	1	100	100
	and Startup Export					2	100	100
						3	100	200

Mild Risk

	Choose one Nutrient	Total Nutrient Dose (mg/L)	YAN (mg/L)	Total DAP Dose (mg/L)	YAN (mg/L)	Stages	Nutrient additions (mg/L)	DAP additions (mg/L)
Chart C	SUPERFERM	300 mg/L	25	100 mg/L	21	1	0	0
	FOR INITIAL JUICE YAN 200 mg/L (Also use this chart for 250 mg/L YAN @ 25 °Brix)					2	100	0
						3	200	100
	SUPERFOOD	300 mg/L	30	50 mg/L	11	1	0	0
	and Superfood Export					2	100	0
						3	200	50
	STARTUP	250 mg/L	15	100 mg/L	21	1	0	0
	and Startup Export					2	100	0
						3	150	100

Low Risk

Chart D	STARTUP	250 mg/L	15	0	0*	1	125	0
	and Startup Export					2	0	0
	FOR INITIAL JUICE YAN 250+ mg/L (Also use this chart for >250 mg/L YAN @ 25+ °Brix)					3	125	0

*DO TRIAL WITH DAP IF H₂S FORMS

Yeast Extract (T154)

Yeast extract is the soluble material (including free amino acids and micronutrients) remaining after separating out the insoluble yeast hulls.

Yeast extract is used in many microbiological media recipes because of its rich nutrition, and is also PERFECT FOR YEAST AND ML FERMENTATION OF WINE.

T154 is a full autolysate high in amino acids in the proportions used by yeasts. It also supplies natural vitamins, micronutrients, and other yeast components in an easily soluble form, so nutrients are available instantly to yeasts.

Yeast Hulls (Nutrex 370)

Yeast Hulls (also called cell membranes, yeast cell walls, yeast ghosts, enveloppes cellulaires) are the insoluble cell membranes left after separating out yeast extract.

They are very beneficial to fermentations, adsorbing pesticide residues, toxic short-chain fatty acids (C8-10) and other inhibitory byproducts. Yeast hulls also provide sterols and long-chain fatty acids to build healthy cell membranes that help delay alcohol toxicity.

Yeast hulls are a key element in many nutrient blends, and are also added separately late in fermentation to stimulate stuck or sluggish ferments.

Yeast Extract is a key to Superfood's great and enduring success, and the success of our other nutrients.

Why don't other yeast nutrients contain yeast extract?

Most yeast extracts are designed to enhance meaty toasty flavours of hearty soups and stews, so they taste too strong to add to wine. Extracts made from brewers' yeast can be bitter or rancid-tasting. *But T154 is produced to minimise sensory qualities, so it does not give offflavours to the wine.*

T154 is agglomerated to reduce its very hydroscopic nature, but if exposed to air it will become sticky and then harden. If hard lumps form, it cannot be used.

**Suggested Dose if added separately: 6-12 g/hL (60-120 mg/L)
Supplies 9 mg/L YAN at 10 g/hL (100mg/L)**

Famed French oenologist Pascal Ribereau-Gayon considered yeast hulls to be the most helpful product for preventing or treating stuck ferments.

Nutrex 370 comes from the same procedure as T154, so it has VERY neutral sensory qualities, without cheesy odours or aggressive flavours that mar some other brands of yeast hulls.

**Suggested Dose if added separately:
12-30 g/hL
Supplies 1 mg/L YAN
at 10 g/hL**



Yeast Hulls

DO YEAST HULLS PROVIDE NITROGEN? NO, VERY LITTLE.

Yeast hulls, no matter what the source or supplier, have very little YAN, though they are high in total nitrogen. Most of the amino acids are tied up in mannoproteins and other proteins, which are not digested by yeasts. Soluble material (including free amino acids) is removed during production, to make yeast extract. Yeast hulls are a wonderful product, but not a source of nitrogen for yeasts, so they can be added directly to stuck and sluggish ferments.

Nutrient Supplementation Q&A

Questions

1. Where do I start?
2. Risk factors: What do they mean?
3. How do I use the addition charts?
4. When do I add this stuff and why?
5. Is it possible to supplement too much?
6. Will someone help?



Test YAN (assimilable 'nitrogen) and bring to recommended level (250 mg/L at 23 °Brix, 300-350 at 25 °Brix) or stuck ferments may occur even if musts have been supplemented

#1 Where do I start? Test Juice YAN

It is very important to measure juice nitrogen, not just guess, because grape nitrogen levels vary so much. Adding the same amount of nutrients to all musts is a recipe for disaster, because - as in "Goldilocks" - some musts will receive the right amount, but some will be underfed while others will have too much. Even the same variety in the same region can have wide differences in YAN values.

Test **alpha-amino nitrogen** (NOPA) by spectrophotometer (enzymatic method or method by Dukes & Butzke, 1996) and ammonia nitrogen (enzymatic or specific ion; multiply by 0.823 to convert **ammonia to ammonia nitrogen**). **The sum is called "Yeast-Available Nitrogen" (YAN)**. Subtract juice YAN from the recommended levels on the charts to obtain the amount of nitrogen to add.

Nitrogen tests MUST be run before ANY yeast growth at all occurs, added or not, or the results are useless. Yeasts deplete nitrogen very quickly, invalidating the test.

Freeze samples, add several hundred mg/L SO₂ to protect juice from fermentation if not testing immediately. Inform us of any SO₂ additions on completed Analysis Request form. Samples may be kept in the freezer and sent in batches for testing, to qualify for quantity discounts. **PLEASE CONTACT US to discuss juice stability in transit before sending samples for YAN! DO NOT SEND JUICE SAMPLES ON FRIDAYS!** See page 39.

**Recommended final levels for YAN
JUICE YAN PLUS ADDED YAN
YAN (mg/L) = Ammonia N + Alpha-amino N**

**21 °Brix or less: 200 - 250 mg/L YAN
23 °Brix: 250 - 300 mg/L YAN
25 °Brix: 300 - 350 mg/L YAN**

**Lower Brix grapes need less nitrogen,
Higher Brix grapes need more.**

**SUBTRACT INITIAL JUICE YAN FROM
RECOMMENDED YAN TO FIND YAN TO ADD**

#2 Risk Factors: What do they mean?

There is a large range in grape nitrogen levels, and in yeast needs for nitrogen. This is not surprising, because there is no evolutionary pressure for a vine to grow nutritionally balanced grapes. The purpose of fruit is to attract birds at the right time for seed dispersal. In general, dry soil and/or water stress significantly reduce berry nitrogen (not the same as vine nitrogen). Vine diseases or deficiencies, and low vigour, also reduce berry nitrogen.

In the winery, some factors increase yeasts' nitrogen needs. High Brix and hot fermentations are the two most important. Some yeast strains use up to twice as much as other strains. And if moulds or non-*Saccharomyces* yeasts grow, all the natural nitrogen and vitamins may be depleted before *Saccharomyces* can dominate the fermentation.

Risk factors for low grape nitrogen

- Varietal (Merlot, Riesling, Chardonnay, etc)
- Newer rootstocks (rootstocks other than ARG-1)
- Poor or infertile soil
- Water stress or drought year (drier vineyards have lower YAN than wetter ones)
- Low-vigour, struggling vines
- Signs of nutrient or mineral deficiency in vine
- Vine diseases (phylloxera, Petri disease, etc)
- Long hang time or grapes starting to dehydrate

Reasons for higher nitrogen needs by yeast

- Grape diseases (mould, rot)
- HIGH-SUGAR GRAPES (25+ °Brix)!
- History of stuck ferments or H₂S
- Clarified juice (fined/filtered)
- Sparging juice with CO₂, N₂ or argon
- Yeast strain with high N requirements
- No yeast added
- Hot fermentations!
- ML inoculation before dryness
- ANY OTHER REASON to anticipate a sluggish ferment

If Brix is over 25, adjusting it downward can prevent stuck ferments. Contact us.

Nutrient Supplementation Q&A

#3 How do I use the charts?

The charts are intended as general guidelines ONLY!
Doses depend on MANY factors, some listed above.
These charts are updated in response to research.

The charts, based on juice YAN, show AVERAGE doses for our complex blends.

SUPERFERM - for high-risk fermentations
SUPERFOOD - for most premium wines
STARTUP - use with your own DAP, or when juice nitrogen is adequate or high.

Using the charts:

1. Find the chart for your juice YAN
2. Select the nutrient blend you will use.
3. The total mg/L of the complex blend to add, PLUS extra DAP, are listed, along with the YAN provided by the additions.
4. Look on the right at the three fermentation stages, to determine how much to add and when (stages explained p. 18)

ADJUST ADDITIONS IF FERMENT IS TOO FAST.

We can recommend specific nutrient regimens for your wines, on request.

#4 When do I add this stuff and why?

Yeasts need nitrogen during growth phase and throughout fermentation, but the cells cannot take up nitrogen late in fermentation, **so timing of supplementation is crucial!**

Raising juice nitrogen: In grapes, alpha-amino nitrogen is naturally 2 to 3 times the ammonia nitrogen, but in yeast nutrients ammonia from DAP provides most or all of the usable nitrogen. DAP is called 'yeast candy' because yeasts use ammonia so easily. They deplete the supply during growth phase and very early fermentation. The more ammonia, the more yeast cells are produced ("biomass"), which all continue to need nitrogen throughout fermentation.

Balancing DAP and complex nutrients: Adding complex nitrogen sources derived from yeasts help balance ammonia. Alas, legal amino acid sources – yeast extract and protein digests – have negative flavour impact at high enough doses, so organic supplements cannot completely restore the balance of amino acids and ammonia, though they certainly do help.

Yeasts need amino acids: Ammonia represses uptake of amino acids. Too much DAP, especially at the beginning, can prevent use of some amino acids, arginine, in particular. Leftover arginine is an ethyl carbamate precursor, and can feed spoilage microbes like *Brettanomyces* and *Lactobacillus*. Amino acids are also aroma and flavour precursors necessary for the wine's sensory profile. Adjust nutrient supplement timing so that the yeasts "eat their amino acids" instead of "spoiling their dinner" by gorging on ammonia first.

AT YEAST REHYDRATION

You can add a supplement made from yeast, without DAP (such as Startup) to water before rehydrating yeast in it. This gives yeasts a boost for a fast, active start. **Many wineries are used to adding other products to the yeast rehydration water but in trials, ours work at least as well at a much lower cost.**

IMPORTANT: YOU SHOULD TEST JUICE NITROGEN and adjust the nitrogen to recommended levels (see chart on page 18), or the 'jump-started' yeasts can slow down or stop when they run out of nitrogen later on.

AT YEAST INOCULATION

If grape YAN is below 150 mg/L, add some supplements when you add yeast (or when encouraging a spontaneous ferment). At or over 150 mg/L, delay the first addition until fermentation has begun.

DURING THE FIRST HALF OF FERMENTATION

Add the rest of the supplements, including extra DAP IN PORTIONS, during the first half of fermentation. It is VERY IMPORTANT TO ADD SUPPLEMENTS GRADUALLY INSTEAD OF ALL AT ONCE! Make the last addition of DAP, or of supplements containing DAP, at or just after mid-fermentation, to give yeasts nitrogen after they have stopped growing, but while they can still take up nitrogen. Despite the inconvenience, it is MUCH better to make multiple additions of products, especially those in which the nutrients are immediately available and do not have to leak out of partly autolysed cells or dissolve slowly.

If H₂S forms during fermentation, do a simple trial (page 18) to determine if DAP or vitamin addition will help.

LATER IN FERMENTATION

In the later stages of fermentation, yeasts lose the ability to intake nitrogen because of inhibitory effects of alcohol. When is that point? It varies... yeasts may stop taking up nitrogen by 10 °Bx, but sometimes they can take up nitrogen later on.

Adding nitrogen to already sluggish/stuck musts does not help, and can hurt the wine. Leftover nitrogenous nutrients of any type, which were not used up because they were added too late in the fermentation, can stimulate spoilage microbes later (*Brettanomyces*, *Lactobacillus*, *Pediococcus*). **Leftover DAP tastes terrible and raises pH. Never add nitrogen-containing nutrients directly to stuck/sluggish wine;** add them to reinoculation starters (ask for restart procedure).

Yeast Hulls are good to add directly to stuck fermentations because they adsorb toxins but contain very little usable nitrogen.

Nutrient Supplementation Q&A

#5 Is it possible to supplement too much?

YES. Additions of DAP, or nutrients containing DAP, should be based on juice YAN levels, not just on an “average” recommendations. **Test YAN and use the charts on page 19.**

What’s wrong with adding too much nitrogen, or adding all the inorganic nitrogen (DAP) at once?

A large influx of nitrogen as DAP throws the cell’s metabolism off balance, potentially leading to overgrowth of yeasts, runaway fermentation, flavour problems, nitrogen wasting, and leftover amino acids.

1) Yeast cell growth (biomass) depends on nitrogen content before fermentation, when yeasts are growing. Too much nitrogen available then leads to a lot of cells which then become “hungry” later on when nitrogen runs out.

2) Fermentation rate also depends on nitrogen. With too much DAP, yeasts may ferment too fast and too hot (they can even kill themselves with the heat, causing stuck fermentations). Also, fast or hot fermentations often have less complexity and less fruity aromas. An Australian study found that normal nitrogen levels made wines with better sensory characteristics than the same must with too low or too high nitrogen.

SUMMARY:

- If yeasts have too much nitrogen while growing, yeasts can produce too many cells, which get “hungry” later on, when they have depleted the nitrogen
- Yeasts without enough nitrogen for their needs may stick and/or produce H₂S.
- Yeasts may ferment too fast and too hot, and may even kill themselves with the heat.
- Some yeast strains waste nitrogen if there is too much DAP available at the start of fermentation.
- Fast or hot fermentations often have less complexity and less fruity aromas.
- Too much DAP can result in incomplete use of grape amino acids, stimulating spoilage microbes.

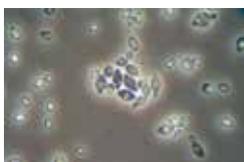
#6 Will someone help?

YES WE WILL! We can often quickly diagnose problem ferments and recommend treatment. We are glad to assist in planning nutrient supplementation, and to work with your fermentations. **Call or email info@pros.co.nz**

Supplementing Un-inoculated Fermentations

SEE PAGE 10 for discussion of non-*Saccharomyces* yeast species.

Kloeckera apiculata (*Hanseniaspora uvarum*) is ubiquitous and is often the most plentiful species on grapes, but many other species can be involved at the beginning.



Kloeckera

Although they are active for only a short while, these non-*Saccharomyces* yeast species can have long-lasting effects, sometimes good... sometimes not.

‘WILD’ VINEYARD YEASTS ARE NOT THE SAME AS SPECIALLY SELECTED NON-SACCHAROMYCES YEASTS PRODUCED BY MAJOR YEAST COMPANIES IN CONTROLLED CONDITIONS.

Some winemakers prefer to encourage ‘spontaneous’ fermentation by not inoculating with cultured yeast. In such ferments, the large numbers of *Saccharomyces* yeast populating wine cellars usually predominate eventually.

Until then, undesirable vineyard yeast species may deplete nutrients and vitamins, and produce off-characters including acetic acid, which acts synergistically with alcohol to cause stuck fermentations.

The nutrients and vitamins must be replenished, but at a time when *Saccharomyces* is growing, not just the ‘wild’ vineyard yeast species.

We recommend examining uninoculated fermentations, or ANY must if an ethyl acetate or banana smell is detected, under a phase-contrast microscope once or twice daily during the first few days after crushing, until the round/ovoid *Saccharomyces* yeasts have taken over.

Do a methylene blue stain for viability at the same time, to confirm that the other yeast species are dying off. Take an unstirred racking valve sample, and a stirred sample, to see yeasts that have already settled out.

Even if they are dead, these yeasts will be seen microscopically, and their proportion can be estimated. A non-*Saccharomyces* population of more than around 10% often indicates an unhealthy fermentation that may stick.

Supplementation with Superfood, PLUS Vitamix or Supervit, and extra DAP if needed, should begin when *Saccharomyces* can be seen under the microscope and are growing up, not before.

If a microscope is unavailable, add the first portion of nutrients after an initial Brix drop of 1-3 degrees if there is no ethyl acetate smell, and add the rest of the nutrients in portions until mid-fermentation. If ethyl acetate, banana, or other off-odours persist, call us immediately!



Saccharomyces

FREEZE-DRIED BACTERIA

Chr. Hansen ML Cultures



Chr. Hansen direct inoculation cultures need NO STARTER preparation!
Just add the packet in dry form plus the appropriate nutrients (Leucofood) to must or wine.

Unopened packets last at least 3 years in the freezer.

Once opened, tape packets tightly closed and return to the freezer; use them during the same vintage.

Note: The manufacturer may run out of Viniflora late in the harvest season, so it's wise to order ahead! It's OK if you don't use it that year; unopened packets last 3 years in the freezer.

Viniflora Oenos (red/white/rose)

This is a versatile strain, intended for most wines. We have had great success with this culture on many kinds of wines, since 1992. It has good all-round tolerance and a clean, classic flavour profile.

Viniflora CH-11 (red/white/rose)

Specially selected for its tolerance to low-pH or temperature (not both at once). Do not exceed 45 mg/L total SO₂ at inoculation (be sure to test SO₂ level).

Viniflora CH-16 (red/rose)

Best for higher alcohol red wines, CH-16 was selected from a California Syrah to conduct MLF at alcohols of up to 16 % (depending on other factors) with pH above 3.4. It is the best bacterium to use for reds with 14+ % alcohol.

Viniflora CH-35 (white/rose)

CH-35 was selected for MLF in difficult white wines, and is more tolerant to low pH and SO₂ than most strains. It is the best choice for wines fermented with bayanus yeast strains or strains producing larger amounts of SO₂. Also use CH-35 if lysozyme has been added to help prevent ML spoilage during yeast fermentation.

Viniflora CiNe (white/rose/red/sparkling wines)

CiNe does not produce diacetyl, so it retains freshness and fruitiness, without adding a buttery note. Many wineries are excited about having MLF without the 'buttered-popcorn' odor. It is more sensitive to SO₂ than some other strains.

	Wine	Temp	Alcohol (max)	pH (min)	Total SO ₂ (max)	Application
Viniflora® Oenos	White, Rosé, Red	17-25 °C	14 %	3.2	40 mg/L	For most wines
Viniflora® CH16	Red, Rosé	17-25 °C	16 %	3.4	40 mg/L	For high alc. wines
Viniflora® CH11	White, Rosé, Red	14-25 °C	15 %	3.0	35 mg/L	For low pH wines
Viniflora® CH35	White, Rosé	15-25 °C	14 %	3.1	45 mg/L	For higher SO ₂
Viniflora® CiNe	White, Rosé, Red	17-25 °C	14 %	3.2	30 mg/L	No diacetyl!

IMPORTANT NOTE ABOUT DISPATCH OF FREEZE DRIED ML CULTURES

These cultures are perishable, are shipped overnight and need to be put into a freezer upon arrival.

Dispatch: Viniflora cultures can survive warm temperatures for at least a week, but we do not dispatch them over summer weekends, to be on the safe side.

Pack Size	
Small (~1.5 g) For up to 250L	Viniflora Oenos CH35 + CH16
Medium (~15 g) For up to 2500L	All Strains
Large (~150 g) For up to 25000L	Viniflora Oenos CH35 + CH16

Discounts available for orders over 4 packets

ML Nutrients

BACTIV-AID 2.0

Bactiv-Aid 2.0 is a new generation MLF nutrient. Produced from inactivated yeast, Bactiv-Aid 2.0 has a two-fold effect on malolactic bacteria. It ensures that there is a sufficient level of organic nitrogen for MLF, by being rich in the particular amino acids required, giving a Bacterial Assimilable Nitrogen (BAN) level of at least 60mg/L. Bactiv-Aid 2.0 is

also very effective at binding medium-chain free fatty acids which can be very inhibitory to populations of *Oenococcus oeni*.

Bactiv-Aid 2.0 is strongly recommended when running MLF in the following situations; MLF in highly clarified wine, when there is a delay between primary fermentation, MLF in low pH wines such as sparkling base.

LEUCOFOOD

Our rich mixture of primary-grown yeast extract, casein digests, vitamins, and minerals **helps any ML bacteria grow and survive.**

Blended especially for ML bacteria, Leucofood is richer than any other ML nutrient and is NOT the same as yeast nutrients. Unlike yeasts, ML bacteria cannot synthesise all the amino acids they need, so they need them in the wine.



**Viniflora oenos
ML bacteria**

Wines having trouble completing MLF despite favourable conditions are often depleted of nutrients and will need Leucofood. **Use it with any ML strain or preparation.**

ML Nutrients	Suggested Dose	Pack Size
Bactiv-Aid 2.0	12 g/hL 120 mg/L	Medium for up to 2500 L (300g) Large for up to 25 000 L (3 Kg)
Leucofood™	5-10 g/hL (50-100 mg/L)	100 g 1 kg

LIQUID OAK TANNIN

Liquid Oak Tannin contains only water and tannins from French oak, with an SO₂ stabiliser. Unique flavors are extracted with different toasting methods in a distillery near Cognac, France.

Tannins are not a substitute for traditional oak. They provide structure and mouthfeel with hints of oak flavors.

**These tannins are VERY different from other oak extracts!
ASK FOR A SET OF FREE SAMPLES - YOU MUST DO TRIALS BEFORE ORDERING.**

FILTRATION: These oak extracts contain tannins and other components that may interact with wines, ESPECIALLY WHITES, to form sediments.

Do not add these or any other tannins after final filtration. Polish filtration may be needed after oak concentrate addition, before testing for filterability.

KEEP REFRIGERATED - SHELF LIFE 1 YEAR

Vanilla

Vanilla uses a different toasting method (80 g tannin/liter), and is a dense concentration of the vanillin present in oak. Aside from giving a slight vanilla accent, it also produces a very smooth - almost creamy - addition to a wine.

Usage: The application rate varies from 1 L of oak concentrate for 3,000 to 10,000 L of wine.

Fruit Enhancer PLUS

Fruit Enhancer PLUS replaced our Cherry/Oak Tannin, with more proanthocyanidic tannin components to accentuate a ripe berry/black cherry character and a fruity, aromatic style. It has to be carefully trialed to find the dose, as it will have a strong influence on the character of red wine.

Usage: Dosage for just a touch of flavor starts at 1L/4000 L of red wine, 500 ml/4000 L for white.

Fruit Express

The primary use is to add structure and mouthfeel to red and white wines. These tannins are partially polymerised, softening existing tannins in the wine. Liquid Oak Tannins will recreate some of the characteristics of extended barrel storage, but in much less time.

Usage: Variable use from 1 L / 1,500 - 5,000 L of Red wine, and 1 L / 2,100 - 7,000 L of White wine

Mocha

Mocha has 10 g of tannin / liter of concentrate. It brings out the character of a heavy toast barrel, slightly smokey with chocolate-coffee undertones.

Usage: Approximately 1 L / 1000 L of red wine, 500 ml/1000 L in white wines.



ENZYMES

Oenobrand



Enzymes - What can they do for us?

While using enzymes in winemaking is far from new, many winemakers do not fully realise the positive impact that the correct application of winespecific, specialised enzymes can have on the finished product.

Note: Bentonite fining inactivates ALL enzyme products. DO NOT add enzymes when there are bentonite lees present, and wait until the desired effect has been achieved before adding bentonite. To stop enzyme activity, or to prevent activity from re-suming after blending with untreated wine, add bentonite at the same dose as the enzyme..

RAPIDASE EXTRA COLOR

For reds

This pectinase enhances red wine colour and mouthfeel. It cannot add colour not present in the skins, but aids in extracting pigments and stabilising them, and helps with settling and clarifying. Rapidase Extra Color is often used in Pinot Noir, but other red varieties can also benefit.

RAPIDASE EXTRA FRUIT

For supple, fruity reds

Maxifruit gives targeted extraction of polysaccharides, aromas, tannins, and anthocyanins, and absorbs bitter tannins. It helps to make colour-stable, well-rounded wines that are softer and fruitier, less bitter or astringent. **Use Rapidase Extra Fruit along with Fermicru XL.** The sequential enzyme activity improves the effects of both.

ENZYME ACTIVITY

- Enzymes are special proteins that cause a reaction but are not consumed in the process, so their effects continue until they are inactivated or destroyed.
- Enzymes act more quickly at warmer temperatures (activity doubles with every 10 °C rise).
- After opening, store dry enzymes tightly closed, in the refrigerator.
- Shelf life 1-1.5 years.

RAPIDASE CLEAR (LIQUID), RAPIDASE CLEAR (DRY)

For white juice only

These enzymes help break down grape pulp to release juice, making pressing and settling easier and increasing yields. Pectinase is essential when making wine from most fruits, but it is also useful for grapes, especially hard-tops varieties. **Store Rapidase Clear Liquid refrigerated.**

RAPIDASE BATONNAGE

For improving filterability

This enzyme, with pectinase and beta-glucanase activities, promotes better filtration and reduces the need for filter aids by specifically hydrolysing filter-fouling colloids, including glucans produced by Botrytis.

RAPIDASE EXPRESSION AROMA

For fruity white wine

Another matched enzyme-yeast combination unique to Oenobrand. Use along with Cepage Sauvignon or 4F9 to produce more 'forward' white wines in a fruity style.

Enzyme	Suggested Dose	Pack Size
Rapidase Extra Color (Ex-Color)	1-5 g/hL (10-15 mg/L)	100 g 1 kg
Rapidase Extra Fruit (= Maxifruit)	30-40 g/tonne	100 g
Rapidase Batonnage (= Glucalees)	2-5 g/hL (20-50 mg/L)	100 g
Rapidase Clear (liquid) (= Vino Super) Rapidase Clear (dry) (= CX)	5-30 g/tonne (g of liquid) 10-15 g/tonne (g of powder)	1 kg Liquid 100 g pack
Rapidase Expression Aroma	20-40 g/tonne	100 g
Rapidase Revelation Aroma (= AR2000)	3-5 g/hL (30-50 mg/L)	100 g (new size)
Claristar	100 mL/hL (1 ml/L)	2.5 litre Liquid
Delvozyme (lysozyme)	10-50 g/hL (100-500 mg/L)	100 g 1 kg

RAPIDASE REVELATION AROMA

For enhancement of floral aromas

In some grapes, potential aromas are bound up as odorless glycosides. Splitting these bonds enzymatically releases free terpenols, enhancing fruity or flowery aromas.

Aromatic whites or whites without intense aromas are enhanced by Revelation. Syrah, Merlot, and Pinot Noir also respond well. Chardonnay and Cabernet show little change, and Sauv. Blanc and Semillon are not improved.

Treat whites before bentonite fining if possible (never add enzymes with bentonite present!). Treat reds several months before bottling, or phenolic instability may result.

If a portion of a blend is treated with Revelation add bentonite (same dose as the enzyme) to the treated portion to inactivate the enzyme, or it will resume activity when untreated wine is blended in.

In lab trials an effect is noticed overnight, but at cellar temperatures aromas develop over several days to 2 weeks. Clarity may also be improved, and a sediment forms.

Revelation Aroma should be added after yeast fermentation.

CLARISTAR

Claristar™ is a specific mannoprotein fraction extracted from yeast (*Sacch. cerevisiae*).
For tartrate stabilisation



Claristar is a solution of high Tartrate Stability Index mannoproteins extracted from *Saccharomyces* yeast. It confers tartrate stability on white and rose wines by the natural action of components of the yeast cell wall, without refrigeration. Add Claristar after fining and after cross-flow filtration. It does not affect the sensory properties of the wine.

Claristar is a LIQUID. Normal dose is 100 mL/hL (1 ml/L). Unopened, keep refrigerated or frozen for up to 12 months (thaw only once). Once opened, keep refrigerated and use within 1 week.

Please call us to discuss the use of Claristar™ and how we can assist with trials.

DELVOZYME (Lysozyme)

For use against lactic acid bacteria

Lysozyme is a natural protein extracted from egg whites. It is effective against many gram-positive bacteria, including most lactic acid bacteria in wine. Lysozyme will NOT inhibit yeast or gram-negative bacteria such as *Acetobacter*.

Sensitive wine bacteria:

- Some strains of *Oenococcus oeni*
- *Pediococcus* sp.
- *Lactobacillus* sp., most species/strains

Lysozyme is used against sensitive strains of *Oenococcus* to help prevent MLF where it is undesirable. Lysozyme is very effective against *Pediococcus*, which otherwise must be filtered out before bottling, because these bacteria can often grow in dry wine that is finished MLF.

The most important use of Lysozyme is to prevent attack by several species of Lactobacilli while sugar is present. These Lactobacilli produce acetic acid from sugar, and can also inhibit yeast fermentation. It is a common, devastating type of spoilage in sluggish or stuck wines. Unfortunately, any procedures to encourage yeasts will also encourage *Lactobacillus* spoilage.

Wineries with a history of stuck wines, or trouble with *Lactobacillus*, are advised to add 100 mg/L lysozyme before yeast fermentation to restrict growth of 'ferocious' Lactobacilli. After dryness, inoculate the lysozyme-treated wine for MLF with CH-35, a lysozyme-resistant strain.

Most Lactobacilli are sensitive to lysozyme (though perhaps not all). Monitor treated wines microscopically on a regular basis, and test VA frequently, to check that a resistant strain has not grown.

Suggestions for lysozyme use:

Lysozyme dose is based on bacterial population; higher numbers require higher doses. It is best to add lysozyme prophylactically, before maximum bacterial growth.

Before fermentation

100-125 mg/L (10-12.5 g/hL) to high-risk musts
High-risk musts:
If Lactobacilli have caused trouble in past vintages
pH > 3.6 after soaking on skins overnight
No SO₂ before fermentation
Grapes in poor condition
No yeast inoculation
Inoculate after dryness with Viniflora CH-35

During fermentation

200 mg/L (20 g/hL) at the VERY first sign of Lactobacilli

Stuck wines

Reds, and whites pH 3.4 or >
150 mg/L (15 g/hL) if NO Lactobacilli are seen
300-500 mg/L (30-50 g/hL) if Lactobacilli are seen
(dose depends on bacterial population)

Mode of action: Within minutes, the enzyme attacks and degrades bacterial cell membranes. Some bacteria are dead but not visibly affected, some remain recognisable but are debilitated, while others are completely pulverised & vanish.



Lysozyme binds to red phenolics, reducing its activity after a few days to weeks. If the wine is reinfected with spoilage bacteria after the lysozyme is bound up, the bacteria may grow anyway. For example, lysozyme during fermentation does not protect wine from bacterial growth in the bottle.

Colour, flavour, and other changes: Because Lysozyme combines with certain phenolics, in some red wines it can reduce pigments. In our experience, colour changes are usually minor, though clarity is much improved. The flavour impact on the wine is similar to an egg white fining. Winemakers often prefer treated wine to untreated samples.

We advise doing a bench trial before adding lysozyme, if time permits. Examine the samples under a phase-contrast microscope to assess the effect on the bacteria. However, Lactobacilli grow poorly in culture, so it is not possible to check viability by culturing.

If a wine that is not dry is attacked by Lactobacilli, add lysozyme immediately, without waiting for bench trials!

Bottling:

250-500 mg/L before bottling unfiltered
If wine is not finished MLF (Caution! Lysozyme does not kill all lactic bacteria!) If *Pediococcus* are present (can grow even if wine is dry and MLF is complete)

Cautions for lysozyme use

- Do not add metatartaric acid if you use lysozyme.
- Do not add lysozyme with bentonite lees present.
- Add lysozyme at least 3 weeks before bottling, to allow time for sediment precipitation.
- Lysozyme may cause protein instability in whites.
- A large dose of bentonite maybe required to achieve protein stability

Figure 1
Lactobacilli prior to treatment with Lysozyme



Figure 2
Post treatment, the cell walls are ruptured

FOR THE CELLAR

Cellar Chemicals

	Item	Pack Sizes
	PMS (potassium metabisulphite) in vacuum pack Make sure you have fresh PMS anytime that critical SO ₂ additions are needed.	
	Sulphur sticks (approx 50 sticks per kg – ¼ to ½ stick needed per barrel)	each 1 Kg

Cellar Supplies

	Item	Pack Sizes
	Airlocks, plastic (stoppers NOT included) 1. Double Bubble (replaced Triple Ripple) 2. Cylindrical, 3-piece	each pk 50
	Airlock stoppers Drilled #10.5 (54mm/46mm) Drilled #11 (56mm/48mm)	each pk 50
	Hydrometer, Brix, no thermometer [305mm] 0/30 -5/+5, -1/11, 9/21, 19/31 Set of 3 (-1/11, 9/21, 19/31)	each set of 3
	Hydrometer, Brix, with built in 0-50 °C thermometer 0/30 [380mm – needs tall cylinder] -5/+5, -1/11, 9/21, 19/31 Set of 3 (-1/11, 9/21, 19/31)	each set of 3
	Hydrometer cylinder, Nalgene plastic, 380x50mm (500ml)	
	Funnel, plastic 30cm diameter (BIG!) with strainer (see photo)	each
	Floating Thermometer, red spirit (no mercury) C/F scale -20 to 100 °C	each
	Liquid Oak Concentrates, from French oak (1 liter size; page 25) Mocha (coffee/chocolate, heavy toast) Vanilla Fruit Enhancer PLUS (cherry/berry character) Fruit Express	each
	Wine Thieves 1. Plastic, 19" (125 cm), 3 part 2. Economy, glass, no handle, 12" (30 cm) 3. Pyrex glass, 16" (41 cm), D-ring (angled or straight)	each

FOR THE LAB

Most of these items are usually available ex-stock, or can be prepared within 1-2 days.

There can be a delay in obtaining imported items if supplies become exhausted. We may be able to obtain other chemicals, please enquire.

AR = Analytical grade FG = Food grade

Note: Certain hazardous chemicals (marked by **HazChem**) have special shipping requirements, so they **CANNOT be sent by air**, which can cause unavoidable delays in delivery.

Lab Chemicals and Supplies

Item	Comments	Size	Size	Shelf Life
A/O SO₂ Indicator	Our formula: sharp colour change from purple to green. Start point and endpoint are grey-blue.	15 ml 30 ml	50 ml 100 ml	6 months (in dark place) OR until colour test fails
Antifoam (Food Grade)	To prevent foaming in must, and while testing lab samples.	15 ml 500 ml	50 ml 1 L	Refer to COA or 6 months
Ascorbic acid	1% - Used in sulphide kits.	50 ml		Discard when yellow. Keep refrigerated
Bottles (for samples)	Brown plastic (caps included) (Case prices available - inquire) Sterile	50 ml 200 ml 1 L 500 ml	100 ml 500 ml	Indefinite
Brix 20° Solution	To adjust refractometers and calibrate hydrometers.	vial + pipette	250 ml	3 months or until mouldy. Refrigerate.
Cadmium sulphate [HazChem]	0.05% - Used in sulphide kits.	50 ml		1 year unopened – POISON!
Reducing Sugar Tablet kit [HazChem]	Kit includes 36-tablet bottle, pipettes x1, test tubes, colour chart and instructions A dessicator pack is sent with bottles	kit each		As indicated on bottles
Copper II sulphate (Food Grade) 0.05 % or 1 % solutions Crystals/powder	For treating sulphide odours	50 ml 500 ml 100 g 1 kg	100 ml 500 g	1 year opened Refer to COA
Dropper tips	For 50 & 100 ml bottles	each	each	N/A
Hydrochloric Acid 0.01N or 0.1N	For standardising NaOH solutions	50 ml 250 ml	100 ml 500 ml	1 Year
Hydrogen peroxide 30 % [HazChem] Food Grade	For SO ₂ analysis & for SO ₂ reduction in wine	50 ml 250 ml	100 ml 500 ml	Refer to expiry date-keep refrigerated
Hydrometers, brix	See Cellar Chemicals & Supplies			N/A

Lab Chemicals and Supplies

Item	Comments	Size	Size	Shelf Life
ML Chromatography				
ML Chrom. kit (contains paper, solvent, capillary tubes, acid stds)	Self-contained unit for monitoring MLF – Instructions included	without jar	ask for suggestions for suitable jars	
Components: Whatman paper #1 (19 x 23 cm)	Leave in solvent 6-8 hours	10/pk	25/pk	Note: Chromatography paper is sensitive to acid, alkali, and SO ₂ . Store away from fumes.
Whatman paper #20 (19 x 23 cm)	Leave in solvent 12+ hours	10/pk	25/pk	
ML Chrom. Solvent	Composed of butanol, formic acid, bromocresol green	100 ml 500 ml	250 ml	At least 1 year unopened. Store in DARK
ML Acid standards	Tartaric, malic, citric, lactic	each	set (4)	Discard when mouldy or 6 months
Capillary tubes	Special made thin-bore tubes, much easier to use than wider ones	tube/100	1200/pk	N/A
o-Phosphoric Acid 25% [HazChem]	For A/O SO ₂ tests	500 ml	1 L	2 Years unopened
Phenolphthalein 1%	Indicator for TA test	50 ml 250 ml	100 ml 500 ml	2 Years unopened
pH Buffer , standard (pH 4.01 or 7.00)	Colour coded	100 ml 500 ml	250 ml 1 L	1 year unopened
pH Soak solution	KCl-buffer solution to store electrodes	100 ml 500 ml	250 ml	Until mouldy or 6 months
Refractometer (0-32 Brix)	ATC, rugged with carrying case. Easy-to-read scale.	each		N/A
Rebelein solutions	For sugar testing			
Z1	Copper sulphate	500 ml	1 L	1 year unopened
Z2 [HazChem]	Sodium potassium tartrate	500 ml	1 L	1 year unopened
Z3	Potassium iodide	500 ml	1 L	2 year unopened
Z4 [HazChem]	Sulphuric acid	500 ml	1 L	1 year unopened
Z5	Starch	500 ml	1 L	Until mouldy or 6 months
Z6	Sodium thiosulphate	500 ml	1 L	6 months
Sodium hydroxide NaOH	Specify strength 0.010 N for A/O SO ₂ testing 0.10 N for TA testing	100 ml 1 L	500 ml	1 year unopened unless standardised
Sulphide kit kit contains: 50 ml each - copper sulphate - cadmium sulphate - ascorbic acid Plus pipettes and detailed instructions	For detecting, distinguishing & treating odours of H ₂ S, mercaptans & most disulphides	each		Various - see individual items
Stir bars, Teflon coated	Autoclavable, magnetic stir bars with pivot ring	13 mm 38 mm	25 mm 50 mm	N/A
Test tubes, screw caps 10 ml	Autoclavable, borosilicate glass	pack of 20		N/A
Thermometer, lab	Dual range C/F scales, -10-110 C	each		N/A

MICROBIOLOGICAL SUPPLIES

Other supplies necessary for in-house culturing of wine microbes are available. We have information and textbooks about wine microbe identification, and examples of microbes. We can also identify microbes cultured in your lab. Microbe identification classes are offered occasionally, in Blenheim and other locations in New Zealand. With our photomicroscopes we are compiling a photo gallery for publication, and we can sometimes take photographs of microbes in your wine.

Microbiological Supplies

Item	Comments	Size	Size	Shelf Life
Bottle, PET	Gamma Sterile	500 ml		N/A
Cycloheximide Sterile solution 0.5 % [HazChem]	Add 1 ml/100 ml media. Selective inhibitor.	10 ml		2 Years Unopened
Media, prepared	To pour dishes, melt in hot water bath on hotplate or in microwave.			1 Years Unopened
WL Nutrient agar	For yeast & mould.	200 ml	400 ml	Open & close no more than 2-3 times to prevent airborne contamination.
WLC agar	50 mg/L cycloheximide. For Brettanomyces & Acetobacter.	200 ml	400 ml	
Modified Rogosa agar	For lactic acid bacteria but will also grow Brettanomyces.	200 ml	400 ml	
Membrane filters 47mm 0.45 µm sterile	Grids, individually wrapped	each	50/pack	N/A
Methylene blue, 0.5 %	For yeast viability stain; does not work on bacteria. Dead yeast cells stain blue. Centrifuge and rinse reds in broth before staining.	15 ml	50 ml	Indefinite if stored in a cool, dark place
Microscope	We can help you choose a phasecontrast microscope.	Please enquire		
Petri dishes, sterile	60x14 mm, disposable. Needs only 10 ml of agar.	Sleeve/10	10 sleeves	N/A
Pipettes, sterile 1 mL	Individually wrapped. Can be reused in lab, including for Clinitest, but cannot be resterilised in autoclave.	each	10/pack	N/A
Steroclave, 7L	We ship these with our harvest products by special order.	Please enquire		

We can help you choose the best phase-contrast microscope for your needs, and train you and your staff to use it. We can set up private sessions, and each year we schedule Wine Microbe Identification Workshops in various places in NZ.

Services

- **Chemical analysis**
- **Technical Assistance / Consultation**
- **Sensory Evaluation**
- **Microbiological Analysis**
- **Seminars, Workshops and
Lab training**

ANALYTICAL SERVICES

Timing of Analysis

Each winery's situation is different, these are just guidelines which must be adjusted to fit each winery situation, or you may do too many or too few tests, or at inappropriate times. For more specific recommendations, please ask us!

Here are some suggestions for tests to be done at different times in a wine's life.

Grapes/Juice

Brix
pH
Total acidity
Ammonia/NOPA (YAN)

Optional:

Malic acid
Potassium
Total SO₂ (top & bottom, to check mixing)
Microscopic exam for non-*Saccharomyces* yeast

During Fermentation

Brix/temperature every day
pH if acid addition was made, or if ML is active
Malic acid if bacteria added

Optional:

Yeast viability check
Microscopic exam for *Kloeckera*, ML bacteria, etc

Sluggish/Stuck Fermentation

Alcohol
Glucose/fructose
Acetic Acid
Micro exam
Yeast viability

Optional:

Malic acid, enzymatic
pH
Sensory evaluation

After Yeast Fermentation

Sensory evaluation
Residual sugar
Acetic Acid
Total acidity
pH
Alcohol
Total SO₂ (free SO₂ is bound up during ferment)

After ML Fermentation

Sensory evaluation
Malic acid
Total acidity
pH
Acid addition trials if needed
Total SO₂ if none added after yeast fermentation
(Free/Total SO₂ if SO₂ added after fermentation)

During Cellaring

Free & Total SO₂
pH
Total acidity if additions/reductions made
Cold stability (white)
Protein stability/bentonite trials (white)
Malic acid (if needed)
Sensory evaluation

Optional:

Acetic Acid
Fining trials for improvement
Sulphide detection/treatment trials
Acid addition/reduction trials
Micro exam/microbe culture if activity/film present
Brettanomyces culture
(if cellar has ever purchased any used barrels or wine)

Before Bottling

Free & Total SO₂
pH if not tested recently
Alcohol if barrel aged
Residual sugar if not tested dry earlier
Cold/heat stability if any blending done (white)
Sensory evaluation

Optional:

Brettanomyces, *Pediococcus* culture
(red intended to be bottled unfiltered)
Adjustment trials if needed
Fining trials if needed
Sulphide detection/treatment trials

After Bottling

Bottle sterility check if sterile-filtered
(membrane culture for yeast & bacteria)
Free & Total SO₂ (for post-bottling records)

During Bottle Aging

Sediment/haze identification if any forms
Micro exam/culture if wine is active in the bottle
Periodic sensory evaluation

A regular schedule of testing will reduce the guesswork and give you a chance to take corrective measures before losing wine quality.

SUBMITTING SAMPLES

1. Put samples in **clean, full, leakproof containers**

(NOT hospital specimen bottles or ones with child-proof caps, they leak!). **Plastic bottles for samples are available from us at a nominal cost (page 29).** An unopened bottle is needed for sensory, legal or microbial tests on bottled wines.

If the sample containers are not full, some tests may not be valid, particularly SO₂ tests, alcohol for labelling, sensory evaluation etc.

2. Label EACH BOTTLE with the date, your name and winery name, and sample name (such as vintage/variety)

or code. Please also include your address and phone/email in the parcel or on one of the sample containers.

3. Fill out an Analysis Request Form (download the template from our website, and save time), **EVEN** if you have spoken to us on the phone.

4. Put the sample in a resealable plastic bag. If possible, use parafilm (NOT cello tape!) to seal container the lid.

5. Samples may be sent via courier or post, or dropped off in person.

ANALYSIS PANELS

Need sample bottles?

See page 29 for our economical assortment of plastic bottles.

When a test says "full container", it means that whatever container is chosen must be full, not partially filled.

JUICE

Panel Name	Description	Sample Qty (MINIMUM)
Basic Juice Panel	TA, Brix, pH *Add \$5.00 for uncrushed grapes	100 ml
Expanded Juice Panel	TA, Brix, pH, YAN (NOPA/Ammonia) *Add \$5.00 for uncrushed grapes	100 ml

WINE IN CELLAR

Panel Name	Description	Sample Qty (MINIMUM)
Stuck Ferment Panel	Alcohol, Glucose/Fructose, pH, Acetic Acid Microscopic exam, yeast count/viability (Representative Stirred Sample)	250-300 ml plastic bottle PART full
Basic Wine Panel	TA, Alcohol, pH, Free & Total SO ₂ , Acetic Acid	500 ml full container
Comprehensive Wine Panel	TA, Alcohol, Malic acid (enzymatic), pH, Acetic Acid, Glucose/Fructose Free & Total SO ₂ , Direct culture (wine in cellar), Microscopic exam	500 ml full container

BOTTLING PANEL

Panel Name	Description	Sample Qty (MINIMUM)
Comprehensive Pre-bottling Panel	Alcohol, Malic acid (enzymatic), Glucose/Fructose, pH, Free & Total SO ₂ , Direct culture (wine in cellar) Micro exam for adjustments. Plus: For whites - heat & cold stability	500 ml full container
Microbial Stability Panel (for bottling reds unfiltered)	Malic acid (enzymatic), Glucose/Fructose, pH, Acetic Acid Direct culture (wine in cellar), Microscopic exam	200 ml
Post Bottling Panel	pH, Free & Total SO ₂ , Membrane filtration culture as required for white + red wines	750 ml unopened bottle/cask

DISPUTE PANEL

Panel Name	Description	Sample Qty (MINIMUM)
Disputes	Analysis will vary depends on the issue(s) Please call to discuss	4x750 ml unopened

CHEMICAL ANALYSIS

Need sample bottles?

See page 29 for our economical assortment of plastic bottles.

When a test says "full container", it means that whatever container is chosen must be full, not partially filled.

*Bring samples BY 10:00 AM for same-day service or call to arrange a later time if possible



Panel Name	Description	Sample Qty (MINIMUM)
Acidity , Total titratable	pH meter / autotitrator	25 ml
Acidity , Volatile	Acetic acid, enzymatic	50 ml
Alcohol by volume	NIR (Anton-Paar alcolyser)	150 ml full container
Brix	Digital Density Meter (juice/must/wine) Refractometer (grapes/juice)	100 ml 5 ml
Carbon dioxide	Carbodoseur	300 ml full container
Cold stability	Traditional (freeze/thaw)	150 ml
Heat/protein stability (takes 3-4 days with lab fining; without fining 2 working days)	Incubation only (no trials) Bentonite fining trial set (includes incubation and NTU readings) Send sample of your bentonite	100 ml 750 ml
ML Fermentation	Malic acid, enzymatic*	50 ml
Metals (copper or iron)	Total metals/Acid digestion ICP-OES, by Asure Quality	
Yeast-Available Nitrogen Both tests (YAN)	Ammonia + Alpha Amino Acids, enzymatic*	50 ml
pH	Metrohm 827 meter	50 ml
Potassium, Calcium	Specific ion, by Asure Quality	enquire
Residual Sugar	Rebelein Inverted (samples sweetened with sucrose) Glucose/fructose, enzymatic*	100 ml 100 ml 50 ml
Sulphur dioxide	Free Aeration/oxidation Total Aeration/oxidation Free & Total Aeration/oxidation	full container 50 ml 50 ml 100 ml
Turbidity	Hach 2100p Turbidimeter	100 ml
Specific Gravity	Digital Density Meter	100 ml

TECHNICAL ASSISTANCE / CONSULTATION

We offer a wide variety of consultancy services for winemakers, drawing on many years of experience in wine production, from technical aspects to cellar operations. We can interpret lab results, discuss finings or adjustments, yeast & ML fermentation, and much more. Please call, or send an e-mail to info@pros.co.nz to discuss your particular needs.

Service	Description	Time Unit
Consultation Interpretation of results and Recommendations	On the phone or in person at our location	Per hour 1/2 day (4 hrs) Full day (8 hrs)
See below for bottling line troubleshooting.	On-Site (plus transport costs)	Per half day Per full day
Special Lab Projects	Train winery lab personnel, cross-check lab procedures and evaluate quality control programs and testing methods and schedules	By arrangement Per hour
Bottling Line Evaluation	Identifying and troubleshooting the causes for non-sterile wine, including detailed on-site inspection of bottling line sanitation, evaluation of microbiological testing at bottling & recommendations for ongoing checks of wines and equipment.	By arrangement
Third Party Evaluation and Expert Witness	Insurance claims (damage), Third party disputes, depositions and court testimony on wine quality.	Per hour

SENSORY EVALUATION AND TRIALS

Procedure	Comments	Sample Qty (MINIMUM)
Sensory Evaluation	BE SURE to specify purpose. We assess wines for general winemaking, wine quality, problem solving, marketability, assessment of damage etc.	750 ml (full container)
Sulphide Treatment	Sulphide detection only Sulphide detection / treatment trials	375-500 ml 2 x 750 ml (full containers)
Wine Adjustment Trials	pH/acidity adjustment trial set Finning trial set to reduce bitterness, astringency, etc. Lysozyme trials (for lactic acid bacteria)	750 ml 750 ml 500 ml
Other Trials	We do many trials to improve balance, SO ₂ adjustment, blending, etc Ring us to discuss your needs!	750 ml (+)



MICROBIOLOGICAL ANALYSIS

From routine culturing of bottled wines to sleuthing the cause of a complicated microbial problem, we can assist you with all your microbiological needs and questions.

We are especially interested in helping wineries choose the most appropriate and cost-effective ways of monitoring wine microbes, and in using the results to control microbes in your winery.

International consultant, Lisa Van de Water is recognised for her work on microbial wine spoilage, and often gives workshops and training on wine microbes.



Contact us about any aspect of wine microbiology.

Culturing and Microscopic Exam

Procedure	Comments	Sample Qty
Microscopic Exam (detection limit 2,000 cells/ml)	Detailed (for most samples) Specific (for certain microbe groups, such as Spoilage, ML bacteria, yeast, sediment)	50 ml 50 ml
Yeast Population Methylene Blue Neubauer	Viability estimate, white must Viability estimate, red must (centrifuge, rinse) Yeast Count (if viability >15 %)	50 ml 50 ml 50 ml
Culture, Direct (detection limit 2 cfu/ml)	Wine in cellar (white + red wines)* Brettanomyces / Dekkera Brettanomyces / Dekkera , monthly sampling *Yeasts and bacteria including <i>Brettanomyces</i> , <i>Acetobacter</i> , <i>Pediococcus</i> ; microscopic exam for <i>Lactobacillus</i> .	50 ml 50 ml 50 ml
Culture, Membrane Filtration (for filtered wines or wines with less than 1 cfu/250ml)	For yeast/mould & bacteria (white wine) For yeast/mould, bacteria + Brettanomyces (red wine) Note: an unopened bottle is needed for culturing bottled wine.	500 ml 500 ml
Zygosaccharomyces	Hold / transfer cultures to await positive ID by conjugation.	Colony
DNA Testing	For <i>Brettanomyces bruxellensis</i> by <i>VinoBrett</i>	50 ml

WHICH CULTURE DO YOU NEED?

Unfiltered, or filtered samples that are still cloudy: Culture by direct methods and microscopic exam.
Lowest numbers of cells to detect by direct culture: 2 cfu/ml.

Unfiltered barrel samples: Usually we culture these samples by direct methods, but on request we can membrane-filter such samples to detect *Dekkera/Brettanomyces* below 2 cfu/ml.

Clear or filtered samples, and samples likely to have fewer than 2 cfu/ml (colony-forming units) of the microbes in question: these samples are most appropriate to culture by membrane filtration.

VIABLE BUT NOT CULTURABLE (VBNC)

Certain microbes sometimes do not grow in culture even though they are still alive and can grow later.

SO₂ ADDITIONS CAN INDUCE THE VBNC STATE IN BRETTANOMYCES.

VERY IMPORTANT: WAIT AT LEAST 2 WEEKS AFTER ADDING SO₂, BEFORE TAKING SAMPLES FOR CULTURING

Lactobacilli seldom grow in culture under any circumstances, so a microscopic exam usually is the best way to detect the presence of Lactobacilli.

MICROBE GROWTH TIMES IN CULTURE

We know how important it can be for winemakers to know quickly if their wine has microbial problems! Final results are ready in 7 days.

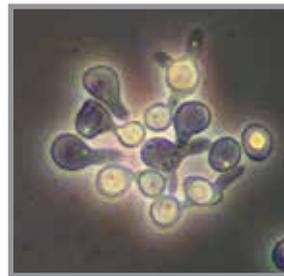
Microbe	Usual Growth Time	Final Count	Further ID
<i>Saccharomyces</i>	2-3 days	7 days	Alcohol tolerance tube 3 days
<i>Zygosaccharomyces</i>	2-3 days	7 days	Confirmation 1-4 weeks
<i>Surface film yeasts</i>	2-3 days	7 days	Alcohol tolerance tube 3 days
<i>Brettanomyces/Dekkera</i>	3-7 days	7 days	PCR if needed by customer
<i>Acetobacter</i>	2-4 days	7 days	Species ID – enquire for time
<i>Oenococcus oeni</i>	4-6 days	7 days	N/A
<i>Pediococcus</i>	4-6 days	7 days	Species ID – enquire for time
<i>Lactobacillus*</i>	7 days if at all	7 days	Species ID – enquire

***Lactobacilli** usually can be seen immediately in wine/must directly under microscope if present in sufficient quantities, but **seldom grow in aerobic culture even if active in the wine.**



DO YOU USE SERENADE (*Bacillus subtilis*) SPRAY?

The spores can survive in wine for many months. They do not grow in wine, but they grow in culture, ruining microbiological tests.



Zygosaccharomyces confirmed by conjugation

Special Microbiological Services and Identification

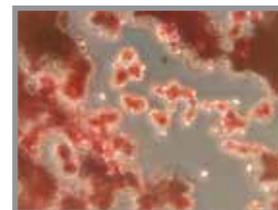
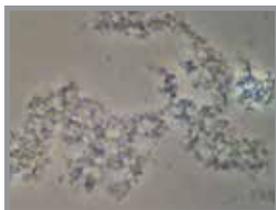
Services:

- Cause of spoilage and/or sediment
- Examination of colonies grown elsewhere
- Confirmation of *Zygosaccharomyces*
- Swab cultures of winery surfaces

Description:

- Microscopic exam plus any needed tests
- Send colonies on petri dish for examination
- Conjugation takes 1-4 weeks
- Taken on-site by winery or by us

Non-Microbial Sediments: We have encountered many non-microbial sediments and hazes in bottled wines, including common items like tartrates, protein and red pigments, and unusual ones such as copper casse, pectin, dried wine, sawdust and clay particles.



Photos, left to right: Protein sediment, Tartrate crystals, Red pigment precipitate

“NON-WINE” MICROBES

We can distinguish wine-tolerant organisms from microbes often found in wine samples but which are unable to grow in wine. These “non-wine” microbes sometimes are in cellar samples, but they are most often found as contaminants in newly bottled wines. They cannot survive in the wine, though their presence can indicate serious problems with bottling line sanitation, which needs to be investigated.

Integrating Modern & Traditional Microbiology Methods

WHICH TESTS DO YOU NEED?

Call or email us for free advice on testing your wines.

Sensory Evaluation?	Cultures?
Chemical tests?	PCR?
Microscopic exam?	Genetic sequencing?

Do You Really Need Expensive PCR Tests? **MAYBE, MAYBE NOT.**

Many times, wineries request tests that labs tell them are necessary, but maybe those tests are not appropriate for their particular wines.

**Please request a FREE copy of
"CHOOSING MICROBIOLOGY TESTS FOR YOUR WINE"**

or download it from our website www.pros.co.nz.

We are happy to work with your winery on the best microbe testing protocol for you.

Our long and extensive experience with wine microbiology enables us to identify microbes more completely, easily, and quickly, **usually at NO extra charge**, or sometimes a small charge.

Some labs provide only cell counts of "bacteria", "yeast", or "mould", without identifying them further. Or, there may be a BIG fee for genetic identifications of microbes **which we identify routinely at no extra charge.**

ASK US!

We will help you select the best methods to tell you what you want to know, and not what you don't need.

See page 45, and download a copy of "Choosing Microbiological Tests for Your Wine" from our website (reference section).

WE RECOMMEND:

CONSIDER ALL THE METHODS, THEN CHOOSE THE ONES THAT ARE BEST FOR EACH WINE!

You don't need all the tests on the same wine. To select the tests for each wine that are most useful AND COST-EFFECTIVE, you need to know EXACTLY what each test measures, and its advantages and disadvantages. Otherwise, you can waste time and money on tests that are inappropriate for your wine and your winery, and which don't tell you what you need to know.

WE HAVE ASSISTED NZ WINERIES IN CHOOSING THE MOST APPROPRIATE AND COST-EFFECTIVE MICROBIOLOGICAL TESTS FOR MORE THAN 25 YEARS!

COMMENTS ON POPULAR METHODS:

Sensory: While always important, sensory clues indicate what has already happened, not what may happen.

Chemical tests: Metabolites such as VA or 4-EP/4-EG also indicate what has happened, though at lower levels than can be detected by sensory means. They do not show activity or predict progression.

Microscopic exam: Examining wines directly with a good phase-contrast microscope is **one of the most useful ways to detect microbes quickly**, especially during fermentation. If there is a large enough population (>2000 cfu/ml), you can see immediately what microbes are there, even if they have already died after causing an effect.

Culturing: For direct culture, spread 0.5 ml of sample on an agar petri dish. For membrane culture, filter sample (10 - 250 ml) through a sterile membrane filter and culture the filter. The final result (except for *Zygosaccharomyces* conjugation) is given at 7 days. Culturing is the **cost-effective mainstay of microbe detection in wine**. Culturing detects lower levels of microbes than any other method, so **it is the only method appropriate for checking bottled wine sterility**. However, if microbes have been stunned, such as by a recent SO₂ addition, they may still be viable but won't grow in culture (VBNC). Also, wine *Lactobacilli* seldom grow in aerobic culture.

PCR (polymerase chain reaction): Methods using 'real-time' PCR are highly specific, so the population of certain species can be detected from among others, by matching a piece of known DNA (a 'primer') to microbes in the wine. Primers have been developed for some wine-related microbes, though by no means all of them, and the specificity of some wine microbe primers has not been thoroughly vetted against other species. PCR is a great tool for some applications, though **NOT sensitive enough for bottle sterility checks for fermentation yeast.**

SEMINARS, WORKSHOPS AND LAB TRAINING

SCHEDULED SESSIONS

Each year we hold numerous technical seminars and workshops in winegrowing regions. Most are technical sessions on spoilage microbes or fermentation for winery staff, but we also present occasional seminars for amateur winemakers, wine sales professionals and consumers.

To request a seminar or educational tasting in your region, please contact us.

WINE MICROBIOLOGY PROGRAM EVALUATION AND TRAINING

In the many years we have taught wine microbiology, we have trained winery staff to identify wine microbes. We can also help your winery develop comprehensive microbiology programs integrating inhouse testing some external testing, tailored to your specific needs and situation.

We can also evaluate your winery's microbiology testing program and protocols, so you are choosing the most **COST-EFFECTIVE AND TIME-EFFICIENT methods**. Many larger wineries perform unnecessary or redundant tests, but may miss critical danger signals. Smaller wineries often do not perform all the checks needed for microbe risk management, or spend too much money on sending out samples. Large and small wineries alike often do not respond to lab results by changing cellar procedures. **We can assist with all aspects of wine microbiology in a way that helps your winery.**

PLEASE CONTACT US FOR FURTHER INFORMATION AND TO DISCUSS YOUR WINERY'S NEEDS.

Technical Books



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