Project	Project Title	Approach (AIMS)
1.1	Non-Traditional Yeast & Bacteria to reduce wine additives and to remove faults	Target attributes (enzymatic activities, biosorption, etc) to be sought from collections and new isolates to identify beneficial strains
1.2	Develop yeast strains with longer viability and reduced brewing foam-degrading proteinase A activity	Using targeted gene knockout via CRISPR (proof-of-concept, established in our lab [# 35]) ahead of a mutagenesis and screening tactic. Candidate strains will be identified and evaluated for beer fermentation performance and product aroma, flavour, foam and shelf-life using innovative small-scale fermentation systems.
1.3	Assess both Saccharomyces and non-Saccharomyces yeast and nutrient additives, for fermentation success, aroma development and bio-protection in cider & production	Strain isolation from juicing facilities and culture collections, rapid screening and profiling (flow cytometry), and assessment of composition by metabolomics will yield ideal strain–nutrition–juice–product specification combinations for cider making.
1.4	Match yeast strain or yeast and bacteria combinations to feedstock (e.g., rye, corn, cane sugar, molasses), for producing whisky or rum.	A combinatorial approach will be used to identify microbe substrate combinations that produce Australian whiskey or rum with distinctive flavour & aromas.
2.1	The soil microbiome: functional metagenomics	Pair metagenomic data with that from new metabolomics methods (new liquid state NMR) to reveal new insights into vineyard soil microbiome structure and guide management practices
2.2	Closing the loop on carbon and water farming in Australian vineyards with biochar	Surface functionalisation of biochar to increase cation exchange capacity and metagenomic characterisation of soil microbial communities
2.3	Microbial soil bio	Microbial/'natural' biostimulants & plant defense activators assessed in scientific trials to show mode of action, benefit for vine resilience and productivity
2.4	A novel preharvest fermentation in grape berries: Winemaking impact and vineyard mitigation	Cutting edge technology for ethanol sensing to define vineyard environmental and management factors that contribute to berry fermentation
2.5	Glycosylation in the grapevine: Defining essential biotrans- formation reactions of small bioactives	Bioinformatics, metabolomics, biochemical and molecular genetic tools to unravel signals that regulate the expression of key vine GTs in response to stimuli and stress
2.6	Enhancing the endo- phytic & rhizospheric microbiome for bioprotection & biostimulation in grapevine	Next gen sequencing and metagenomics to define microbes of the endophytic phyllosphere & rhizosphere within grapevines to find beneficial organisms, and thus a 'bioactive vine inoculum'

2.7	Grape marc to grow and deliver entomopathogenic fungi	Valorise grape marc by using it to produce and deliver entomopathogenic fungi to vineyards against LBAM. Trial marc-based soil amendments to promote beneficial arthropods
3.1	Develop novel methods to monitor spirit evolution during aging, to optimise the use of casks or oak alternatives to produce desired spirit flavour profiles.	Optimal use of oak during spirit maturation will make the best use of expensive resources and provide producers with a competitive edge to create distinctive Australian spirits with targeted flavour profiles.
3.2	Predicting & managing mouthfeel in red wines through AI-guided process metrics	Human senses, instrumental methods, and AI to model mouthfeel traits based on chemical composition, to optimise mouth- feel via winemaking
3.3	Driving the image and growth of NOLO wines in Australia and key export markets	Consumer purchasing surveys and sensory assessments will help understand which aspects of NOLO wines disappoint buyers, despite rapid growth of the sector
3.4	Use a yeast fermentation of hulls to increase inositol content [# 30] and find methods to enhance its extraction, thereby converting the growing stockpile of hulls in Australia to a valuable product	This will create an alternative income source while making use of a waste material to improve the industry's sustainability.
3.5	Creating healthy, satisfying and scalable protein-rich meat and dairy alternatives from plant and non-animal sources.	Utilising All G Foods' natural food technology, this will not only benefit consumers seeking healthy and sustainable food options, but also the environment by decreasing pressure on already stretched natural resources. Crucial to this is an improved understanding of phosphorylation of recombinant as2-casein to favour the production of the 'native' configuration seen in cow milk