Growing Wine Grapes in an Undercover System

A Look at thinking outside the square in the primary industries

Caleb Dennis

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Preface

In working on this report, I realised that my key learnings actually had little to do with the subject I was looking into. Yes it was an interesting topic, but once I got further into the actual outcomes I realised that they would be of interest but little use to many growers. As such I decided that rather than write a report on the technical details, possible effectiveness and likely quality, consumer acceptance and outcomes of using an undercover system (as these wouldn't be transferable to another site), that a look into the thought process and work behind undertaking a project such as this, to highlight the importance of questioning the status quo and looking for solutions outside the square, would be far more interesting and useful to anyone who was interested in reading this report.

Executive Summary

Thinking outside of the square and challenging the status quo is and will become more and more important as we see challenges to the primary industries. The changing consumer preferences and urbanisation of our communities is and will continue to erode at the traditional way of farming and growing in New Zealand, and the world over. How do we combat this and retain a highly valuable primary production systems in New Zealand.

The simplistic answer is for us to evolve and change in line with consumer preferences and what is accepted by society, we can see this happening all around us. Cage free eggs in all major supermarkets by 2027, Low alcohol wines gaining a market share from relative obscurity only a few years ago, chicken free chicken and artificial proteins becoming available to consumers, that were highly expensive prototypes at the start of the decade. But what do we need to do to evolve?

The question then lies, “how do we keep ahead of the curve” and “how do we maintain relevance in todays society”. The answer to this is complex and not straightforward, but it all starts in one place, asking questions and challenging the status quo, not being content with how things are, or how they are progressing. Always asking why.

I will use the example here of looking to grow wine grapes in a semi-protected or undercover system. I have investigated and continue to evaluate this as part of my professional role as a viticulturalist, and for the Kellogg programme. Also I will try to understand the process of thinking outside of the square, as well as provoke thought about all our systems and processes, and encourage you to always be looking forward for a new and novel solution.

I've been thinking, can we grow wine grapes undercover?

In my work there is a phrase that is often heard between the offices "so I've been thinking" This is the cue that someone has identified a problem and come up with a solution that is probably a little out of the box. In this case it was to do with weather and the rather wet, and disappointing end to the 2017 vintage

The wine industry faces many challenges, both at the growing and sales end, the one thing that we can't control, or really do anything about though is the weather. Like many crops there are a multitude of events that can spell disaster, rainfall at the wrong time, an unexpected frost event, or a drought can all have major consequences for the growing season and that vintage, the flow on effects of which can be felt for many years due to the long winemaking cycle. As climate change occurs these events may become more regular, and areas that were once prime for growing grapes may well face new climatic challenges, there will be a need to come up with new and novel solutions to overcome these.

As the company I am involved in is looking to expand some plantings, we started to think about how to put in place technology, or some system that would allow the quality to be maintained, and a premium product grown and produced, even when the weather conspired against us at the worst possible times in the season. So the question was put forward, "Do you think that we can grow the grapes undercover?"

This is a simple enough question, but when you start to actually look further into it and pick away at it there are suddenly a lot more questions that come up and need answering. Is it physically possible to build a structure that would serve our purpose, and what would this look like? What downstream effects might be caused by this? Could we even get consent for this? Are there any unintended consequences? What is it likely to cost? How will it affect the management of the vineyard? And most importantly even though this sounds like a great idea, Why? Why are we going to go down this track?

WHY?

Why is probably the most important question you can ask. Yes, you might sound a little like a toddler discovering the world for the first time, but like the toddler without asking how can you learn? And if you ask why enough you will discover not only the things that you don't know, but also the things that you didn't know you don't know, and probably needed to know.

As I have mentioned above, the weather and climate can have wide ranging effects on the grape growing and subsequent winemaking for a vintage. It can be argued that this is one of the keys to wine, vintage variation. But when producing a high-level crop, then transforming this into a high end wine is your livelihood, you want to do all you can to ensure that this happens season after season. One of the key barriers to this that is currently almost impossible to overcome is late season rain, at or around harvest.

For wine grapes, rain at or very close to harvest will have a marked effect on the quality of the fruit and subsequent wine. Rain can cause the vine to take up large volumes of water and either dilute the flavour of the fruit and berries, changing the wine style and intensity. But more seriously it can cause berries to swell to the point that the skin splits, and very quickly allows diseases such as sour rot and botrytis to set in. This can easily ruin a crop and make it unsuitable to pick or vinify. Warm weather, ripe berries and rain are also the three key elements to let a dormant botrytis infection take hold, although there are good sprays available to help with this, you can only fight the weather so much.

So we have the first why, we want to protect our crop from late season rain. Why do we want to do this? To ensure that we can reliably get high quality and high value crops, even if the climate conspires against us. So we have a good idea of what we want to achieve, but where to from here?

What would this look like?

We now have a preliminary idea of what we want to do, and most importantly why we want to do it. But now its time to flesh out the more practical aspects of this idea. This is probably the hardest part of a project, working through the process of trying something that either isn't common or hasn't been done at all before.

The "what this may look like" can vary hugely between different projects and the goals for each one, it may be the layout of an app, the plan for a new land development, or even something that isn't physical. For example a project may be about a perception, or creating a value in the mind of the public or consumer. Whatever it is though it is vital to have an idea of what the end goal is, without this it is almost impossible to analyse and evaluate your plan or concept further.

It is important to bear in mind though that the plan or vision that you come up with now will most likely not be the final outcome, but is just a starting point.

In this example many chats over coffee and sketches later we had an idea of what we thought would work for an undercover or as we had by now termed it, semi-protected system. This allowed us to carry on and further unravel the key elements around this idea.

Unintended effects

So we now have a concept for our idea, what next? Well its time to start pulling on that loose thread and see how much of your jersey unravels! What are the possible outcomes from your idea, both positive and negative. In our example here we came up with a number of interesting additional benefits, as well as a few potential issues.

Firstly let's start with the obvious things, if we have a solid roof we will stop the rain getting to the vines. This is what we are after though right? Well yes and no, we still need to give the vines water to grow, and also what will we do with the runoff from the roof? If we have 3-4 hectares covered this potentially could be a lot of water that has to go somewhere, and also potentially a lot of extra irrigation required, ok so do we capture this rainfall and then recycle back into our irrigation, that now requires a dam and more infrastructure. But if we can't do this can we get enough water from our irrigation consent, and is this secure enough for us to rely on it for all the water required? As you can see what seems simple at first can them become quite complex, and possibly heading rapidly into the too hard basket.

So let's look at the same issues but from a different angle. Our water consent may be restricted due to changes in the local by-laws that are coming up, so let's plan to build a dam as part of the development, that way we can store water so that we will have contingency if there is an issue with take being restricted. So now that we have a dam rather than paying to pump water into it, lets capture the excess rain that would otherwise just drain away before the vines use it, that way we can supplement our irrigation take with rainwater, reducing out reliance on a bore or river take. And if we keep pulling at this thread, if we are only applying enough water for the vines to grow, logic says that this will reduce or minimise any nutrient leaching that could be occurring, and if we are leaching less we may be able to then reduce the amount of fertiliser that we are needing to apply. So as we look further down each little rabbit hole of information we can start to build quite a big picture of the impacts that this project could have.

And that's just the rain water and irrigation. Also in this example we looked at the use of fungicides, if the crop is protected, but not fully enclosed to that there is still airflow, then there will be less reliance on chemistry, at least for the main diseases that require rain. Therefore, potentially a lower spray regime and less fungicide costs. There are implications for frost control, having a roof changes the dynamics of frost. This could be a positive as it may reduce the frost risk for some frost events, but also means that different control methods that may not be effective in a fully open system could be utilised. Another key benefit that was identified is bird control. Rather than netting blocks of rows, or individual rows as is current practices, the perimeter of the structure could be netted to make one large enclosed space that would enable work to continue uninterrupted by nets.

What started out as a way to protect grapes from rain now looks like it has the potential to reduce nutrient leaching, reduce out fertiliser inputs and allow us to manage our water take consents with less risk to the crop, as well modify our approach to bird control and fungicide use. By pulling at those threads and looking down the rabbit holes that appear we are beginning to really analyse and think critically about all the issues and benefits that can come up form what started as a relatively simple project.

Practicality

Great ideas, and diagrams on paper are all good and well, but is the project practical and will it deliver the desired outcomes. Just as there are threads to pull and rabbit holes to go down when looking for unintended effects, the practical aspects need some thorough investigation as well.

In the example of the semi-protection for the vineyard there are several items that need looking into in this regard. Firstly there is the physical aspects, how much space will this require, is this going to erode into valuable planting area? And engineering requirements, what will the structure actually look like? What materials are available to meet our requirements?

With this in mind what aspects need to be taken into account to allow normal and required vineyard operations to take place. Considerations need to be made around machinery, can conventional tractors and machinery be used, or will special equipment be required? What is the ability to harvest, can a mechanical harvester be used, or will it all have to be hand harvested? All these considerations need to be thoroughly investigated and assessed for suitability. For this example, it became clear quite quickly that this system was not suitable for a conventional system. The structure would limit the machinery too much and therefore push the operating costs too high for a standard vineyard model to work.

However great a plan or idea is, if it cannot be practically carried out then it needs to be shelved until the issues that are holding it up can be solved. But even getting to this stage is important, by now enough questions have been asked that you now know the questions that you didn't know existed when you started out, and are able to start finding answers for them.

Feasibility

If the idea has made it this far, there is a sound reason to carry on, it is practically able to be done there is another hurdle to get over. Is it actually feasible? Will there be a net benefit once all these factors have been taken into account?

Firstly, do the dollars stack up? Is the cost benefit positive? This can be quite a hard question to answer if your goals are more than purely economic. Its relatively straight forward to make a cost/profit analysis, but often there are factors that fall outside of this.

For example, what is the cost to your brand if you can't deliver a certain wine some vintages or is your goal to improve an environmental outcome that doesn't have an actual dollar value. Regardless the business must be able to sustain the cost.

When starting to work through this step for the semi-protection there were a few challenges to overcome. Firstly as this hasn't been done yet in New Zealand there are no direct comparisons and costs that can be used, similar industries can be looked at and costs approximated, but until a full design is produced and costed out at some expense these remain a relative unknown. For other projects there may well be a close comparison that can be used, or costs can be more easily approximated. However this is done though knowing costs and outcomes is important.

Like practicality however this may just mean that the project or idea is shelved until technology catches up, with the rapid increases in connectivity, data processing power and miniaturisation of technology what was a pie in the sky idea a few years ago can be reality today.

Consumer acceptance

Just as important as actually being able to bring a concept, idea or project to actuality is whether it will be accepted by the consumers, or indeed society.

The acceptance by consumers and society in general is of increasing importance in the age of social media. It can take as little as one bad image, comment or post to go viral for serious brand damage to occur. As such it is important that the views of the consumers and society are taken into consideration when looking at new and different ideas. Its not just consumers as well, members of your own community may also take some convincing that a new way is better. The old "if its not broke, don't fix it" mentality can come out very quickly.

Lack of acceptance can cause issues with buy in to an idea or new system, in the grape example there is a real risk that by removing some environmental aspects to wine growing that there could be a pushback of the wine. Terroir or the sense of place that a wine portrays is very important to many consumers. If it was construed that this system wasn't allowing the wines terroir to show through, then it could make the marketing departments job much harder and impact sales.

However, acceptance of an idea, system or product is a dynamic process. Perceptions and preferences change. Take cage eggs for example, there was some consumer rejection to battery cage eggs, in response a new cage production system was designed. The colony cage system was designed to be better for animal welfare and advertised this way. However it didn't fully meet consumer demands, and as such due to consumer pressure the major supermarkets, and fast food outlets are in the process of or have moved to exclusive use of cage free eggs. This is a good example of why testing acceptance to a new idea, as well as re-testing ideas that have previously fallen over at this point is important.

Take Home

In summary, if we don't strive to better our systems, improve our outcomes and look forward to anticipating new challenges we will stagnate. The ability to take what is at face value possibly a fairly oddball or hairbrained idea is crucial to development and growth in our industry. We need to move with consumer preferences and understand their motives in order to improve our systems.

In the example used here we are still looking for a suitable place to try a semi-protected system, as in the right location and brand it has the potential to help enable us to make world class wine, sustainably and with lower environmental risk.

But whatever the project is, or whatever the "I've been thinking" leads to I know that by asking lots of questions and allowing yourself to think broadly as well as out of the square solutions can be found.

Don't forget to always ask why, and challenge the status quo, innovation and questioning is what drives us forward and will see us prosper into the future.