STARTING A SMALL WINERY - By Douglas P. Moorhead

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I have been involved in a winery operation for over thirty years and have been growing wine grapes for almost forty. While I may have made the transition from being a young buck to becoming an old curmudgeon, I can honestly say that these endeavors have brought and continue to bring many satisfactions. This is common in the industry, for I know very few people who have entered the business who have left it for other than financial reasons.

My task in this article is to consider what is necessary in the way of equipment to start a small winery and some of the factors that should enter your calculations when making the decision on whether to start such an operation.

I will limit the scope of this presentation to what I would call "small wineries." There is no accepted standard of what differentiates a small winery from a large one. I am aware of firms producing as little as 500 gallons and as much as 60,000 gallons annually who consider themselves to be small wineries, but we need a tighter definition than that. Here are several that may be helpful:

a. One basis for distinguishing between small and large wineries is whether they use their own or outside marketing resources.
b. The division can be made strictly on the basis of production volume. The dividing line will usually fall between 5,000 and 25,000 gallons, depending upon who is making the definition.
c. The BATF divides large from small on a tax rate basis with the dividing line starting at 150,000 gallons of annual sales.

Personally, I look more at the attitude of those running the winery (and I include those who merely have a gleam in their eyes). Although this may be an intellectually lazy viewpoint, I think that I can tell when I see a small winery even if I can't provide a consistent definition.

One fairly useful approach for me is to look at a winery from the standpoint of its capital expenditures. Large wineries tend to purchase more expensive equipment than small wineries because less labor input is required, it will last longer and need less maintenance, because it has more flexibility or potential for expansion, or perhaps a combination of these factors. At some point the purchase of this more expensive equipment becomes cost effective based on the volume of wine produced (or, more to the point, the amount sold!).

I like to look at a winery from the standpoint of the operations, which must be performed when considering the capital involved. Here sis a run-through of the various operations a winery must be concerned with when weighing the elements that go into the decision-making process. Just the act of physically handling raw materials from received fruit to wine covers a long process, each of which needs some equipment.

Fruit Handling – Weighing grapes or other raw products will require either that you have a scale on your premises or convenient access to one. There are several reasons why you will need to weigh the

fruit used in your operation whether you purchase the scales or not. BATF reporting requirements will necessitate the use of a scale and you should always do basic cost accounting in any operation. If you purchase fruit from some distance away, you should be aware that you might lose 5% to 8% of weight at picking because of evaporation in transit. It is obviously to your advantage to weigh at delivery.

Most convenient would be a scale that would weigh an entire truck. Used scales of this type are occasionally available for under $1,000, but you may spend considerable time and money installing it since you will need a pit with drainage provisions. We once used an animal scale with which we could weigh one bin or pallet at a time. As I recall, the scale cost about $800 to $1,200, required the forklift driver to make a very careful approach and was fairly easily knocked askew. When we first started we used an overhead scale from which we suspended a support frame. It was critical to balance the load by almost perfect centering; if not, the load would sag on one side and the load would touch the ground or, worse, would actually tip over. It was inexpensive, but I am glad that I don't have to hone those balance skills anymore.

It is also possible to get scales which are mounted on a forklift. These are very convenient, but expensive. We currently use a low profile scale with a 4' X 4' platform that rests on load cells in each corner which weighs one pallet or bin at a time. It will take a fair amount of abuse but shouldn't be left out in subfreezing temperatures for very long. These scales cost around $3,500.

A very small winery might get by with a platform scale and weigh representative samples of product or else make arrangement to have the load weighed elsewhere. This latter approach would be the least expensive but also the least convenient and the least accurate.

Tractors - You will need a tractor, especially if you grow your own fruit, and the cost will run from $1,500 for the cheapest adequate use models to over $15,000 for a newer vineyard tractor. Some wineries can get by with a hand or electric powered hand fork truck, but only if they have concrete floors. Renting a tractor on a seasonal basis may be possible in some agricultural areas. Equipment leases offer another way to spread out the timing on expenses for big items like this.

Containers - For picking fruit, many small wineries use the plastic crates developed by Welch Foods in the early 1960'sand, which may still be produced by NOSCO Plastics Co. The going market for used crates is $3 to $4 each while new ones were about $7 to $10 when I last checked about six years ago. These containers hold about 35 lbs. Of fruit and stack nicely on top of each other, but will also nest, taking up less space when turned 180° degrees. They are quite durable (we still have many dating back to 1961, the first year they were available), fairly easily cleaned and provide good air circulation. Crushing of the fruit is not a problem unless the crates are filled too full. They stack neatly on either a 4' X 4' or 4' X 3.5' pallet. While they may be unstable when stacked more than six crates high, a simple hook placed over the top tier will help increase stability. Hand picked grapes can be stored in them longer than machine picked grapes in bulk bins without significant quality loss. A similar, although incompatible, crate is produced in Canada which is about as good as the Welch crate. The cost was about $6.50 six years ago. If you purchase grapes from other growers, they may have their own picking containers, but few of them have enough to avoid having to worry about fast turnaround. I grow 160 acres of grapes and have a good supply of crate s and bins, but turnaround is always a problem when selling to wineries that aren't nearby.

Bulk bins are now widely used for grape or other fruit containers. These are about 3.5' X 4' and vary in height from 2' to about 4' and hold from ½ to about 1 ton of fruit. They normally have a heavy plastic liner and a lid that fits on a wood box over the top of a pallet. They require a forklift or lift truck to be moved. Grapes which have been machine picked are relatively easy to be lifted or "bucketed" out of the bin, but hand picked grapes are nearly impossible to remove unless you can tip the bin. When depth of fruit exceeds about 8", fruit crushing will occur; therefore you shouldn't store grapes in these bins for long periods. Machine picked grapes in bins should be processed within 5 or 6 hours; hand picked grapes will last longer, but I would hate to go much over 15 to 18 hours. These bins cost around $180 to $200 including liner and lid and are usable as red wine fermenters as well.

Other miscellaneous containers such as hampers, bushel baskets, etc. can be used by small wineries, but are fairly inefficient to use and difficult to maintain.

Truck to Crusher – The cheapest way to handle grapes in a winery is to dump directly from the truck or other hauling vehicle directly into the crusher hopper. This is seldom convenient because you don't often get just the right amount of fruit to fill one press load and it may become necessary either to wait for other fruit, or the vehicle must remain with a partial load for the next press batch.

If the grape crates are placed on pallets or if bulk bins are used, a forklift unit is a requirement. If you already own a tractor, you might find a used forklift attachment for $900 to $2000, but you won't be able to use your tractor for other purposes while the forklift is attached. A lift suitable for lifting loads of one ton or better will need a heavy-duty mount and may require at least 5 to 6 hours for installation and removal. A swivel forklift has advantages in handling bins.

An alternative to swivel forklift is a bin dumper. Commercial models suitable for handling 1 ton bins will cost $4,500 to $7,000. A conveyer could be used for hand picked grapes placed in crates. The only other alternative is to use a hillside and gravity by filling form a higher level into a crusher, which could be above the press.

Crusher to Press – Crushing is an almost universal treatment which permits higher yields of juice when the grapes are pressed. The most common crusher consists of a hopper with two parallel fluted cylindrical rollers which turn in opposite directions so the grapes are pulled down between them. They are placed closely enough together so that the berries, but not the seeds, are crushed. Another common crusher type consists of a hammer mill or a cylinder which turns in one direction while a series of paddles on the inside turns the opposite way. This style of crusher is much faster, but produces higher levels of ground-up-solids which must later be separated. Wine quality potential is higher with the crusher roller type. Models suitable for small wineries range form about $400 for a hand flywheel driven model with a capacity of about 1 ton per hour up to units with a sump and pump unit which will drive the fruit to press or fermenter which might do 10 tons per hour and cost up to $14,000. Units with pumps are much more convenient.

Destemming - If you only make white wine, there is no advantage to having a stemmer. You can put more grapes into a press if they have been stemmed, but the pressing operation will be more difficult and the juice will have higher levels of suspended solids. Very few crusher-stemmers are also usable as simple stemmers.

When making red wines, it is advantageous to remove the stems before fermenting the grapes on the skins to avoid the taste of some bitter tannins which may be extracted from the stems. This is not as serious a problem with small stemmed varieties such as Pinot Noir where additional stems are sometimes added, but most varieties will benefit by stemming.

A stemmer usually consists of a horizontal cylinder which has many circular holes of ¾" to 1" diameter spaced quite closely together and a shaft with a series of propeller-like blades that turn inside the cylinder. The cylinder may be stationary or may actually spin in the opposite direction from the blades on the central shaft. When the grapes fall into the cylinder the stems are gradually pushed out the other end while everything else falls through the holes in the cylinder into a catch basin or a pump sump.

New crusher stemmers will cost $550 to $10,000 depending upon capacity, whether they come with painted steel or stainless steel, and what type of pump setup is included. The roller type will handle up to about 3 tons per hour while the flail type might handle up to 8 to 10 tons per hour.

Transfer to Press – Gravity works best since it is not dependent upon electric current or motor conditions. It should be said, however, that conditions are seldom just right for using gravity. A crusher stemmer with a centrifugal must pump works quite well, but if you are not stemming you will need a piston or diaphragm type pump as part of the crusher. There are some portable crusher pumps available although they are expensive.

Dejuicing – A dejuicer is a device similar to a continuous press. It consists of a long cylinder with small slits in the walls of an internal cylinder and a central auger. The cylinder is normally placed at about a 45° angle and grapes are gradually driven upward by the auger toward the top end of the cylinder. There is an adjustable counterweight at the top end of the cylinder. The resistance of this weight helps dry the pulp that goes into the press and produces more" free run" juice.

These devices are efficient and allow you to put much drier material into the press which permits greater tonnage per batch. The major disadvantage is that the juice produced has much higher levels of suspended solids. These devices are most effective with Vitis labrusca grapes which tend to have more pulp and less free run material. Dejuicers cost from about $3000 to $11,000. Their use seems to de declining.

Pressing aids – Pectic enzymes are often used to increase juice yield or to increase color extraction with red musts. They also aid faster and better settling of whiter musts. They work most effectively under warm conditions and usually double their activity with every 10° degrees rise in temperature up to about 140° Fahrenheit where they are inactivated. Rice hulls (husks) or wood pulp (such as "Silvacel" from Weyerhaeuser) are commonly added to the grapes as they are dumped into the press. They make the grapes less slippery and therefore less liable to push out through the press staves during pressing. While they make it easier to press any variety, they are nearly essential when pressing Vitis labrusca grapes. They also seem to help produce a cleaner juice. We prefer the rice hulls if both are readily available. A 50 lb. Bag of rice hulls costs about $8 and is enough for about 4 to 6 tons of grapes.

A simple screen such as plastic window screen or, better, a stainless steel screen draped on the inside of a press basket will be of great help when using small presses.

Pressing- Presses used in small wineries fall into two general categories: batch presses or continuous presses. Batch presses may have either vertical or horizontal baskets and on some top level horizontal units may include an internal membrane. Presses are costly, especially considering the few days a year in which they are used, so a small window should at least examine such alternatives as renting, cooperative use, or contracting out.

Continuous presses are available in many sizes and range in price from $3,000 to $12,000. They are fast and efficient and one is not limited to certain batch sizes when pressing. Juice quality, however, is lower than that obtained in basket presses and suspended solids are much higher.

Vertical basket presses are the least expensive type available but are the slowest, yield the least, and have the highest labor input. Ratchet presses are the cheapest of this type and range from $300 to $800 in price. Motorized hydraulic presses are more efficient but have been largely replaced by vertical bladder presses, which range from $700 to $2500 each. The larger of these will press up to ½ ton per batch and only require about 45 minutes per batch as compared with minutes per batch and compared with 2 ½ hours for a ratchet press.

Horizontal basket presses tend to be much more expensive but are larger and requires much less labor and supervision, especially with models with programmed cycles. One style is the bladder press such as the widely used "Willmes" presses. These presses require a source of air pressure. The other style of horizontal basket press has a central shaft with moveable plates at one or both ends. As the basket turns the plate gradually come together or back off depending upon the turning direction. Different cut-off systems are used. You will generally find these cost effective only when your production exceeds about 10,000 gallons per year. Used units can sometimes be found for under $10,000, but new units are gong to cost from about $12,000 up.

When deciding what press or presses to use, you need to consider what level of production you expect to achieve in the next 3 to 5 years. Don't overbuy since this equipment will require a significant portion of your capital.

Fermentation and Storage- Our experience has been that white wines can be fermented and stored in the same container. They may be placed in open fermenter for a few days, but there is no great advantage in doing so. Reds are much easier to make if they are fermented in open containers for a few days. Several different materials are used for cooperage with each having different strengths and weaknesses:

1. Stainless steel containers are durable and have low maintenance costs. They are easily cleaned and the cost is moderate, running from about $2 to $5 per gallon. Costs are reduced if you select sizes using standard sheet sizes to advantage. The most commonly used grades are 304 and 316. These containers are inert and do not permit oxygen transfer. There are some relatively inexpensive floating top tanks that have rubber gasket systems to seal the tops of the tanks at different volume levels. One advantage of these is that they make odd volumes easier to handle. They cost form $4 to $7 per gallon. It should be noted that exposure to string SO2 solutions will cause pitting.
2. Fiberglass containers may be more expensive than stainless steel except for the type of tank that is coated with food grade finishes rather being made entirely with food grade resins. They are lightweight, easy to move and, if properly made, inert.

3. Wood cooperage, especially oak barrels, tend not to be long-lived. Maintenance and handling costs are higher and there is some risk of springing leaks (usually at the most inopportune time). If a wine has been allowed to spoil in a barrel it may be both difficult and expensive to reclaim the container. A further disadvantage is the 5% to 8% loss by evaporation each year under normal cellar condition. Many wineries avoid using small barrels for the above reasons, but it is difficult to produce traditional red wines without using them.
4. Other container materials include glass carboys, suitable only for small amounts of wine; glass or plastic lined tanks, which are generally only used in larger wineries; and plastic (polyethylene) tanks. With the latter you must be careful to get high density tanks where oxygen transfer is not a problem as it is with many of these tanks. For short term storage there are 60 gallon plastic shipping drums that can be purchased used at a cost of $4 to $10 each from some food plants.

Pumps- Pump prices and capabilities vary greatly. Durability, convenience and capacity all come at a price. Stainless pumps are best and longest lasting, but satisfactory pumps are available which are made of bronze or plastic. Centrifugal pumps with flexible impellers are the least expensive, starting around $250, but they aren't easy to prime and are not suitable for filtration uses. Rigid impeller pumps will prime much better but are more easily damaged by particulate matter. Filter units will use rigid impeller pumps of smaller capacity and tighter tolerances. Must pumps which are used to pump pulpy liquids are quite expensive, starting at about $3,500, and are seldom found in small wineries.

Filters- These are expensive but fairly necessary items. Their main advantage is in helping to get wines ready for sale sooner. Types include cartridge filters which, while they are the cheapest at $300 to $1,500, have the most expensive filter media; plate and frame filters starting around $3,000; and DE (diatomaceous earth) filters which have the greatest starting expense at about $7,000 but much cheaper filter media. Crossflow filters start around $12,000 but have no media cost except to replace the ceramic filter tubes when they break. Used units are available, though it is unwise to pay a lot for "orphaned" units that no longer have a vendor servicing them.

Bottling- Most wineries use gravity type fillers. There are some very primitive units available for $200 to $400, but most wineries will do better to buy a more expensive stainless steel model such as produced by GAI at $1,000 to $1,500 for 4 or 6 spout units. These units are adequate for bottling levels of up to 400 to 700 gallons per day. Gravity fillers will need an accompanying storage tank with an opening and preferably a valve at the bottom of the tank. Vacuum fillers start at about $5,000. Manual floor model corkers run from $70 up to $500 and can handle at least 500 gallons per day. Semi-automatic corkers are much easier to use but start at over $7,000.

An alternative is to hire an itinerant bottler who can come to your winery and bottle everything quickly and with good sanitation. One such vendor in the East charges about $1.50 per case which includes bottling, capsuling, corking, and even labeling if the winery has pressure sensitive labels on rolls (and wound in the correct direction). The winery would supply bottles, corks, capsules, inert gas, some labor, and would either supply or pay for filter cartridges. This is actually quite cost effective although it limits the winery to infrequent and rather large bottlings.

Labeling- The cheapest label applicators start at about $150. Motorized labelers increase speed by 25 to 50 % and cost from $400 to $700. This is a slow and expensive process in any small winery. Pressure sensitive labels can be applied without the above label applicators, but are available with somewhat limited types of paper stock.

Laboratory Equipment- This is not a big factor for most small wineries. You must have a means of testing alcohol (not in order to make better wine, but because of tax rates). The most important tests for quality control are for sugar solids and total acidity followed by pH and SO2.

Most wineries use an ebulliometer for testing alcohol which costs about $600. The test takes about 8 to 10 minutes compared with 30 to 40 minutes for a small distillation apparatus which might cost less than $200. Rental or share agreements with other wineries are worth pursuing.

Sugar content of grapes or other fruits can be measured by hydrometer or refractometer. The refractometer, which costs from $170 to $400, is easier to use in the vineyard as the grapes ripen because you can measure individual berries. Once fermentation has started, however, its readings are

useless. A hydrometer will cost between $4 and $15 and will give the same accuracy. It does require the preparation of a simple in which the hydrometer will float.

Total acidity is tested with a simple titration unit which may range in price from $25 to $100 depending upon ease of use and accuracy and how much you need to show off! Some red wines are difficult to measure because of color interferences with the end point in which case a pH meter is quite valuable.

pH is an important factor with grape varieties or other fruits that tend to be unbalanced. pH meters will cost from $200 up. Sulfer dioxide testing apparatus is not expensive, but the standard Ripper tests are a pain because you need to restandardize your reagents every time you use them. The Chemetrics titret units cost a little more and are very convenient to use.

Summary

I strongly recommend that anyone planning to start a winery should take the time to visit as many operations as possible. We did this when we started and were cordially received in every case and given good advice, particularly about mistakes that had been made by those we visited. You well avoid some obvious mistakes, get some excellent ideas, stay away from reinventing the wheel, and in a few cases may even decide against entering this business. Some of you may end up making some fine wines or even making a living from this business at some future time, and I should point out that these are not necessarily mutually exclusive goals.

It is getting much harder to enter this business on the low cost end that it was a few years ago for many reasons including increased federal and state taxes, environmental concerns, etc. Entering at a higher capital input increases future profit potential, but at the same time increases the chances and the consequences of failure.

I have learned that I don't have the wisdom or perhaps the sufficient analytical ability to predict which operations will likely succeed and which will fail. I admit that there is some comfort in discovering that no one else seems to do much better at such analysis. Endurance, intelligence, work ethic, creativeness, ability to connect, attention to detail, discrimination and other attributes all play a part in success, but just plain luck often seems to be a large factor in the equation. Not all wineries that close down are failures even when thought so by those involved in such operations. Some good ideas are not successful simply because of bad or even unlucky timing. There are vehicles in human behavior and attitude over which we have little control. Consider for instance the periodic rise and fall of prohibitionist sentiment.

While we can't ignore financial factors in this business it is obvious that for many winemakers artistic factors loom large in their decisions. Many of us can easily forget hours and years of drudgery and frustration and are buoyed by remembering shared wines and foods. We are part of an interesting industry where few of us think of other wineries as competitors, but rather as fellow sufferers. If we have done something right we are more likely to enlighten our neighbor than to suppress our information, and this is one of the charms of this business.

Another positive factor in the wine business is the availability of research and extension personnel to service the industry. State boundaries are almost never a factor in your being able to utilize such resources as conferences.

For those of you wanting to start a winery, I offer an encouraging hand and good wishes. At the same time I urge you to proceed with caution and good sense and to do detailed and continuous financial analyses.