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THE UNIVERSITY OF ARIZONA, 1987

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AN ECONOMIC EVALUATION OF PREMIUM VINEYARDS AND WINERIES IN ARIZONA

by

Thomas Anthony Brady Jr.

A Thesis Submitted to the Faculty of the

DEPARTMENT OF AGRICULTURAL ECONOMICS

In Partial Fulfillment of the Requirements
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1987

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ABSTRACT

Economic and financial analysis is conducted on small, premium vineyards, wineries and joint vineyard and wineries in Arizona. The vineyards range in size from twenty acres to one hundred acres, and the wineries from twelve thousand gallons to sixty thousand gallons. The objectives are to estimate the potential demand for Arizona wine, construct budgets for winegrowing enterprises, and evaluate the economic and financial profitability varying interest rates, prices of grapes, and receipts. Results indicate favorable conditions for the establishment of an indigenous wine industry. Small vineyards and wineries can be profitable, especially when economies of size are gained and strong retail sales are established.

CHAPTER ONE

INTRODUCTION

Viticulture was brought to the western shores of the Americas by Spanish conquistadors. As the unexplored frontiers were pushed back, grape culture advanced. During the seventeenth and eighteenth centuries the spread of grape and wine production in western North America was largely associated with the Catholic Church. Early in the nineteenth century the Spanish missions had increased contact with the rest of the world as ships began to stop frequently at Californian ports. This greatly augmented the facilities for wine production in that state. Commercial and private plantings of vines began in earnest in the 1820's and prospered until national Prohibition thoroughly disrupted the industry a century later (Adams, 1973).

Repeal of Prohibition, in 1933, occurred in the midst of the great Depression, and winegrowing in America was slow to rebound. Although per capita wine consumption was more than six gallons annually in 1920, before Prohibition, it took decades for consumption to climb back over one gallon after Repeal. In the 1940's, 1950's, and most of the 1960's, the predominant types of wine sold in North America were sweet dessert wines and "pop" wines which were artificially

flavored, low alcohol varieties with perceptible residual sugar. In the mid-1960's the United States, led by California, entered into an unprecedented wine boom based on premium European classic grape cultivars such as Chardonnay and Cabernet Sauvignon. By 1968, table wines had surpassed dessert wines in total sales. In 1972, per capita wine consumption in the U.S. increased to over two gallons. In 1982, total wine sales out-stripped total hard spirits sales in the United States for the first time. In 1985, wine sales, including wine coolers, were up 4.1% to 577.2 million gallons. For the entire post prohibition era (1934-1985) sales of wine grew at an annual rate of 5.8%, increasing from 32.7 million gallons to 577.2 million gallons. Per capita wine consumption grew from 2.34 gallons in 1984 to 2.42 in 1985 for a 3.4% increase (Wines and Vines Statistical Issue, July 1986). Between 1975 and 1980 the number of bonded wineries in the United States grew from 569 to 822. From 1980 to 1985, 467 more premises were added for a total of 1,289. Half the growth in wineries occurred outside of California. Forty-one states possessed at least one bonded winery (TABLE 1).

ARIZONA WINEGROWING

The history of viticulture in Arizona reflected the relatively slow development of this State and the difficult agricultural obstacles indigenous to the region. A few

TABLE 1
Bonded Winery Premises, by States.

STATE	1985	1980	1975
California	676	470	323
New York	95	54	41
Washington	54	18	9
Pennsylvania	51	28	12
Ohio	48	41	32
Oregon	46	33	16
Missouri	35	19	15
Virginia	32	10	4
Michigan	31	20	12
Iowa	19	14	12
New Jersey	18	14	17
Texas	18	5	3
New Mexico	17	4	6
Indiana	12	9	5
Massachusetts	12	3	4
Maryland	12	11	4
Connecticut	11	4	2
Wisconsin	11	9	11
Florida	9	5	4
Illinois	8	5	6
Arkansas	7	9	14
Idaho	7	2	2
Georgia	6	4	1
Tennessee	6	0	0
West Virginia	6	1	0
Mississippi	5	4	0
Alabama	4	0	1
Arizona	4	0	0
Minnesota	4	2	2
North Carolina	4	4	0
Rhode Island	4	5	0
Colorado	3	1	2
Oklahoma	3	4	3
South Carolina	3	3	1
Kentucky	2	3	0
Maine	2	0	1
Delaware	1	1	0
Hawaii	1	1	1
Louisiana	1	0	1
New Hampshire	1	1	1
Utah	1	0	0
Vermont	0	1	1
TOTAL	1,289	822	569

Source: Wines and Vines Magazine July 1986, July 1981, and May 1976.

scattered efforts were made to grow wine grapes in central Arizona in the latter decades of the nineteenth century, but most of the natural areas for such an endeavor in southeastern Arizona were under control of hostile Apaches. In the early decades of the twentieth century Prohibition halted any serious commercial ventures.

The University of Arizona became interested in wine grape growing in the early 1970's as a by-product of a water harvesting project. The water conservation research was aimed at watering crops solely from rainfall using contours and terraces. It was found that grapes required half the water per acre of some of Arizona's traditional crops like cotton and alfalfa, and the wines produced by the fruit were of surprisingly consistent high caliber. A number of experimental vineyards were planted around the state, including one on the Babocomari Ranch near Sonoita in Southeastern Arizona. A University winery was set up to evaluate the wines. The results of the research were coupled with similar data from New Mexico, Colorado, and Utah, and were published in 1980 (Dutt, 1980). The conclusion for Arizona, especially at higher elevations, was that there was good potential to produce fine, premium quality vintage wines from the classic Vitis Vinifera grape varieties.

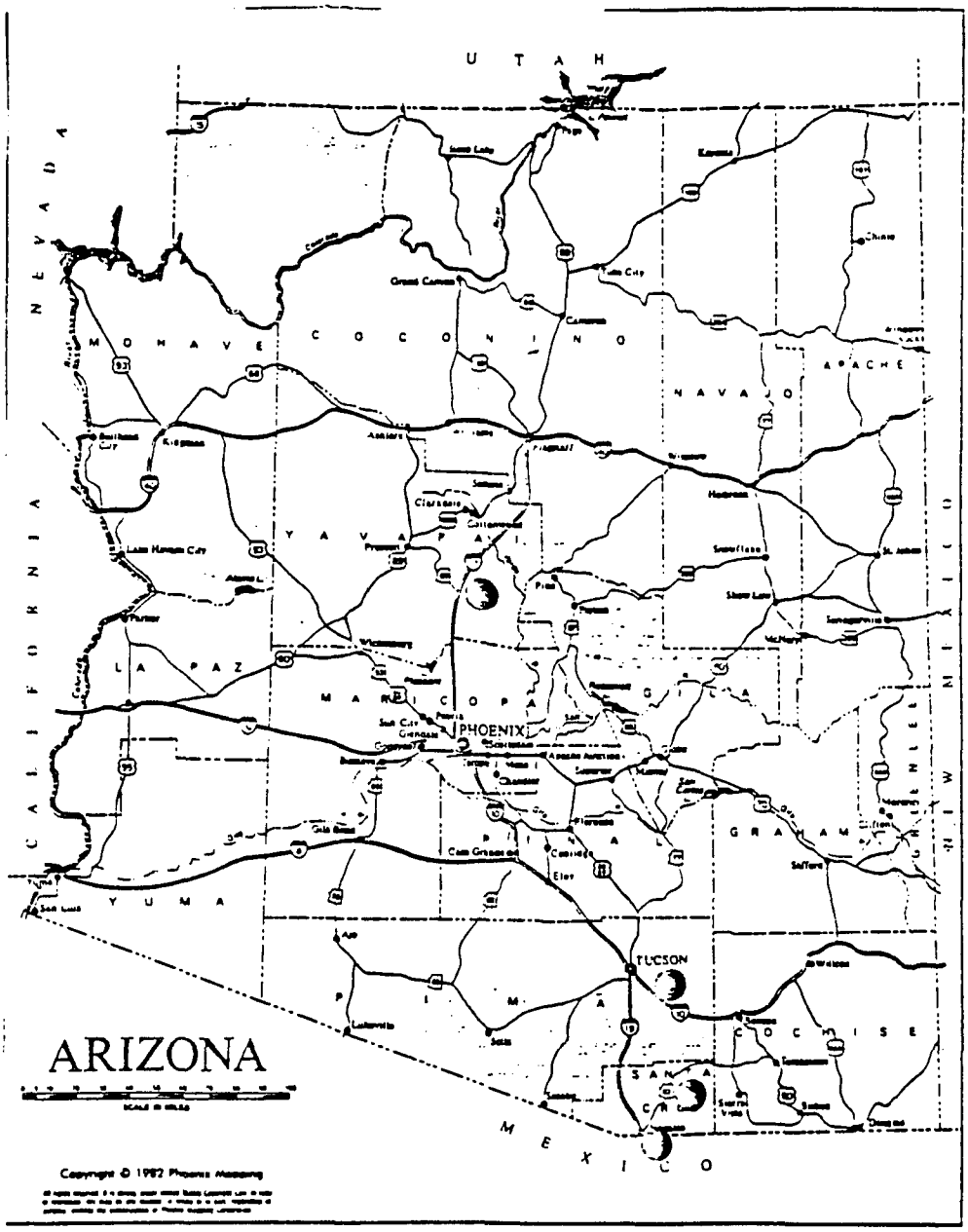
In 1980 Arizona's first new bonded winery, located in Tucson, released wines produced in Arizona made from fruit from California and Mexico. In 1981, an Arizona Wine Growers

Association was formed which lobbied successfully for the passage of a State Farm Winery Bill which recognized wine as an agricultural product and reduced taxes on Arizona wine, in addition to allowing for direct retail sales at state wineries (Appendix A). In 1984 two additional bonded wineries, established in Sonoita and in the Verde Valley north of Phoenix, released Arizona wines produced from Arizona fruit. In 1984 the Sonoita Viticultural Area became Arizona's first federally created appellation of origin district (Appendix B). An annual wine festival was inaugurated in Sonoita that same year. In 1985 a fourth bonded winery opened outside of Nogales (Figure 1). In 1986 the first Arizona Wine Competition was held in conjunction with the Third Sonoita Wine Festival, and The Arizona Wine Journal began publication. From 1980 to 1986 approximately 150 acres of premium wine grapes were planted in Arizona, mostly concentrated in the southeastern portion of the state at elevations between 4,000 and 5,000 feet. In 1987 approximately 100 acres of wine grapes are expected to be planted in Arizona.

SONOITA

The first recognized winegrowing region in Arizona is Sonoita. The bulk of the fine wine grapes grown in Arizona in 1986 and planted in 1987 are in Sonoita. This paper will use the Sonoita area as a basis for a case study

Figure 1. Locations of Arizona's Four Bonded Wineries.



on Arizona winegrowing.

The Sonoita Viticultural District is the focal point of the present wine industry for a number of reasons. It is located sixty miles southeast of Tucson in a popular historic setting. The area was first explored in 1539 by Fray Marcos de Niza, a Franciscan, whose fanciful report of finding the mythical Seven Cities of Cibola soon brought Francisco Vasquez de Coronado to the land searching for wealth and glory. The first real settlement by non-Indians came in 1691 when Padre Eusebio Francisco Kino, a Jesuit missionary-explorer, established a visita for the Sobaipuri Indians. The visita was called Los Santos Reyes de Sonoita. The area was slow to develop, primarily because it was in the center of Apache controlled lands. The Gadsen Purchase of 1853 secured this territory for the United States. The area is classified as "high desert grassland" and is surrounded on all sides by mountains which are part of the Coronado National Forest. It is zoned for agricultural use. Sonoita is outside of the Tucson Active Management Area, and is therefore not subject to the moratorium established by the 1980 Groundwater Management Act, which prohibits new irrigated agricultural acreage in active management areas (Richardson, 1971).

The primary soil association for the Sonoita area is a combination of Bernadino-Hathaway-White House gravelly loam. This series of soils can be more than sixty inches deep on

slopes ranging from 0 to 10 degrees. The soils are formed in old alluvium from igneous and calcareous sedimentary rocks. Grape vines are deep rooted plants that require good water drainage and light to medium soil fertility. These soils provide both. Average annual precipitation for the region is approximately 18 inches. The mean annual temperature is around 60 degrees Fahrenheit. The frost free season is over 200 days (Richardson, 1971). The high altitude of Sonoita allows for cooler average temperatures which slow ripening of fruit and aid in producing a balance between acid, which gives wine body, and sugar, which is fermented into alcohol. On cold nights late in the spring or early in the fall, the cooler air will tend to journey down the broad slopes while the warmer, less dense air will rise up the plains, thereby affording a degree of protection for the vines planted on hill sides. Water runoff is slow and the hazard of erosion is slight. The soils have moderate to high available water capacity, which contributes to good drainage. Current vegetation is mainly grasses and forbs, and historically the land has been used for grazing livestock and wildlife. The natural attractiveness of the area, the horse races and restaurants in Sonoita, the lakes and mountains of the Coronado Forest, the popularity of nearby towns like Patagonia and Tombstone, and the proximity of Tucson, all combine to make the location a reasonable choice for

wineries that are predicated on strong tourist traffic and on-site retail sales (Figure 2).

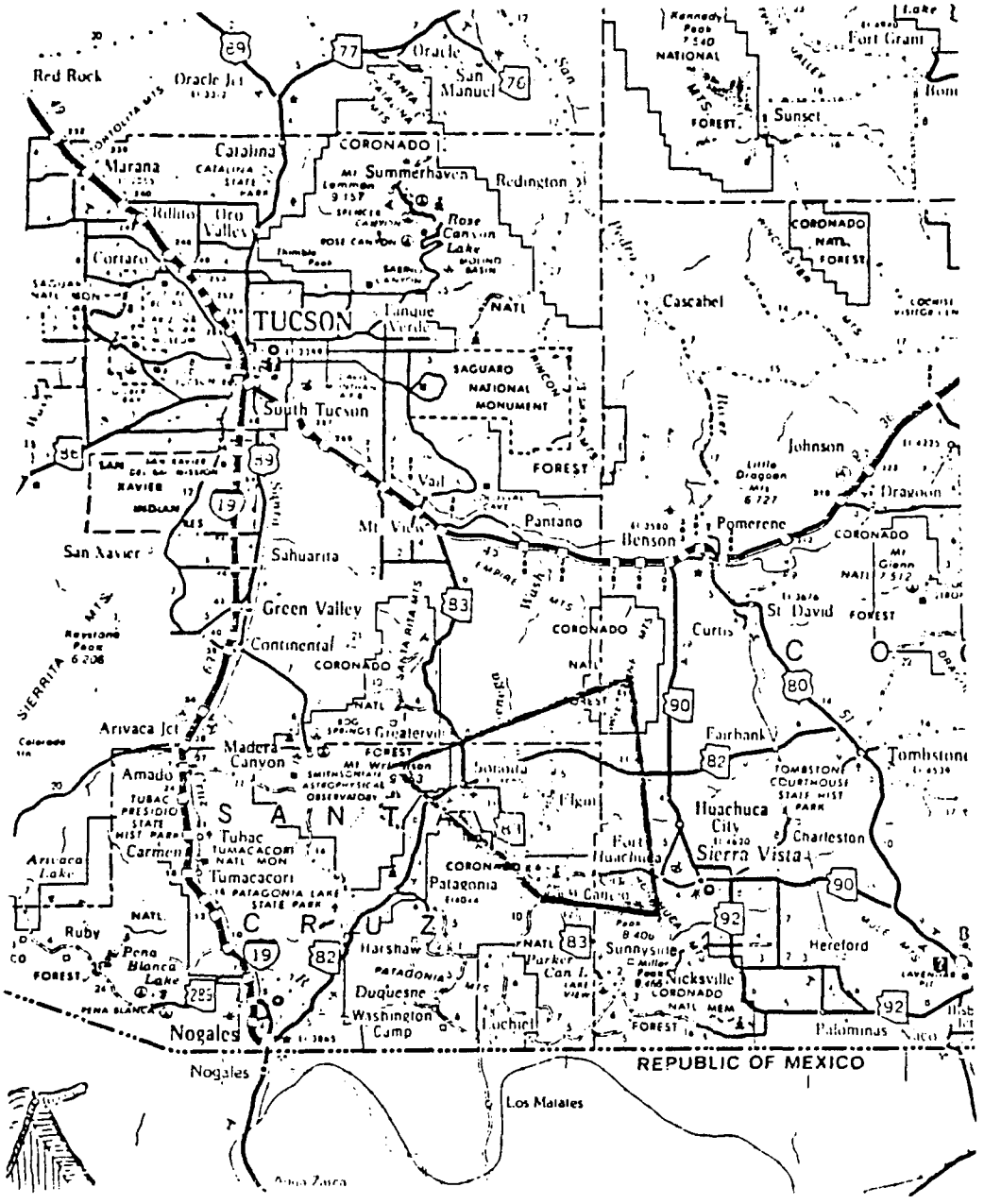
Other Arizona areas that wine vineyards are being planted in, include the Sulphur Spring Valley in Cochise County south of Wilcox, the area surrounding Bonita in Graham County, the southern slopes of the Rincon Mountains between Vail and Benson, and the Verde Valley north of Phoenix. It is the author's opinion that many more micro-districts exist in Arizona that have yet to be used for viniculture. An unscientific method of finding potential sites is to locate in areas where apples can be successfully grown. Apples blossom before grapes and are exposed to the dangers of frost earlier. If apples can thrive in a locale then it is reasonable to surmise that wine grapes would also flourish.

RISKS

Agricultural risks involved in growing premium wine grapes in Arizona are varied. Vitis Vinifera grape vines are hardy plants which have adapted to harsh enviroments around the world. They can withstand a series or combination of inflictions with minimal fruit loss. However, the possibility always exists that a particularly unfortunate set of disorders could occur, resulting in severe crop loss or extensive vine damage.

The most important disease of grapevines in the

Figure 2. The Sonoita Viticultural Area.



Southwest is a fungus called Texas Root Rot (Phymatotrichum omnivorum). The symptoms of the disease is prevalent during the warm months of June through September and it will penetrate the outer living tissue of grapevines and destroy the roots. Should the crown of the root be attacked, death of the vine will ensue. Badly infected vines show a great deal of defoliation, dead wood, decayed roots and raisined clusters. There are two treatments available if the problem does appear, both are expensive. One method of solving the problem is to apply sulfur to the soil to lower the pH, in order to control the growth of the rot. An alternative if the rot is suspected is to use grafted vines with a resistant rootstock in future plantings. Neither practice is totally effective. The only sure way to avoid the disease is to select a vineyard site that is root rot free (Dutt, 1980).

Two other fungal diseases that pose a more certain, but less serious challenge, are Powdery Mildew and Bunch Rot. They both lower fruit quality by causing the berries to prematurely decay. Sulfur dust sprays are the most effective means of controlling these diseases. Other potential problems are leafroll, yellow mosaic, corky bark and yellow vein. These infections tend to reduce the general vigor of the vines and fruit production. The best control over these irritants is to insure that only certified, virus-free rootings are planted in the vineyard.

A variety of insect pests exist in Arizona that cause concern for grapegrowers. They include the flea beetle, grape leaf hopper, grape leaf folder, the western grapeleaf skeletonizer and possibly phylloxera. Most of these destroy buds, young leaves, tendershoots or fleshy root tissue. The usual remedy for these threats takes the form of sprays that won't enter or can be filtered out of wine. Other pests that most surely will be encountered in Arizona vineyards, with varied detrimental impacts, will be birds, deer, rabbits, mice, gophers and tourists. These are potentially serious causes of grape losses and tender shoot damage. A couple of good vineyard dogs, or noise-making carbide cannons are recommended to keep these pests at bay.

Weather injury from hail, lightning, excessive heat, early and late frosts and severe winter cold will be constant threats to Arizona vineyards. There are several weeks at a time when one or several of these problems will be a major concern. An untimely hail at flowering or just before harvest could reduce potential or actual production. Lightning has been known to hit a trellis wire and wipe out an entire row of vines. Excessive heat may cause an early ripening, reducing acid and fruit balance. Frosts in the spring can damage young shoots and in the fall can destroy late ripening fruit and the following year's fruiting canes. A severe winter also can impair potential production by

hurting dormant buds and wood.

While the list of potential agricultural dangers for winegrowers seems extensive, there is little evidence that viniculture in Arizona poses more problems than other fine wine growing districts around the world. The list of viticultural concerns faced in other regions, but not posed in Arizona is more extensive than the threats listed for this state. The salient point here is that other established winegrowing regions have a history and therefore a record of dealing with their agricultural idiosyncrasies, in Arizona the labor has just begun.

THE MARKET

Total wine consumption in Arizona in 1985 was 8,983,000 gallons, up from 8,215,000 in 1984, Arizona produced roughly 0.002% of its own consumption in state bonded wineries, the balance was imported from out of state (author's calculations). Currently the four bonded wineries in Arizona have a combined capacity of 44,000 gallons. Total actual production in 1986 will be half that figure. Most of the wines produced in Arizona will be made from Arizona grown fruit, however these will be comprised largely from lesser table varieties rather than fine wine grapes. None of the estimated 150 acres of fine wine vineyards in Arizona have reached full maturity.

Viniculture in Arizona presents some unique

opportunities for marketing. There are three main varieties of grapes grown in the United States for table wines: native American grapes, French-American hybrids, and European Vitis Vinifera. American grape varieties such as Concord, Catawba, Delaware and Niagara are big producers with immunity to many pests and diseases. Their fruit has a distinctive " Welch's grape" flavor that one would associate with grape soda pop or grape chewing gum. The grape can be vinified into sweet dessert wines and have been for years. Unfortunately, the grapy flavor that is so characteristic of the fruit, when vinified dry, becomes harsh and dominates. This "foxy" flavor has been rejected by wine drinkers, and so American varieties are seldom used for dry wines. The growth of the dry table wine market at the expense of sweet wines has hurt traditional grape growing areas, mainly in the east and south, that have relied on these varieties (Adams, 1973).

The French hybrids were created by a catastrophe in the vineyards of Europe during the latter parts of the 19th century. In the 1860's an aphid native to the United States was exported to France on some grapevine cuttings. This louse attacked the root systems of vines, eventually killing them. The European vines have fleshy roots and are especially susceptible to an attack by phylloxera. American varieties have a woody, more fibrous system and some natural immunity. By the 1880's virtually all the vineyards of Europe had been hit by the pest, with up to 90% of the vines

destroyed. One solution to the problem was to cross breed American varieties with European varieties in order to produce vines that had immunity to phylloxera coupled with good, traditional fruit. The hybrids that resulted are currently being planted extensively in the east and mid-west United States because they have good winter hardiness, immunity to phylloxera and produce wines akin to the European varietals (Wagner, 1965). The general criticism of hybrids is that, while they produce good wines, they are incapable of producing great wines.

The great wines of the world are produced by the European species Vitis Vinifera. Phylloxera spread virtually all over the wine-growing world and, ironically, made its way west of the Rockies into California on vines imported from France. The alternative solution to the use of hybrids in combating phylloxera and the one employed in France, Europe and California, was to graft the European scion onto native American root stock. This provided immunity to the aphid and allowed the use of the classic fruit for vinification. Today most of the premium wine vineyards of the world are grown on American root stock (Winkler, 1974).

A few eco-niches exist that have escaped the phylloxera infestation. The Andes have protected Chile. Parts of Australia, South Africa and even California have been spared. The southwestern desert of the United States has

proven so far to be too hot for the pest. The Sonoita "appellation of origin" district is one of those rare areas where classic Vinifera varieties will thrive on their own roots and may produce distinctively varietal wines which will display the nuances of pre-phylloxera vintages.

Vintage dates on labels also add value to wines. The vintage label applies to the year the fruit was harvested. Wines made from the fruit of one vintage year are considered special for the mystique of tasting a summer a few or many years past. Boutique or small wineries in approved appellation regions commonly produce premium table wines using the estate bottled, varietal, and vintage date designations. Estate bottled wines are wines made exclusively from grapes grown in vineyards that are in federally recognized viticultural districts. Varietal wines contain at least 75% of one grape variety such as Sauvignon Blanc. Vintage wines are vinified from fruit gathered in the same harvest year. These compare favorably to ordinary table wines that are often made from the fruit from many vineyards in different areas, blended with a variety of grapes from several vintage years. The designation of Sonoita as a recognized viticultural district creates the potential for wines with the estate bottled label to be produced in Arizona.

In the last fifteen to twenty years there have been major strides made in the technology of winemaking. Much of

it has originated in California. The trends have been toward wines that are not big and alcoholic, but rather light with the emphasis on fruit and varietal character. The greatest single radical change that has been adopted in wineries has been the use of stainless steel refrigeration tanks. This allows the winemaker complete control over temperature and fermentation. Subtle, easily dissipated flavors are more readily retained under controlled conditions. Advances in yeast strains, filtration, lab monitoring procedures and oxygen control during bottling have also contributed to clean, crisp, consistent wines. Most of these changes have been exogenous in nature. The endogenous, ages old process of yeast acting on grape sugar and converting it to alcohol and free CO2 continues as always. The upshot of these technological advances is that relatively young wineries employing these new concepts can be extremely competitive in wine quality. The possibility exists for Arizona to produce high standard wines in a short period by embracing the latest procedures.

OBJECTIVES

The general objective of this work is to determine the economic feasibility of small, premium, vineyard and winery investments in Arizona. The procedure is to estimate the costs and returns from three different sized vineyards and farm wineries based on various assumptions regarding input

costs, output prices and the Arizona market. The specific objectives of this study were to:

1. Determine the total investment costs of establishing and maintaining three different sized vineyards;
2. Determine the total investment costs of building and operating three different sized wineries;
3. Determine the total investment and operating costs of the three different sized vineyards combined with their appropriate sized wineries.
4. Estimate the annual cash flow for each vineyard and each winery, and each vineyard combined with its appropriate sized winery.
5. Evaluate the potential market for Arizona wines in Arizona.
6. Determine the impact of various alternative assumptions concerning input costs, product mix and output prices on the profitability of the investments using net present value and internal rate of return analysis.

CHAPTER TWO

LITERATURE REVIEW

A small amount of data have been generated on the economics of combined vineyard and winery ventures in the United States. No in-depth studies have been made on the two facets of winegrowing in Arizona. A considerable amount of literature has been published nationwide pertaining to the economics of vineyards and a more limited output of research is available on winery budgets. The following is a general literature review of the economic considerations pertaining to the viticultural, enological, and marketing aspects of winegrowing.

VINEYARD SITE SELECTION

Site selection is the initial concern in establishing a premium wine vineyard. Technical Bulletin 239 published by the University of Arizona as part of the Four Corners Regional Commission's research into grape and wine production, Dutt (1980), attempted to delineate the grape growing areas in the Four Corners Region. These ranged from the hot low deserts of Arizona and New Mexico to the cool high valleys of Colorado and Utah. Arizona was a Zone V according to the California base 50 growing-degree-day (G.D.D.) model. The G.D.D. method wasdevelopedto aid in

determining varietal suitability for a given location. The G.D.D. calculates the heat summation units of a region. The approximate temperature at which vine growth begins is 50 degrees F. which is the temperature base. Heat summation refers to the sum of the mean monthly temperature above 50 degrees F. for the period concerned. The summation is expressed as degree-days. Areas are segregated into five grape producing regions when the total degree days are calculated. The climatic districts are:

TABLE 2

Region	Growing Degree Days
I	less than 2,500
II	2,501 to 3,000
III	3,001 to 3,500
IV	3,501 to 4,000
V	over 4,001

A region V has the hottest climate of the areas that can produce grapes and is generally not recommended for premium wine varieties. It is well suited for table grapes. The Four Corners study developed a new model for delineation of viticultural zones. It was found that a model based on soil surveys and altitude allowed for wider climatic conditions to be evaluated in making varietal recommendations and predicting wine quality. The study concluded that at altitudes above 4,000 feet where thermic soils are found and good air drainage exists, premium white

and red table wine varieties could be grown. The significance of the research was that it challenged the assumption that Arizona was to hot for wine grape production.

The Four Corners report noted that the most important consideration for developing a successful grape vineyard was the selection of the vineyard site and the grape varieties planted. Site selection based on mean minimum and recorded maximum temperatures, rainfall, growing season length and heat summation provides little empirical data for varietal selection. The Four Corners model attempted to take the major selection criteria away from the growing degree day concept and placed it on soil characteristics. Soils considered for wine grape production should be low in organic matter and permeable with good drainage. They should be hyperthermic, thermic or lower mesic, which means the mean annual temperature at a 50 cm depth should be greater than 47 degrees F. Success in matching regions to varieties will be one of the primary viticultural concerns in Arizona for decades to come.

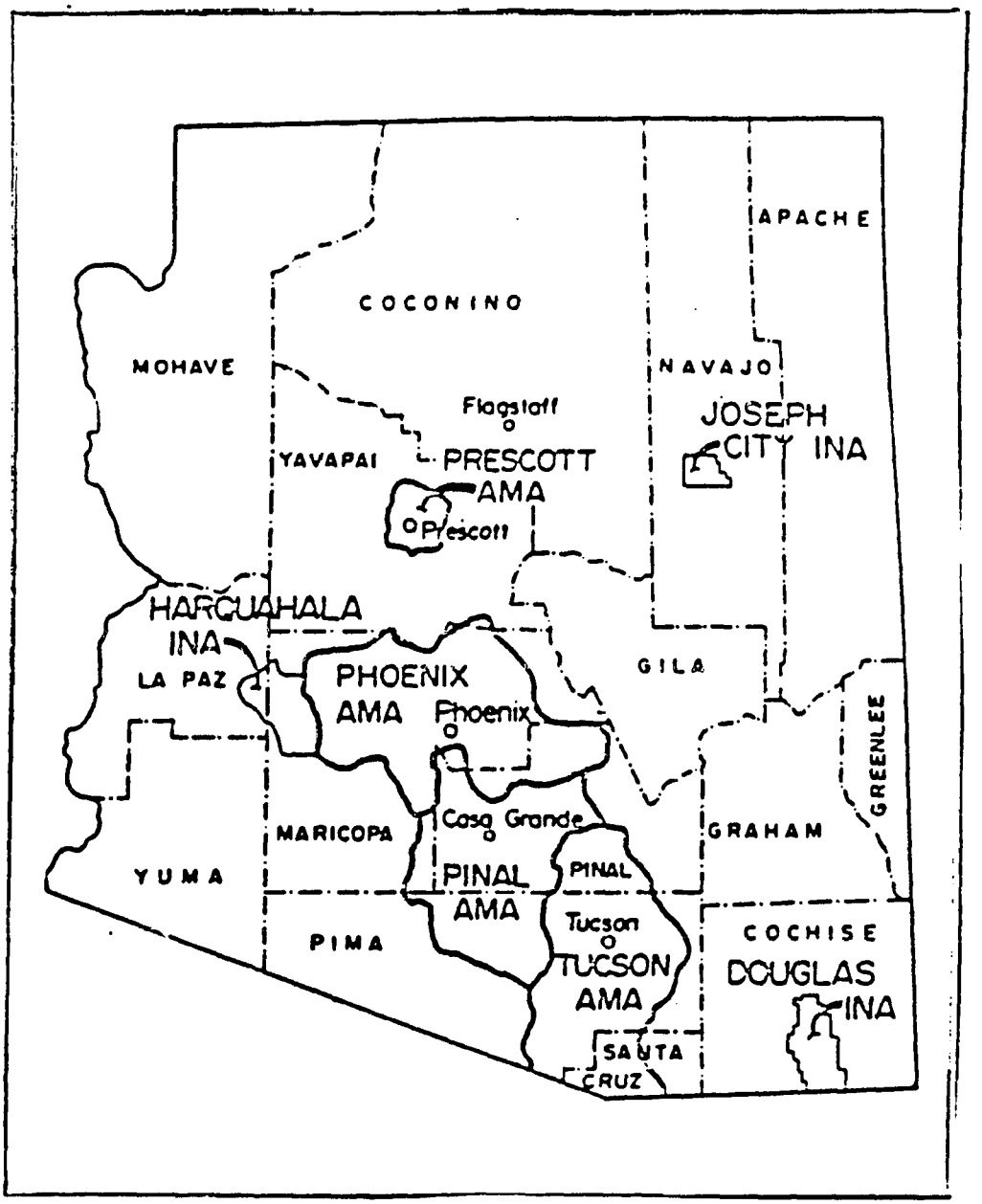
Savage and Hamman (1984) found in a study in Colorado that the price of land was the most important financial factor in vineyard investment and would probably determine the economic feasibility of a vineyard regardless of other costs. Price is viewed as the primary criteria for site selection. Winkler (1974) stated that temperatures and

exposures were the first considerations in site selection, followed by the amount, nature and season of rainfall, prevailing winds, soil conditions and the presence of specific wine pests or diseases. In Arizona the availability of water is of paramount concern. The vineyard site selection process must take into consideration the 1980 Groundwater Management Act, which limits irrigated agricultural acreage in active management districts (Figure 3). Careful attention must also be given to elevation and slope to guarantee slow, even ripening of fruit and frost protection. Accessibility to electric power is another consideration. If a winery is to be included with the vineyard, the site should reflect the need to locate in an area favorable for winery retail sales.

EQUIPMENT

The costs associated with equipment and machinery vary for different vineyard sizes and establishment practices. Vaden and Phillips (1982) estimated that a ten acre vineyard in Virginia would require $35,650 worth of machinery. Annual repairs were estimated at one to three percent of the purchase prices. White and Jordan (1978) estimated that the typical grape equipment fixed costs for a fifty acre vineyard in the Great Lakes Region would be $45,050. Smith (1981) estimated that the minimum

Figure 3. Active Management Areas and Irrigation Non-Expansion Areas in Arizona.



Source: Water Resources Department of Tucson Active Management Area. 371 South Meyer Ave. Tucson, Arizona.

cost of items of equipment required to run a vineyard to be $27,800. The costs were for new equipment. The major purchases for all the studies were tractors, pick-up trucks and spray rigs. These will also be the major equipment outlays for vineyards in Arizona.

A major item overlooked in most vineyard studies is the cost for an equipment service center. White and Jordan (1978) assumed one building with combined shop and machinery storage. In their model a building 48 by 36 feet was suggested with one end of the shop area, 16 by 36 feet, finished with a concrete floor. The estimated initial cost of the building was $8,100. The author suggests the following basic features common to farm shops adequate for servicing and minor repairs of big machinery; big doors, complete sets of hand tools, stationary power tools and portable power tools, a welder, parts storage, good lighting, compressed air, water and heat. Areas should be included for metal work, wood work, general repair, storage and service. A seperate room for storage and handling of spray materials is also recommended.

ESTABLISHMENT AND MAINTENANCE

High flucuation is exhibited in the costs of developing trellis systems for premium wine vineyards. Dutt (1980) found per acre costs, based on a forty acre planting with a 7' by 12' spacing, 522 vines per acre, to range from

$443.70 for a head-trained system on stakes, to $1196.94 for a Geneva double curtain using posts, deadmen and crossarms. Vineyards are known to remain viable forty to eighty years. High quality materials must be employed in trellis construction to ensure durability. In Arizona the author suggests the addition of a bottom wire and clamps to support the drip irrigation lines off the ground. Wire borne irrigation lines are exposed to less damage from pests and machinery, and contribute to cultivation efficiency by allowing for mechanical cultivation via a French plow or grape hoe.

Careful attention should be given in laying out a vineyard to prevailing winds and sun exposure. A novel concept that could be incorporated into a vineyard design is water harvesting. Coupal (1985) estimated construction and operating costs for an eight acre vineyard in the Page Ranch experimental water harvesting system. The water harvesting system consisted of a series of linear microcatchments with a four-foot strip at the bottom for growing crops. Water harvesting was the only source of irrigation water available for the crops grown in the system. A fifteen year cash flow summary for the vineyard operation was presented. The study concluded that land necessary to collect enough irrigation water in a water harvesting system for a vineyard was too large to be economically feasible. A more practical usage for water harvesting would be to combine it with drip

irrigation and use it as a means of conservation and a supplemetary water source. Contour planting coupled with a series of grape mounds and clean cultivation would be one method.

Vaden and Phillips (1982) found that establishment and production costs were influenced primarily by variety, vine spacing, training system, cultural practices and pest control. Savage and Hamman (1984) found that it was extremely difficult to project true costs of establishing and maintaining vineyards in cases of small acreage because of the various trade offs between labor costs and equipment costs. The costs of an irrigation system was found to vary widely from $500 an acre for gated pipe to $1500 an acre for an automated microsprinkler system which would reduce long term labor costs.

White and Jordan (1978) point out that the typical family farm vineyard and winery must also devote attention to non-cash costs such as owner management. Production decisions, labor management, purchasing decisions, marketing decisions, planning and coordinating as well as financing and record keeping are all aspects of winegrowing management that must be addressed. The value of owner management is difficult to isolate since the operator frequently performs the dual tasks of manager and laborer, often simultaneously. Procedures for estimating the value of management include a

flat annual fee, independent of farm size; a flat per acre fee; a percentage of gross receipts; a percentage of total expenses; a flat annual fee plus a percentage of net receipts; or a charge per unit of time worked.

Booze-Allen & Hamilton Inc. (1982) conducted a study of the commercial feasibility of grape and wine production on University of Texas lands. The primary purpose of the project was to explore the practicality of establishing a new agricultural industry on the University's West Texas landholdings that would increase the University's income from the land surface and hedge against the ultimate decline of oil and gas lease and royalty income. They found that the time frame for evaluation of the economic feasibility of a vineyard venture was longer than typically expected. Results that looked very unfavorable at the end of ten years became very favorable at the end of twenty years. The project was found to be feasible under certain conditions; a large scale size, focus on white wines, competitive prices, partnership with a strong marketing organization and a long-term commitment. The long-term nature of vineyard and winery investments must be appreciated at the outset if the project is to have a reasonable chance for success. The industry joke about the capital intensive nature of the business is; "the way to make a small fortune in the wine industry is to start with a large one".

Kirpes and Folwell (1984) estimated the costs of

establishing and maintaining a fifty acre wine grape vineyard. They analyzed the rates of return for specific wine grape varieties. The estimated profit level was found to vary by variety due to the differences in yields and prices. While the average estimated profit level for the vineyard given eight different varieties was $427.13 per acre, the most profitable variety, Chardonnay, produced $984.28 per acre, while the least profitable variety, Gerwuztraminer, lost $146.39 per acre. The realized rate of return (RRR) was determined for the fifty acre vineyard. RRR differed from the internal rate of return (IRR) in that IRR assumed that the net cash inflows were reinvested and earned interest at the IRR. The RRR assumed that the net cash inflows were reinvested in alternative investments where returns differed from that of the original investment. The investment was profitable if the RRR exceeded the cost of capital. The average RRR was determined for each variety by randomly selecting different yields and grape prices for a thirteen year production period, various discount rates were used to show the effects on the rates of return (TABLE 3).

The range in average RRR's was from 12.1% for Gewurztraminer with a 10% discount rate to a high of 15.5% for Chardonnay with a 14% discount rate in cases of 100% equity position or where it was assumed that the total initial investment amount for the establishment years was

TABLE 3
Summary of the Realized Rate of Return for Eight Wine Grape Varieties at Various Equity Positions, and Before-Tax Discount Rates.

Variety	100% Equity Position Before-tax Discount Rates 10%	12%	14%
	%	%	%
Cabernet Sauvignon	12.59	13.29	14.02
Chardonnay	14.27	14.88	15.50
Chenin Blanc	13.24	13.91	14.60
Gewurztraminer	12.05	12.81	13.61
Merlot	13.18	13.85	14.54
Sauvignon Blanc	13.94	14.57	15.21
Semillon	13.93	14.62	15.32
White Riesling	13.98	14.67	15.38

Variety	80% Equity Position Before-tax Discount Rates 10%	12%	14%
	%	%	%
Cabernet Sauvignon	15.23	16.05	16.89
Chardonnay	16.54	17.20	17.89
Chenin Blanc	15.64	16.39	17.16
Gewurztraminer	14.55	15.41	16.30
Merlot	15.57	16.32	17.08
Sauvignon Blanc	16.43	17.14	17.87
Semillon	16.20	16.95	17.73
White Riesling	16.25	17.00	17.78

Source: Kirpes and Folwell (1984).

not borrowed. In cases of less than 100% equity it was assumed that 80% of the monies for the vines and trellis materials was borrowed at 14% for 7 years. The less-than 100% equity position produced a higher realized rate of return than the 100% equity position due to the increased cash flows in the early production years. This increase was the result of a lower income tax burden.

There is an important lessons derived from the study for potential Arizona winegrowers. Varietal selection will have an influence on profitability. The profit level will vary by variety due to the differences in establishment costs, yields and prices in the vineyards, and vinification practices in the wineries (Table 4).

TABLE 4

Suggested aging cycles for premium wine varieties.

VARIETY	BARRELS	WOOD TANKS	BOTTLE AGE
Cabernet Sauvignon	2 Years	-	1 Year
Pinot Noir	18 Months	-	1 Year
Merlot	1 Year	-	1 Year
Zinfandel	-	1 Year	6 Months
Chardonnay	6 Months	-	6 Months
Fume Blanc	6 Months	-	6 Months
Sauvignon Blanc	-	-	3 Months
Chenin Blanc	-	-	3 Months
Riesling	-	-	3 Months
Gewurztraminer	-	-	3 Months
Semillon	-	-	3 Months

Source: Peterson (1975).

What the exact variation in profit will be in Arizona for each variety is an unanswered question. The same

holds for variation associated with financing a winegrowing operation. A degree of control may be exercised over equity position but not over the cost of capital or taxes. The equity margin, cost of capital and taxes are influences that will definitely impact on profitability.

WINERY STUDIES

Peterson (1975) provided an indepth look at the information and decisions which should be reviewed and completed prior to planning a winery. He described the fixed conditions that should be determined from the outset as, the business plan, the source of grapes, the source of capital, and the source of personnel. After the basic preconditions were met, the actual calculations for building and equipment size could begin (Appendix C). Robbins (1980) estimated $40 a square foot for constructing a winery building. For a 25,000 case capacity premium winery he projected operating costs of $35.25 a case and investment costs of $43.65 a case. Equipment costs would be $682,800 to set up a winery with standard presses, pumps, barrels, refrigeration equipment, bottling and labeling equipment and other materials. The estimation of costs were considered to be in the middle range for all items.

Cooke, Reed and Keith (1977) offered guidance to those factors in design that influenced costs in the construction of wineries, and presented examples of

approximate costs for building table wineries for wholesale, retail, and direct sale markets for several sized wineries in California. They estimated that construction of a winery involved nearly 24 governmental and related agencies including an enviromental impact report. They recommended having a master plan since all required facilities were rarely built in the first year. The master plan should include the number of construction phases, the starting date for each phase and the approximate cost of each phase. The factor of inflation should be considered in long-range cost projections. An analysis of the cost components listed in their table revealed that the cost for the building, processing equipment and contingencies which covered material testing, design, inspection and construction management, accounted for 78 percent to 89 percent of the total cost to build the representative wineries. It snould be noted that a considerable portion of the processing operations of wineries constructed in Arizona could be located outdoors, thus minimizing the need for building space and therefore reducing total construction costs.

Webb (1976) stated that the small winery must have approximately 250 gallons of fermenter capacity per ton of grapes to be fermented. The size of the small winery would vary significantly with the type and quality of the wine to be produced. White wines require little aging and a minimum of storage capacity, red wines require several years of

aging in small oak barrels and later in bottles. Consideration had to be given to federal, state and local regulations before building the winery. Winery building costs varied tremendously depending upon the amount of time and material invested in the aesthetics of the structure as compared with strict utility. The work estimated the cost for a well-constructed, vintage varietal style winery of about 25,000 gallons capacity, to be about $45 per gallon or slightly over one million dollars (Table 5).

Ledgerwood (1981) researched a cash flow cycle for a new winery with a 12,000 gallon capacity in New York. He assumed that a suitable tasting and sales facility was already available and that no advertising expenses were included in the budget. All costs were financed. The cumlative operating expenses became the major credit need and were the most difficult to finance. The article stressed the importance of a sound financial package prior to starting a winery. Recommendations were made to concentrate efforts on quality wines to ensure success in marketing.

Brady (1982) combined a ten acre vineyard with a 5,100 gallon capacity winery in Virginia to estimate cash flows. All ten acres were planted in the first year with the winery constructed in the third year. Half of each year's wine production was sold at retail and half at wholesale. Total debt was slowly retired over the course of time starting in

TABLE 5
Summary of Winery Construction Costs and Costs Per Gallon.

Author	Year	Gallons	Cost	Per Gallon
Robbins	1980	60,000	$1,774,050	$29.50
Cooke	1977	24,000	$793,000	$33.00
Cooke	1977	240,000	$3,620,000	$15.00
Webb	1976	25,000	$1,125,000	$45.00
Ledgerwood	1981	12,000	$159,660	$13.30
Brady	1982	5,100	$102,000	$20.00
Key	1982	12,000	$157,223	$13.10
Castaldi	1984	10,000	$269,330	$25.93
Castaldi	1984	30,000	$523,472	$17.45
Castaldi	1984	100,000	$1,572,050	$15.72

the fourth year. In the twelfth year a positive cash flow occured, this was nine years after the first wine was released. Key (1982) presented economic analysis for a New York vineyard investment and a small-scale winery. He shared Legerwood's assumptions. The analysis used the net present value method of evaluating investment proposals. The study examined a fifty acre vineyard and a 12,000 gallon capacity winery. Investment in either a winery or a vineyard were found to be worthwhile on an after-tax basis if wine grape prices kept up with inflation. If one invested in both projects, considerable income would accrue to the owner over the long run, however capital costs would be twice as high in a joint operation as in a vineyard investment without the supporting winery. Grape prices and inflation were shown to have a very large impact on the profitability of the enterprise. In times of accelerating inflation rates, the degree of risk being assumed also accelerated since costs and incomes become increasingly difficult to project with confidence.

Castaldi (1984) examined the economic feasibility of potential investments in small premium wineries in Washington State. The objectives of the study were to determine the total investment cost in terms of land, buildings, and equipment for five different sized wineries, given various assumptions regarding production costs, product mix and product prices. Attempts were made to define

and calculate the cost of producing a bottle of wine. Estimates of cash flow data were then analyzed to determine the overall feasibility and attractiveness of each size winery as an investment opportunity. Despite the relatively high initial investment cost and negative cash flows which occurred during the early stages of operation, the study found that winemaking could be a very profitable investment capable of generating a desirable rate of return. Initial investment costs for equipment, land and buildings for a small winery were over a quarter of a million dollars.

Coupal and Angus (1985) conducted sensitivity analysis for a twenty acre vineyard and a 3,600 gallon winery budget in Arizona. The cost of land was excluded from the budget. The net present value of returns over a 15 year period were examined assuming no inflation. They found that the factor that had the greatest impact upon the net present value was the discount rate. A one percent change in the discount rate could elicit a change in the net present value from $8,600 to $32,400. For a one percent change in output, holding all inputs constant, the change in net present value varied from $2,100 to $3,400. The net returns for the winery were estimated assuming it was financed with 50 percent borrowed funds at 12 percent. A mixture of 10 percent premium wine and 90 percent generic wine was also assumed. The sensitivity analysis showed that tax rates could have a

significant impact upon the net present value of a winery investment. A one percent change in the corporate tax rate would cause a $9900 change in the net present values. Marketing effects were also evaluated by adjusting the proportion of premium and generic wines sold. At a 30 percent tax rate, a one percent increase in the proportion of premium wine sold would result in a $29,977 change in net present value.

Gorenz, Strano and Wolfe (1984) developed a generalized vineyard and winery model for an Arizona winegrowing venture as an alternative to cotton growing. No attempt was made to estimate specific costs. The current composition of assets, liabilities and sales of each industry were measured against each other. The solvency ratios, quick ratios and the current ratios for both grapes and cotton were very similar. According to the authors, cotton was found to have a less secure position for creditors than the grape industry. The current liabilities to net worth ratios indicated a less secure position for grapes than cotton. The return on assets for grapes was found to be more than twice as much as for cotton.

MARKET STUDIES

Clark Gavin Associates Inc. (1984) predicted that in promoting table wines, wine marketers would have to keep in mind the fact that they would be competing not only against

malt-beverages and the various types of distilled spirits, but against all the many other types of beverages consumed with meals (TABLE 6). The most important U.S. wine trend was viewed as being the ascendancy of table wines. The report stated that large numbers of Americans had become accustomed to having wine with meals on a fairly regular basis. It was in the furtherance of this frequency rate that marketers should place their hopes for the future.

Folwell and Baritelle (1977) investigated the market structure and the various segments served by the U.S. wine industry. A panel consisting of approximately 7,000 households was used. Data showed that households purchasing table wine, varietal and nonvarietal, had significantly more education and higher household incomes. The demographics of table wine purchasing households did not differ significantly betweens regions. In contrast, the households that bought sweet wines and flavored wines tended to be slightly less educated with smaller household incomes and bigger families. The demographic structure of sparkling wine purchasing households tended to be like the table wine purchasing households. While there was some degree of brand preference for all wine types, the panel of households did not show strong brand preference for all wines produced by a single company.

Total Research Corporation (1981) conducted a study to determine preferred beverages, whether alcoholic or

TABLE 6
Consumption Trends by Beverage 1979-1983 (millions of gallons).

Beverage	1979	1980	1981	1982	1983	trend '79-'83
Soft Drinks	8,246	8,588	8,909	9,149	9,617	3.9%
Coffee	6,558	6,080	6,128	6,050	6,060	-2.0%
Beer	5,341	5,512	5,650	5,653	5,672	1.5%
Milk	4,715	4,703	4,682	4,636	4,633	-0.4%
Juices	1,505	1,565	1,535	1,530	1,590	1.4%
Powdered Drinks	1,345	1,360	1,375	1,390	1,520	3.1%
Tea	1,480	1,500	1,490	1,460	1,490	0.2%
Bottled Water	565	628	720	816	935	13.4%
Wine	439	472	498	508	520	4.3%
Distilled Spirits	447	449	449	438	431	-0.9%

Source: Jobson Publishing Co. (1985).

non-alcoholic, for upscale income, adult consumers, aged 21 to 54, in 17 different situations ranging chronologically from luncheon to after-dinner to before retiring. The work also examined changes in beverage preferences and the relationship between demographic and lifestyle characteristics and beverage preferences, as well as changes in preferences. Wine was found to be consumed in each of the 17 situations studied; particularly at home with friends or with business guests for dinner. Beverage preferences appeared to have been relatively stable over the three years surveyed, with only 15 percent of consumers changing either alcoholic or non-alcoholic beverage preferences. Wine accounted for 30 percent of those changes recorded. The reasons given by consumers for changing to wine reflected growing consumer consciousness about health and diet. Peer influence and increased popularity of wine were also important factors shifting consumer preferences.

Folwell and Baritelle (1978) found that half of U.S. households never bought wine and less than 5 percent purchase more than half the wine consumed in the United States. The two important variables that influenced the amount of wine purchased were wine price and income level. Households that bought the most wine paid lower average prices, gaining economies of size in their buying. The four largest wine companies accounted for 54 percent of all wine sales. The average prices paid per ounce for the various

wine types produced by the largest companies in the United States differed among regions partly due to varying taxes imposed by the states

Cannon (1983) predicted that wine consumption would continue to expand in the United States at an average annual growth rate of 6 percent. Americans would choose to drink more wine as the economy improved, as the population in the 25 to 45 year-age group increased, as states relaxed their regulations of alcohol sales and as industry marketing campaigns persuaded consumers to drink more wine. Marketing was viewed as the key to persuading consumers to increase their consumption of wine. Despite overall growth in wine consumption, sales would be affected by fluctuations in economic cycles.

CHAPTER THREE

ANALYTICAL MODELS AND REPRESENTATIVE BUDGETS

Agricultural economic analysis frequently assumes that farmers operate as if profit maximization were their single goal. In fact no single objective can express all of the complexities incorporated into financial management. Sample alternative goals could be: to attain a target market share, stabilize prices or profit margins, avoidance of losses, increase leisure time, or provide community service (Boehlje and Eidman 1984). While recognizing that potential winegrowers may frequently have other objectives, including some which may conflict with profit maximization, the assumption is made here that the primary objective of the wine business is to maximize the economic well-being of the owners.

Small, premium vineyard and winery ventures require large capital expenditures which are permanent in nature and will influence the long-run earning power of the enterprise. The economic effects of capital investments in winegrowing occur over a considerable period of time in the future. Most of the capital must be expended in the first years of the project while the benefits accrue to the winegrower over many later years. The timing of outlays and

receipts is the crucial component of the capital budgeting process.

From the standpoint of investment analysis, "time is money". A dollar received next year is not equivalent to a dollar held today. This stems from the investment possibilities for today's dollar. Today's dollar can grow over time. Interest rates serve as the pricing mechanism for the time value of money (Levy and Sarnat 1986). A dollar in hand today is certain, there is risk associated with any alternative investment, which could result in depreciation of assets. Inflation can also serve as a mechanism to lessen the value of future monetary holdings.

NET PRESENT VALUE

The purpose of agricultural economic profitability analysis in winegrowing is to determine whether the enterprise will contribute to the long-run profits of the winegrower. The net present value (NPV) is a capital budgeting concept for evaluating the desirability of investments. NPV employs a discounting formula for a payment series to value the projected cash flows for each investment at one point in time. NPV directly accounts for the timing and magnitude of outlays and receipts. An investment's NPV is derived by discounting the net cash receipts at a rate which reflects the return which a firm can earn on its capital in the financial market or the

minimum required return for the firm. The discounted cash receipts are summed over the life of the investment and then the initial investment outlay is subtracted. Reliable cash flow projections are required for accurate evaluation. NPV can be set up as follows:

$$NPV = S/(1+K) + S/(1+K)^2 + S/(1+K)^3 \ldots + S/(1+K)^N + V/(1+K)^N - I$$

where:

S = the net cash receipt at the end of each successive year,

K = the discount rate, i.e. the required minimum rate of return on new investments,

N = the length of the project's planning horizon,

V = any salvage or terminal investment value,

I = the present value of the investment outlays.

The sign and size of an investment's net present value determine its ranking and desirability. The decision rule for winegrowers seeking to maximize profits would be to accept the project if the NPV were positive and reject it if the NPV were negative. The present value of net cash inflows when discounted with the minimum acceptable rate of return, represents the maximum amount that the winegrower could afford to pay for the benefits expected and just

"break even" (Casler, Anderson and Aplin 1984). An investment with a positive net present value will yield a return greater than the rate of return used as the standard in testing the proposal (K). A negative net present value would require investment outlays that exceed the maximum amount the winegrower could afford to pay without being financially worse off.

The discount rate is of crucial concern in NPV analysis since it indicates the minimum acceptable rate of return for an investment. Typically the rate employed in capital budgeting is the firm's required rate of return on its equity capital, referred to as its opportunity cost. The opportunity cost of capital for a particular investment is the rate such equity capital could earn in its most favorable alternative use.

INTERNAL RATE OF RETURN

Another time discount measure of investment worth is the internal rate of return (IRR). The IRR is the discount rate that equates the present value of the expected future cash flows, or receipts, to the initial cost of the winegrowing venture (Brigham 1979). The IRR can be compared to alternative rates on other investments to determine if the particular investment is desirable. If the IRR exceeds the rates on other investments or the cost of capital, the project is acceptable; if not the project is

rejected. IRR is set up as follows:

$$I = S/(1+R) + S/(1+R)^2 + S/(1+R)^3 \ldots S/(1+R)^N + V/(1+R)^N$$

where:

I = the present value of the investment outlays,
S = the net cash receipt at the end of each successive year,
R = the internal rate of return,
N = the length of the project's planning horizon,
V = any salvage or terminal investment value.

In effect the IRR is the discount rate which equates the NPV of the winegrowing project's cash flow to zero. The NPV and IRR criteria, used in evaluating the profitability of alternative capital investments, will generate the same results in most winegrowing cases since they use similar data and computation procedures. Although both criteria give equivalent results, they do not rank projects the same. NPV reflects the absolute magnitude of the winegrowing projects while IRR does not. NPV implicitly assumes reinvestment of the interim cash inflows at the cost of capital, while IRR assumes reinvestment at the project's own rate of return. NPV provides an optimal solution to capital budgeting problems on the twin assumptions that the future cash flows are known, as well as the appropriate discount rate.

ENTERPRISE BUDGETS

An enterprise budget is a projection of average annual costs and returns for a proposed project. The enterprise budget is a practical method of summarizing cash flow projections for use in winegrowing management decisions. These decisions vary from analyzing trellis systems, to developing a leasing arrangement, choosing the time to replace equipment, or selecting the winery plan. The enterprise budget is based on the system of production that identifies the specific outputs to be produced such as grapes or wine, the sequence of operations, the approximate time the operations are to be performed, and the inputs required for the production process (Boehlje and Eidman 1983).

The data summarized with enterprise budgets are used with the capital budgeting procedures to complete financial analysis (Chapter 5). The enterprise budget includes an estimate of the physical resources required for production and products produced, their prices, and the total value of each resource and product per unit of the enterprise, projected over time. Enterprise budgets typically include a title describing the enterprise and any unique characteristics, cash inflows from output sales, the operating costs listed by item, the ownership costs also listed by item, and the returns per unit of production

above cash outflows. The data on enterprise costs and returns form the basis for vineyard and winery planning.

The figures developed for the representative budgets in this study are based on the costs associated with premium level vineyards and wineries. High quality materials, equipment and labor are employed to insure that the resulting grapes and wine are of the highest possible standards. The vineyards and wineries are expected to produce over forty years. It is with that planning horizon in mind that every effort is made to construct the enterprises with durable inputs. Prospective winegrowers in Arizona will be able to substitute lesser quality inputs for those delineated in this study for short-term gains, it is expected that the trade-offs would be apparent over time.

VINEYARD BUDGETS

Receipts

Three vineyard enterprise budgets, one each for a twenty acre vineyard, a fifty acre vineyard and a hundred acre vineyard are developed to reflect annual costs and returns in Tables 7, 8, and 9. Only Vitis Vinifera, the European grape varieties, are included in each model. Two-thirds of the vines planted are assumed to be white varieties such as Chardonnay, Sauvignon Blanc and Semillon, and one-third of the vines are red cultivars such as Pinot

Table 7. Enterprise Budget For Twenty Acre Vineyard.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1
GROSS RECEIPTS					
GRAPES (A)	TON	80	800	64000	0
OPERATING COSTS					
LAND PREPARATION					
SURVEY	EACH	1	250	250	250
SOIL SAMPLE	EACH	1	250	250	250
FERTILIZER, NITROGEN	LB	20	0.3	6	6
WEED CONTROL, SURFLAN	GAL	2.5	60	150	150
DEEP PLOW	HR	8	100	800	800
DISK	HR	4	5	20	20
LAY OUT	HR	16	5	80	80
GRADE STAKES	EACH	500	0.15	75	75
TRELLIS CONSTRUCTION					
AUGER HOLES	HR	1760	5	8800	8800
SET POSTS	HR	2640	5	13200	13200
BRACING	HR	16	5	80	80
STRING WIRE	HR	160	5	800	800
INSTALL IRRIGATION SYSTEM	HR	160	5	800	800
PLANTING					
LABOR	HR	200	5	1000	1000
MOUND UP	HR	16	5	80	80
IRRIGATION	AC/FT	10	60	600	600
VINEYARD MAINTENANCE (B)					
FUNGICIDE SPRAY	ACRE	20	20	400	0
WEED CONTROL	HR	480	5	2400	2400
HAND CULTIVATION	HR	160	5	800	800
FERTILIZER	ACRE	20	18	360	0
IRRIGATION	AC/FT	20	60	1200	0
PEST CONTROL	ACRE	20	15	300	300
BUD AND CLUSTER THIN	HR	80	5	400	0
PRUNE AND SUCKER	HR	1000	5	5000	500
MOW AND BRUSH DISPOSAL	HR	40	5	200	0
TIE UP AND TRAIN	HR	160	5	800	0
REPLANT	EACH	280	1	280	0
HARVEST	TON	80	60	4800	0
TRELLIS MAINTENANCE	ACRE	20	10	200	0
MACHINERY REPAIR	YR	1	0.05	1975	1975
EQUIPMENT REPAIR	YR	1	0.05	805	805
FUEL	GAL	1000	1	1000	1000
UTILITIES	YR	1	2400	2400	2400
INTEREST	YR	1	0.1	1166	1858
TOTAL OPERATING COSTS					39029
INCOME ABOVE OPERATING COSTS SHOWN					-39029
OWNERSHIP COSTS					
MACHINERY (C)	TOTAL	1	39500	39500	5080
EQUIPMENT (C)	TOTAL	1	16100	16100	2070
CAPITAL IMPROVEMENTS					
SHOP AND STORAGE BUILDING	EACH	1	9000	9000	450
WELL 500 FEET	EACH	1	10000	10000	500
IRRIGATION SYSTEM (D)	ACRE	20	1000	20000	2000
HIGH CORDON TRELLIS (D)	ACRE	20	1000	20000	1000
ROOTED CUTTINGS	EACH	10500	0.4	4200	210
LAND	ACRE	25	2000	50000	2500
INTEREST	YR	1	0.1	1105	1105
INSURANCE AND TAXES	YR	1	1250	1250	1250
TOTAL OWNERSHIP COSTS					16165
TOTAL COSTS					55194
NET RETURNS ABOVE COSTS SHOWN					-55194

A. SEE TABLE 10
B. SEE TABLE 11
C. SEE TABLE 12
D. SEE TABLE 13

Year One Shown Above.

Table 7. Enterprise Budget For Twenty Acre Vineyard.

2	3	4	5	6	7	8	9	10
0	8000	16000	32000	48000	64000	64000	64000	64000
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
400	400	400	400	400	400	400	400	400
2400	2400	2400	2400	2400	2400	2400	2400	2400
800	800	800	800	800	800	800	800	800
360	360	360	360	360	360	360	360	360
1200	1200	1200	1200	1200	1200	1200	1200	1200
300	300	300	300	300	300	300	300	300
200	400	400	400	400	400	400	400	400
1000	2000	3000	4000	5000	5000	5000	5000	5000
200	200	200	200	200	200	200	200	200
800	800	800	800	800	800	800	800	800
280	280	280	280	280	280	280	280	280
0	600	1200	2400	3600	4800	4800	4800	4800
200	200	200	200	200	200	200	200	200
1975	1975	1975	1975	1975	1975	1975	1975	1975
805	805	805	805	805	805	805	805	805
1000	1000	1000	1000	1000	1000	1000	1000	1000
2400	2400	2400	2400	2400	2400	2400	2400	2400
716	806	886	996	1106	1166	1166	1166	1166
15036	16926	18606	20916	23226	24486	24486	24486	24486
-15036	-8926	-2606	11084	24774	39514	39514	39514	39514
5080	5080	5080	5080	5080	5080	5080	5080	5080
2070	2070	2070	2070	2070	2070	2070	2070	2070
450	450	450	450	450	450	450	450	450
500	500	500	500	500	500	500	500	500
2000	2000	2000	2000	2000	2000	2000	2000	2000
1000	1000	1000	1000	1000	1000	1000	1000	1000
210	210	210	210	210	210	210	210	210
2500	2500	2500	2500	2500	2500	2500	2500	2500
1105	1105	1105	1105	1105	1105	1105	1105	1105
1250	1250	1250	1250	1250	1250	1250	1250	1250
16165	16165	16165	16165	16165	16165	16165	16165	16165
31201	33091	34771	37081	39391	40651	40651	40651	40651
-31201	-25091	-18771	-5081	8609	23349	23349	23349	23349

Years Two Through Ten Shown Above.

Table 8. Enterprise Budget For Fifty Acre Vineyard.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1
GROSS RECEIPTS					
GRAPES (A)	TON	200	800	160000	0
OPERATING COSTS					
LAND PREPARATION					
SURVEY	EACH	1	350	350	350
SOIL SAMPLE	EACH	1	350	350	350
FERTILIZER, NITROGEN	LB	50	0.3	15	15
WEED CONTROL, SURFLAN	GAL	8	60	480	480
DEEP PLOW	HR	20	100	2000	2000
DISK	HR	10	5	50	50
LAY OUT	HR	40	5	200	200
GRADE STAKES	EACH	1000	0.15	150	150
TRELLIS CONSTRUCTION					
AUGER HOLES	HR	4400	5	22000	22000
SET POSTS	HR	6600	5	33000	33000
BRACING	HR	40	5	200	200
STRING WIRE	HR	400	5	2000	2000
INSTALL IRRIGATION SYSTEM	HR	400	5	2000	2000
PLANTING					
LABOR	HR	500	5	2500	2500
MOUND UP	HR	40	5	200	200
IRRIGATION	AC/FT	25	60	1500	1500
VINEYARD MAINTENANCE (B)					
FUNGICIDE SPRAY	ACRE	25	20	500	0
WEED CONTROL	HR	1000	5	5000	5000
HAND CULTIVATION	HR	400	5	2000	2000
FERTILIZER	ACRE	50	18	900	0
IRRIGATION	AC/FT	50	60	3000	0
PEST CONTROL	ACRE	50	15	750	750
BUD AND CLUSTER THIN	HR	200	5	1000	0
PRUNE AND SUCKER	HR	2500	5	12500	1250
MOW AND BRUSH DISPOSAL	HR	100	5	500	500
TIE UP AND TRAIN	HR	400	5	2000	0
REPLANT	EACH	700	1	700	0
HARVEST	TON	200	60	12000	0
TRELLIS MAINTENANCE	ACRE	50	10	500	500
MACHINERY REPAIR	YR	1	0.05	3775	3775
EQUIPMENT REPAIR	YR	1	0.05	1165	1165
FUEL	GAL	2500	1	2500	2500
UTILITIES	YR	1	4000	4000	4000
INTEREST	YR	1	0.1	2640	4422
TOTAL OPERATING COSTS					92857
INCOME ABOVE OPERATING COSTS SHOWN					-92857
OWNERSHIP COSTS					
MACHINERY (C)	TOTAL	1	75500	75500	9700
EQUIPMENT (C)	TOTAL	1	23300	23300	3000
CAPITAL IMPROVEMENTS					
SHOP AND STORAGE BUILDING	EACH	1	11000	11000	550
WELL 500 FEET	EACH	1	10000	10000	500
IRRIGATION SYSTEMS (D)	ACRE	50	1000	50000	5000
HIGH CORDON TRELLIS (D)	ACRE	50	1000	50000	2500
ROOTED CUTTINGS	EACH	26250	0.4	10500	525
LAND	ACRE	60	1700	102000	5100
INTEREST	YR	1	0.1	2150	2150
INSURANCE AND TAXES	YR	1	3750	3750	3750
TOTAL OWNERSHIP COSTS					32775
TOTAL COSTS					125632
NET RETURNS ABOVE COSTS SHOWN					-125632

A. SEE TABLE 10
B. SEE TABLE 11
C. SEE TABLE 12
D. SEE TABLE 13

Year One Shown Above.

Table 8. Enterprise Budget For Fifty Acre Vineyard.

2	3	4	5	6	7	8	9	10
0	20000	40000	80000	120000	160000	160000	160000	160000
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
500	500	500	500	500	500	500	500	500
5000	5000	5000	5000	5000	5000	5000	5000	5000
2000	2000	2000	2000	2000	2000	2000	2000	2000
900	900	900	900	900	900	900	900	900
3000	3000	3000	3000	3000	3000	3000	3000	3000
750	750	750	750	750	750	750	750	750
500	1000	1000	1000	1000	1000	1000	1000	1000
2500	5000	7500	10000	12500	12500	12500	12500	12500
500	500	500	500	500	500	500	500	500
2000	2000	2000	2000	2000	2000	2000	2000	2000
700	700	700	700	700	700	700	700	700
0	1500	3000	6000	9000	12000	12000	12000	12000
500	500	500	500	500	500	500	500	500
3775	3775	3775	3775	3775	3775	3775	3775	3775
1165	1165	1165	1165	1165	1165	1165	1165	1165
2500	2500	2500	2500	2500	2500	2500	2500	2500
4000	4000	4000	4000	4000	4000	4000	4000	4000
1515	1740	1940	2215	2490	2640	2640	2640	2640
31805	36530	40730	46505	52280	55430	55430	55430	55430
-31805	-16530	-730	33495	67720	104570	104570	104570	104570
9700	9700	9700	9700	9700	9700	9700	9700	9700
3000	3000	3000	3000	3000	3000	3000	3000	3000
550	550	550	550	550	550	550	550	550
500	500	500	500	500	500	500	500	500
5000	5000	5000	5000	5000	5000	5000	5000	5000
2500	2500	2500	2500	2500	2500	2500	2500	2500
525	525	525	525	525	525	525	525	525
5100	5100	5100	5100	5100	5100	5100	5100	5100
2150	2150	2150	2150	2150	2150	2150	2150	2150
3750	3750	3750	3750	3750	3750	3750	3750	3750
32775	32775	32775	32775	32775	32775	32775	32775	32775
64580	69305	73505	79280	85055	88205	88205	88205	88205
-64580	-49305	-33505	720	34945	71795	71795	71795	71795

Years Two Through Ten Shown Above.

Table 9. Enterprise Budget For One Hundred Acre Vineyard.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1
GROSS RECEIPTS					
GRAPES (A)	TON	400	800	320000	0
OPERATING COSTS					
LAND PREPARATION					
SURVEY	EACH	1	450	450	450
SOIL SAMPLE	EACH	1	450	450	450
FERTILIZER, NITROGEN	LB	100	0.3	30	30
WEED CONTROL, SURFLAN	GAL	16	60	960	960
DEEP PLOW	HR	40	100	4000	4000
DISK	HR	20	5	100	100
LAY OUT	HR	80	5	400	400
GRADE STAKES	EACH	1500	0.15	225	225
TRELLIS CONSTRUCTION					
AUGER HOLES	HR	8800	5	44000	44000
SET POSTS	HR	13200	5	66000	66000
BRACING	HR	80	5	400	400
STRING WIRE	HR	800	5	4000	4000
INSTALL IRRIGATION SYSTEM	HR	800	5	4000	4000
PLANTING					
LABOR	HR	1000	5	5000	5000
MOUND UP	HR	80	5	400	400
IRRIGATION	AC/FT	50	60	3000	3000
VINEYARD MAINTENANCE (B)					
FUNGICIDE SPRAY	ACRE	50	20	1000	0
WEED CONTROL	HR	2000	5	10000	10000
HAND CULTIVATION	HR	800	5	4000	4000
FERTILIZER	ACRE	100	18	1800	0
IRRIGATION	AC/FT	100	60	6000	0
PEST CONTROL	ACRE	100	15	1500	1500
BUD AND CLUSTER THIN	HR	400	5	2000	0
PRUNE AND SUCKER	HR	5000	5	25000	2500
MOW AND BRUSH DISPOSAL	HR	200	5	1000	1000
TIE UP AND TRAIN	HR	800	5	4000	0
REPLANT	EACH	1400	1	1400	0
HARVEST	TON	400	60	24000	0
TRELLIS MAINTENANCE	ACRE	100	10	1000	1000
MACHINERY REPAIR	YR	1	0.05	5325	5325
EQUIPMENT REPAIR	YR	1	0.05	1650	1650
FUEL	GAL	5000	1	5000	5000
UTILITIES	YR	7000	1	7000	7000
INTEREST	YR	1	0.1	5059	8620
TOTAL OPERATING COSTS					181010
INCOME ABOVE OPERATING COSTS					-181010
OWNERSHIP COSTS					
MACHINERY (C)	TOTAL	1	106500	106500	13700
EQUIPMENT (C)	TOTAL	1	33000	33000	4250
CAPITAL IMPROVEMENTS					
SHOP AND STORAGE BUILDING	EACH	1	16000	16000	800
WELL 500 FEET	EACH	2	10000	20000	1000
IRRIGATION SYSTEM (D)	ACRE	100	1000	100000	10000
HIGH CORDON TRELLIS (D)	ACRE	100	1000	100000	5000
ROOTED CUTTINGS	EACH	52500	0.4	21000	1050
LAND	ACRE	120	1500	180000	9000
INTEREST	YR	1	0.1	3584	3584
INSURANCE AND TAXES	YR	1	7500	7500	7500
TOTAL OWNERSHIP COSTS					55884
TOTAL COSTS					236894
NET RETURNS ABOVE COSTS					-236894

A. SEE TABLE 10
B. SEE TABLE 11
C. SEE TABLE 12
D. SEE TABLE 13

Year One Shown Above.

Table 9. Enterprise Budget For One Hundred Acre Vineyard.

2	3	4	5	6	7	8	9	10
0	40000	80000	160000	240000	320000	320000	320000	320000
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0
1000	1000	1000	1000	1000	1000	1000	1000	1000
10000	10000	10000	10000	10000	10000	10000	10000	10000
4000	4000	4000	4000	4000	4000	4000	4000	4000
1800	1800	1800	1800	1800	1800	1800	1800	1800
6000	6000	6000	6000	6000	6000	6000	6000	6000
1500	1500	1500	1500	1500	1500	1500	1500	1500
1000	2000	2000	2000	2000	2000	2000	2000	2000
5000	10000	15000	20000	25000	25000	25000	25000	25000
1000	1000	1000	500	500	500	500	500	500
4000	4000	4000	4000	4000	4000	4000	4000	4000
1400	1400	1400	1400	1400	1400	1400	1400	1400
0	3000	6000	12000	18000	24000	24000	24000	24000
1000	1000	1000	1000	1000	1000	1000	1000	1000
5325	5325	5325	5325	5325	5325	5325	5325	5325
1650	1650	1650	1650	1650	1650	1650	1650	1650
5000	5000	5000	5000	5000	5000	5000	5000	5000
7000	7000	7000	7000	7000	7000	7000	7000	7000
2834	3284	3684	4209	4759	5059	5059	5059	5059
49675	58675	66675	77175	88175	94175	94175	94175	94175
-49675	-18675	13325	82825	151825	225825	225825	225825	225825
13700	13700	13700	13700	13700	13700	13700	13700	13700
4250	4250	4250	4250	4250	4250	4250	4250	4250
800	800	800	800	800	800	800	800	800
1000	1000	1000	1000	1000	1000	1000	1000	1000
10000	10000	10000	10000	10000	10000	10000	10000	10000
5000	5000	5000	5000	5000	5000	5000	5000	5000
1050	1050	1050	1050	1050	1050	1050	1050	1050
9000	9000	9000	9000	9000	9000	9000	9000	9000
3584	3584	3584	3584	3584	3584	3584	3584	3584
7500	7500	7500	7500	7500	7500	7500	7500	7500
55884	55884	55884	55884	55884	55884	55884	55884	55884
105559	114559	122559	133059	144059	150059	150059	150059	150059
-105559	-74559	-42559	26941	95941	169941	169941	169941	169941

Years Two Through Ten Shown Above.

Noir, Merlot and Cabernet Sauvignon. Expected vineyard production is as follows: (Table 10)

TABLE 10
Grapes harvested in tons.

YEAR	1	2	3	4	5	6	7.....20
PER ACRE	0	0	.5	1	2	3	4.....4
20 ACRES	0	0	10	20	40	60	80.....80
50 ACRES	0	0	25	50	100	150	200....200
100 ACRES	0	0	50	100	200	300	400....400

An average of four tons per acre is the expected maximum yield. Vineyard practices for wine grapes are aimed at restricting yields to improve quality in terms of sugar and acid ratios and pH balance. The expected market price for the enterprise budgets is $800 a ton, received at harvest.

Operating Costs

The variable or operating inputs for a vineyard include, land preparation, trellis and irrigation installation, planting and vineyard maintenance. Land is assumed to be cleared. Two foot strips will be deep plowed where the vines are to be planted to promote root penetration. The strips will then be disked and herbicide applied to begin weed control.

The trellis consists of a top wire supported by posts which will bear the vines and a bottom wire to secure

the irrigation lines off the ground. The trellis and irrigation drip system is installed prior to planting to insure water for the young cuttings. Rows are ten feet apart and six hundred feet long to promote efficiency for tractors moving along the rows of vines. Fifteen feet is left at the end of each row for turning space. Five hundred and twenty-five vines are planted per acre. The vines are spaced seven feet apart, one to a post in an T-shaped, double arm, high cordon, training method. The high cordon method is thought by the author to offer some reduction in heat summation from ground radiation, thus slowing ripening.

A grape mound under the trellis maintained by a French plow or grape hoe, will be the primary method of weed control. Hand cultivation around each vine will augment the system to keep wetted areas weed free. The thinning of buds and clusters, coupled with winter pruning is aimed at promoting even ripening and high quality fruit. Most of the costs during harvest are for picking labor. A seasonal distribution of inputs after vineyard establishment is illustrated by Table 11. Interest is calculated at 10% on 50% of the operating costs.

Drip irrigation is the system of water distribution assumed for this study. This method of irrigation uses plastic tubing and emitters to deliver the water to the

TABLE 11

Vineyard maintenance expenses; mature vineyard.

ITEM	COST PER ACRE	
SPRING		
BRUSH DISPOSAL	5.00	
FERTILIZER	18.00	
PEST CONTROL	10.00	
IRRIGATION	20.00	
WEED CONTROL	40.00	
TRELLIS MAINTENANCE	10.00	
TIE UP AND TRAIN	40.00	
BUD AND CLUSTER THIN	20.00	
REPLANT	14.00	
MACHINERY REPAIR	20.00	(AVERAGE)
EQUIPMENT REPAIR	7.00	(AVERAGE)
SPRING TOTAL	204.00	
SUMMER		
FUNGICIDE	20.00	
WEED CONTROL	40.00	
HAND CULTIVATION	40.00	
MOW	5.00	
IRRIGATION	20.00	
PEST CONTROL	5.00	
HARVEST	240.00	
MACHINERY REPAIR	20.00	
EQUIPMENT REPAIR	7.00	
SUMMER TOTAL	397.00	
FALL		
WEED CONTROL	40.00	
IRRIGATION	10.00	
MACHINERY REPAIR	20.00	
EQUIPMENT REPAIR	7.00	
FALL TOTAL	77.00	
WINTER		
PRUNE AND SUCKER	250.00	
IRRIGATION	10.00	
MACHINERY REPAIR	20.00	
EQUIPMENT REPAIR	7.00	
WINTER TOTAL	287.00	
ANNUAL TOTAL	965.00	

Source: Author's estimation.

root zone of each vine. The timing of applications and amount of water delivered will depend on the growth cycle, soil type, climate and rooting depth. The cost of pumping water is the primary input cost for irrigation once the well and delivery system has been installed.

Ownership Costs

Ownership or fixed costs are those cash outflows in vineyard production that will continue even if the enterprise were to halt. A list of machinery and equipment with prices is provided in Table 12. Irrigation and trellis costs are for materials used in construction. Table 13 gives a breakdown of these fixed costs. The drip system is depreciated in a straight line with no terminal salvage value at the end ten years, the trellis is depreciated over twenty years, as is the shop, well and cuttings. Machinery and equipment is depreciated over seven years with a ten percent trade in value at the end of the period.

Rooted cuttings are one year old, non-grafted, certified virus free vines. Land costs reflect prices in the Sonoita Viticultural District. For each vineyard, excessive land is purchased to allow for a well, turning space at the end of each row, buildings, a possible winery site, and parking. Twenty-five acres are allocated for the twenty acre enterprise, sixty acres are required by the fifty acre vineyard and one hundred and twenty acres for

TABLE 12

Machinery and equipment for vineyard establishment and maintenance.

MACHINERY	20ACRE	50ACRE	100ACRE
TRACTOR 50 HP	14000	32000(2)	44000(2)
PICK UP TRUCK 3/4 TON	12000	28000(2)	36000(2)
SPRAY RIG 500 GALLON	10000	10000	18000
WEED SPRAYER	1500	2500	4500
ROTARY MOWER	2000	3000	4000
TOTAL MACHINERY	39500	75500	106500
PER ACRE TOTAL	1975	1510	1065
EQUIPMENT			
POST HOLE AUGER	1400	2400	2400
DISK 8'	3500	3500	4000
TRAILER CART	1000	1500	1500
GRAPE HOE	3000	3500	3500
TWO BOTTOM PLOW 12"	800	800	800
PICKING BINS	2400(8)	3600(12)	4800(16)
SHOP TOOLS	1000	2000	4000
FIELD TOOLS	1000	2000	4000
MISC	2000	4000	8000
TOTAL EQUIPMENT	16100	23300	33000
PER ACRE TOTAL	805	466	330

Source: Author's communication with Burris-White Machinery Co. Tucson, Az.

TABLE 13

Per acre irrigation and trellis materials for vineyards.

IRRIGATION	PRICE	NUMBER	COST
PVC 2" TUBING	.30FT	100FT	30
BLACK POLY 1"	.10FT	3900FT	390
PVC RISERS	.20FT	6FT	2
1.5"-2" TEES	.75EA	7	6
1"-1.5" TEES	.75EA	7	6
BRASS VALVE	18EA	7	126
1.5" PIPE THREAD FITTINGS	1.50EA	14	21
SPRAY EMMITTERS	.10EA	1050	105
HOSE CLAMP ADAPTORS	.75EA	28	21
CLAMPS	.10EA	14	2
WELL SUPPLIES (FILTERS, PUMPS)	EST	1	150
WIRE	.03FT	4000FT	120
MISC			21
TOTAL			1000
TRELLIS			
WIRE	.03FT	4000FT	120
LINE POSTS	2.10EA	260	546
END POSTS	5.60EA	28	156
BRACING	5.00EA	28	140
NAILS	30.00EA	1	30
MISC			8
TOTAL			1000

SOURCE: Partially compiled from Angus and Luben (1984).

the one hundred acre budget.

Returns Above Costs Shown

Returns above costs shown are calculated by totaling vineyard operating costs and ownership costs, and then subtracting the total costs from gross receipts. No charges are reflected for management and overhead business expenses such as office expenses, transportation and utilities. Returns above costs shown represent a residual return to all factors for which a charge has not been shown. It is a return to the winegrower's management and overhead expenses of the vineyard (Boehlje and Eidman 1984). Vineyard financial analysis will be based on the enterprise cash outflows and receipts on an after tax basis.

WINERY BUDGETS

Receipts

Three winery enterprise budgets are presented in Tables 14, 15, and 16. The twelve thousand gallon winery can process the grapes from a twenty acre vineyard. The thirty thousand gallon winery is the necessary capacity for a fifty acre vineyard, and the sixty thousand gallon winery is sufficient to handle the crush from a one hundred acre vineyard.

All wines are assumed to be of premium quality. The

Table 14. Enterprise Budget For A Twelve Thousand Gallon Winery.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1	2
GROSS RECEIPTS (A)						
WHITE WINE RETAIL	CASE	1000	96	96000	0	48000
WHITE WINE WHOLESALE	CASE	2334	54	126036	0	63018
RED WINE RETAIL	CASE	500	120	60000	0	0
RED WINE WHOLESALE	CASE	1166	78	90948	0	0
TOTAL RECEIPTS					0	111018
OPERATING COSTS						
GRAPES	TON	80	800	64000	64000	64000
PACKAGING	GAL	12000	3	36000	11880	23760
MARKETING	GAL	12000	2	24000	0	7920
WINEMAKER	YR	1	25000	25000	25000	25000
SEASONAL LABOR	YR	2	10000	20000	20000	20000
UTILITIES	YR	1	3000	3000	3000	3000
SUPPLIES	YR	1	2000	2000	2000	2000
EQUIPMENT REPAIR	YR	1	0.05	4715	4715	4715
WINERY MAINTAINCE	YR	1	5000	5000	5000	5000
MISC	YR	1	5000	5000	5000	5000
INTEREST ON OPERATING CAPITAL	YR	1	0.1	9436	7030	8020
TOTAL OPERATING COSTS					147625	168415
INCOME ABOVE OPERATING COSTS SHOWN					-147625	-57397
OWNERSHIP COSTS						
EQUIPMENT (B)						
OAK BARRELS	TOTAL	150	150	22500	0	4050
STAINLESS STEEL	TOTAL	17	3360	57100	2570	2570
PRODUCTION	TOTAL	1	107560	107560	13445	13445
CAPITAL IMPROVEMENTS (C)	TOTAL	1	155000	155000	6975	6975
LAND	ACRE	5	2500	12500	625	625
INTEREST	YR	1	0.1	770	770	770
INSURANCE AND TAXES	YR	1	10000	10000	10000	10000
TOTAL OWNERSHIP COSTS					34385	38435
TOTAL COSTS					182010	206850
NET RETURNS ABOVE COSTS SHOWN					-182010	-95832

A. SEE TABLE 17
B. SEE TABLE 19 AND APPENDIX D
C. SEE TABLE 20

Years One And Two Shown Above.

Table 14. Enterprise Budget For A Twelve Thousand Gallon Winery.

3	4	5	6	7	8	9	10
96000	96000	96000	96000	96000	96000	96000	96000
126036	126036	126036	126036	126036	126036	126036	126036
0	30000	60000	60000	60000	60000	60000	60000
0	45474	90948	90948	90948	90948	90948	90948
222036	297510	372984	372984	372984	372984	372984	372984
64000	64000	64000	64000	64000	64000	64000	64000
30002	36000	36000	36000	36000	36000	36000	36000
15840	19920	24000	24000	24000	24000	24000	24000
25000	25000	25000	25000	25000	25000	25000	25000
20000	20000	20000	20000	20000	20000	20000	20000
3000	3000	3000	3000	3000	3000	3000	3000
2000	2000	2000	2000	2000	2000	2000	2000
4715	4715	4715	4715	4715	4715	4715	4715
5000	5000	5000	5000	5000	5000	5000	5000
5000	5000	5000	5000	5000	5000	5000	5000
8728	9232	9436	9436	9436	9436	9436	9436
183285	193867	198151	198151	198151	198151	198151	198151
38751	103643	174833	174833	174833	174833	174833	174833
4050	4050	4050	4050	4050	4050	4050	4050
2570	2570	2570	2570	2570	2570	2570	2570
13445	13445	13445	13445	13445	13445	13445	13445
6975	6975	6975	6975	6975	6975	6975	6975
625	625	625	625	625	625	625	625
770	770	770	770	770	770	770	770
10000	10000	10000	10000	10000	10000	10000	10000
38435	38435	38435	38435	38435	38435	38435	38435
221720	232302	236586	236586	236586	236586	236586	236586
316	65208	136398	136398	136398	136398	136398	136398

Years Three Through Ten Shown Above.

Table 15. Enterprise Budget For A Thirty Thousand Gallon Winery.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1	2
GROSS RECEIPTS (A)						
WHITE WINE RETAIL	CASE	1675	96	160800	0	80400
WHITE WINE WHOLESALE	CASE	6700	54	361800	0	180900
RED WINE RETAIL	CASE	825	120	99000	0	0
RED WINE WHOLESALE	CASE	3300	78	257400	0	0
TOTAL RECEIPTS					0	261300
OPERATING COSTS						
GRAPES	TON	200	800	160000	160000	160000
PACKAGING	GAL	30000	3	90000	29700	60300
MARKETING	GAL	30000	2	60000	0	19800
WINEMAKER	YR	1	30000	30000	30000	30000
SEASONAL LABOR	YR	3	10000	30000	30000	30000
UTILITIES	YR	1	5000	5000	5000	5000
SUPPLIES	YR	1	4000	4000	4000	4000
EQUIPMENT REPAIR	YR	1	0.05	9286	9286	9286
WINERY MAINTAINCE	YR	1	10000	10000	10000	10000
MISC	YR	1	10000	10000	10000	10000
INTEREST ON OPERATING CAPITAL	YR	1	0.1	20414	14399	16919
TOTAL OPERATING COSTS					302385	355305
INCOME ABOVE OPERATING COSTS SHOWN					-302385	-94005
OWNERSHIP COSTS						
EQUIPMENT (B)						
OAK BARRELS	TOTAL	375	150	56250	10125	10125
STAINLESS STEEL	TOTAL	38	3760	142950	6435	6435
PRODUCTION	TOTAL	1	196820	196820	25305	25305
CAPITAL IMPROVEMENTS (C)	TOTAL	1	335000	335000	15075	15075
LAND	ACRE	5	2500	12500	625	625
INTEREST	YR	1	0.1	1550	1550	1550
INSURANCE AND TAXES	YR	1	20000	20000	20000	20000
TOTAL OWNERSHIP COSTS					79115	79115
TOTAL COSTS					381500	434420
NET RETURNS ABOVE COSTS SHOWN					-381500	-173120

A. SEE TABLE 17
B. SEE TABLE 19 AND APPENDIX D
C. SEE TABLE 20

Years One and Two Shown Above.

Table 15. Enterprise Budget For A Thirty Thousand Gallon Winery.

3	4	5	6	7	8	9	10
160800	160800	160800	160800	160800	160800	160800	160800
361800	361800	361800	361800	361800	361800	361800	361800
0	49500	99000	99000	99000	99000	99000	99000
0	128700	257400	257400	257400	257400	257400	257400
522600	700800	879000	879000	879000	879000	879000	879000
160000	160000	160000	160000	160000	160000	160000	160000
74700	90000	90000	90000	90000	90000	90000	90000
40200	49800	60000	60000	60000	60000	60000	60000
30000	30000	30000	30000	30000	30000	30000	30000
30000	30000	30000	30000	30000	30000	30000	30000
5000	5000	5000	5000	5000	5000	5000	5000
4000	4000	4000	4000	4000	4000	4000	4000
9286	9286	9286	9286	9286	9286	9286	9286
10000	10000	10000	10000	10000	10000	10000	10000
10000	10000	10000	10000	10000	10000	10000	10000
18659	19904	20414	20414	20414	20414	20414	20414
391845	417990	428700	428700	428700	428700	428700	428700
130755	282810	450300	450300	450300	450300	450300	450300
10125	10125	10125	10125	10125	10125	10125	10125
6435	6435	6435	6435	6435	6435	6435	6435
25305	25305	25305	25305	25305	25305	25305	25305
15075	15075	15075	15075	15075	15075	15075	15075
625	625	625	625	625	625	625	625
1550	1550	1550	1550	1550	1550	1550	1550
20000	20000	20000	20000	20000	20000	20000	20000
79115	79115	79115	79115	79115	79115	79115	79115
470960	497105	507815	507815	507815	507815	507815	507815
51640	203695	371185	371185	371185	371185	371185	371185

Years Three Through Ten Shown Above.

Table 16. Enterprise Budget For A Sixty Thousand Gallon Winery.

ITEM	UNIT	NUMBER	PRICE	COST	YEAR 1	2
GROSS RECEIPTS (A)						
WHITE WINE RETAIL	CASE	2512	96	241152	0	120576
WHITE WINE WHOLESALE	CASE	14238	54	768852	0	384426
RED WINE RETAIL	CASE	1238	120	148560	0	0
RED WINE WHOLESALE	CASE	7012	78	546936	0	0
TOTAL RECEIPTS					0	505002
OPERATING COSTS						
GRAPES	TON	400	800	320000	320000	320000
PACKAGING	GAL	60000	3	180000	59400	120600
MARKETING	GAL	60000	2	120000	0	39600
WINEMAKER	YR	1	35000	35000	35000	35000
SEASONAL LABOR	YR	5	10000	50000	30000	40000
UTILITIES	YR	1	8000	8000	8000	8000
SUPPLIES	YR	1	8000	8000	8000	8000
EQUIPMENT REPAIR	YR	1	0.05	14279	14279	14279
WINERY MAINTAINCE	YR	1	15000	15000	15000	15000
MISC	YR	1	20000	20000	20000	20000
INTEREST ON OPERATING CAPITAL	YR	1	0.1	38514	25484	31024
TOTAL OPERATING COSTS					535163	651503
INCOME ABOVE OPERATING COSTS SHOWN					-535163	-146501
OWNERSHIP COSTS						
EQUIPMENT (B)						
OAK BARRELS	TOTAL	750	150	112500	20250	20250
STAINLESS STEEL	TOTAL	55	4400	241750	10880	10880
PRODUCTION	TOTAL	1	279480	279480	35935	35935
CAPITAL IMPROVEMENTS (C)	TOTAL	1	535000	535000	24075	24075
LAND	ACRE	7	2500	17500	875	875
INTEREST	YR	1	0.1	2540	2540	2540
INSURANCE AND TAXES	YR	1	35000	35000	35000	35000
TOTAL OWNERSHIP COSTS					129555	129555
TOTAL COSTS					664718	781058
NET RETURNS ABOVE COSTS SHOWN					-664718	-276056

A. SEE TABLE 17
B. SEE TABLE 19 AND APPENDIX D
C. SEE TABLE 20

Years One and Two Shown Above.

Table 16. Enterprise Budget For A Sixty Thousand Gallon Winery.

3	4	5	6	7	8	9	10
241152	241152	241152	241152	241152	241152	241152	241152
768852	768852	768852	768852	768852	768852	768852	768852
0	74280	148560	148560	148560	148560	148560	148560
0	273468	546936	546936	546936	546936	546936	546936
1010004	1357752	1705500	1705500	1705500	1705500	1705500	1705500
320000	320000	320000	320000	320000	320000	320000	320000
149400	180000	180000	180000	180000	180000	180000	180000
80400	99600	120000	120000	120000	120000	120000	120000
35000	35000	35000	35000	35000	35000	35000	35000
50000	50000	50000	50000	50000	50000	50000	50000
8000	8000	8000	8000	8000	8000	8000	8000
8000	8000	8000	8000	8000	8000	8000	8000
14279	14279	14279	14279	14279	14279	14279	14279
15000	15000	15000	15000	15000	15000	15000	15000
20000	20000	20000	20000	20000	20000	20000	20000
35004	37494	38514	38514	38514	38514	38514	38514
735083	787373	808793	808793	808793	808793	808793	808793
274921	570379	896707	896707	896707	896707	896707	896707
20250	20250	20250	20250	20250	20250	20250	20250
10880	10880	10880	10880	10880	10880	10880	10880
35935	35935	35935	35935	35935	35935	35935	35935
24075	24075	24075	24075	24075	24075	24075	24075
875	875	875	875	875	875	875	875
2540	2540	2540	2540	2540	2540	2540	2540
35000	35000	35000	35000	35000	35000	35000	35000
129555	129555	129555	129555	129555	129555	129555	129555
864638	916928	938348	938348	938348	938348	938348	938348
145366	440824	767152	767152	767152	767152	767152	767152

Years Three Through Ten Shown Above.

product mix is one-third red wines and two-thirds white ines. It is assumed that the twelve thousand gallon winery sells 30% of its wines on the premise at its bonded retail outlet, the balance is sold at wholesale prices off premise. The thirty thousand gallon winery sells 20% retail and 80% wholesale. The sixty thousand gallon capacity winery has a 15% to 85% ratio or retail and wholesale receipts.

One half of the white wines are sold in the second year after each harvest and the other half is sold in the third year. This reflects the wood and bottle aging process, and lags in inventory turnover. Red wines are sold in the fourth and fifth years after each harvest, with one half sold in each time frame. Premium red wines require extended wood aging and bottle aging. Table 17 shows the annual availability of wines for sale.

Operating Costs

The variable inputs for a premium, small winery are the grapes, packaging, marketing, labor, utilities, supplies, maintenance and interest on operating capital. The grapes are Vitis vinifera, similar to those grown in the vineyard budgets. The price for wine grapes is $800 a ton. Packaging costs refer to outlays for bottles, corks, labels and capsules. Quality materials are employed to enhance marketing of the wines. Marketing costs represent

TABLE 17
Cases available for sale on yearly basis.

YEAR	1	2	3	4	5.....20
% OF ANNUAL PRODUCTION	0	.33	.67	.83	1.....1
12000 GAL WHITE RETAIL	0	500	1000	1000	1000....1000
WHITE WHOLESALE	0	1167	2334	2334	2334....2334
RED RETAIL	0	0	0	250	500.....500
RED WHOLESALE	0	0	0	583	1166....1166
TOTAL	0	1667	3334	4167	5000....5000
30000 GAL WHITE RETAIL	0	838	1675	1675	1675....1675
WHITE WHOLESALE	0	3350	6700	6700	6700....6700
RED RETAIL	0	0	0	412	825.....825
RED WHOLESALE	0	0	0	1650	3300....3300
TOTAL	0	4188	8375	10437	12500...12500
60000 GAL WHITE RETAIL	0	1256	2512	2512	2512....2512
WHITE WHOLESALE	0	7119	14238	14238	14238...14238
RED RETAIL	0	0	0	618	1238....1238
RED WHOLESALE	0	0	0	3507	7012....7012
TOTAL	0	8375	16750	20875	25000...25000

0.087% of the average per case wholesale price. Castaldi (1984) found that the typical winery costs for marketing ranged from 3.75% to 9.50% of the wholesale price.

The service of a trained enologist is assumed for each winery budget, with part-time assistance employed at appropriate times of the season, such as during harvest and crushing, racking, bottling, and for tastings and sales. A seasonal work schedule for a winery is presented in Table 18.

Ownership Costs

Fixed costs for premium wineries include equipment, capital improvements, land, interest, insurance and taxes. A list of equipment and costs for each sized winery is provided in Table 19. Oak barrels are from American oak and are depreciated over five years which is their useful life. Stainless steel tanks used for fermentation and aging are depreciated over twenty years. Production equipment is depreciated over seven years. All the equipment is assumed to have a 10% terminal salvage value, straight line depreciation is used.

Capital improvements are listed in Table 20. Capital improvements are depreciated using the straight line method over twenty years with a 10% salvage value. Five acres are purchased for the twelve thousand and thirty thousand gallon wineries and seven acres are required for

TABLE 18
Winery work schedule.

SUMMER
LAB TEST, GRAPES
CRUSH & STEM
FERMENTATION & PRESS
LAB TEST, WINE
RACK
SALES
FALL
LAB TEST, WINE
DETARTRATION
RACK
FINE
SALES
WINTER
LAB TEST, WINE
RACK
FILTER
BLEND
SENSORY EVALUATION
SALES
SPRING
LAB TEST, WINE
SENSORY EVALUATION
ADJUSTMENT
FILTER
BOTTLE
TRANSFER
LABEL
STORAGE
COOPERAGE & TANK MAINTENANCE
SALES

TABLE 19
Winery equipment costs.

ITEM	12000 GAL	30000 GAL	60000 GAL
OAK BARRELS	22500	56250	112500
STAINLESS STEEL			
55 GAL	2250	3750	7500
600 GAL	7200	18000	36000
1000 GAL	20000	52000	60000
2000 GAL	26000	65000	0
5000 GAL	0	0	130000
FITTINGS	1650	4200	8250
TOTAL SS	57100	142950	241750
PRODUCTION			
CRUSHER STEMMER	2400	12000	17000
BATCH PRESS	9500	20000	35000
MUST PUMP	3600	6000	7000
MUST LINE	500	500	700
AGITATOR	700	700	700
FITTINGS	600	1000	2000
TRANSFER PUMP	3000	3500	3800
TRANSFER HOSE	600	800	1000
BARREL WASHER	400	400	400
TANK WASHER	400	400	400
PLATE FILTER	5000	5000	9000
LAB EQUIP	6000	15000	25000
REFRIGERATION	30000	40000	60000
BOTTLE WASHER	700	700	900
BOTTLE FILLER	200	1400	2100
CORKER	150	6000	7000
FOIL SPINNER	650	3000	3000
LABELLER	300	10000	15000
BOTTLING LINE	3000	4000	5000
STERILE FILTER	1000	2500	3500
PALLET LIFTER	800	800	800
HAND CART	60	120	180
FORK LIFT	6000	9000	14000
TRUCK	12000	14000	16000
MISC	20000	40000	50000
TOTAL PROD.	107560	196820	279480
EQUIPMENT TOTAL	187160	396020	633730
COST PER GALLON	15.60	13.20	10.60

Source: Castaldi (1984), Robbins (1980), Ledgerwood (1981) and conversations with small winery owners.

TABLE 20
Capital improvements for winery budgets.

ITEM	COST		
WINERY SIZE	12000 GAL	30000 GAL	60000 GAL
SITE WORK	20000	25000	35000
WASTE TREATMENT	10000	20000	30000
WATER DEVELOPMENT	15000	20000	30000
BUILDING	100000	250000	400000
LANDSCAPING	10000	20000	40000
TOTAL COST	155000	335000	535000
COST PER GALLON	12.90	11.16	8.92

Source: Partially Compiled from Cooke, Reed and Keith 1977.

the sixty thousand gallon winery. Land prices for the Sonoita viticultural district are utilized. The land is for the winery, out buildings, parking, landscaping and waste water treatment.

Returns Above Costs Shown

Returns above costs shown are obtained by subtracting total winery costs from total receipts. As in the case of the vineyard enterprise budgets, no charges are shown in the winery budgets for management and overhead business expenses. Winery financial analysis will incorporate these charges along with the enterprise costs and receipts. (Chapter 5)

CHAPTER FOUR

THE MARKET

The long-term growth of the American wine industry has been slow, with the per capita consumption rate increasing only .038 gallons on average per year between 1934 and 1984. Per capita wine consumption in the U.S. increased from .26 in 1934 to 2.29 in 1984 (TABLE 21).

In recent years the rate of wine consumption has accelerated over the historical norm. The wine boom years of 1968 to 1972 witnessed annual growth rates in excess of 10 percent. Consumption levels were forecasted on a per capita basis for the years 1900 and 2000 by Folwell and Kirpes (1982). Under the optimistic income scenario they presented, the projected consumption levels were 3.31 and 4.43 gallons respectively. Per capita consumption of all wine increased 1.19 gallons between 1980 and 1990 and 1.12 gallons between 1990 and 2000. The 1980s market growth rate was forecasted to be above that of the 1970s and slowing in its rate of increase in the 1900s.

In terms of average annual growth rates, the 1980s were expected to produce a 6 percent annual increase in all wine consumption, while the 1990s were expected to slow to 3.6 percent per year. The projected total consumption of

TABLE 21
Long Term Trends in U.S. Wine Consumption and Expenditures, 1984 to 1951.

	CONSUMPTION			
Year	Million Gallons	Per Capita	Per Adult	Consumer Expenditure In Million $
1984	542	2.29	3.29	$8,260
1983	519	2.22	3.20	7,839
1982	508	2.21	3.18	7,289
1981	497	2.17	3.15	6,900
1980	471	2.08	3.04	6,219
1979	439	2.00	2.94	5,352
1978	418	1.91	2.83	4,625
1977	389	1.80	2.69	3,987
1976	371	1.73	2.59	3,603
1975	361	1.70	2.58	3,287
1974	341	1.62	2.49	3,012
1973	337	1.61	2.51	2,790
1972	326	1.57	2.49	2,505
1971	295	1.43	2.37	2,130
1970	255	1.26	2.09	1,746
1969	225	1.12	1.87	1,390
1968	205	1.03	1.74	1,199
1967	196	0.99	1.69	1,088
1966	186	0.95	1.62	915
1965	182	0.94	1.60	891
1964	179	0.94	1.59	875
1963	170	0.91	1.53	835
1962	163	0.88	1.48	803
1961	165	0.90	1.51	819
1960	158	0.88	1.46	751
1959	150	0.84	1.00	737
1958	150	0.87	1.43	705
1957	148	0.87	1.42	664
1956	146	0.88	1.42	577
1955	141	0.86	1.38	597
1954	138	0.86	1.37	580
1953	136	0.86	1.37	533
1952	133	0.86	1.34	560
1951	121	0.79	1.23	522

Source: Jobson Publishing Co. (1985).

TABLE 21 (continued)
Long Term Trends in U.S. Wine Consumption and Expenditures, 1950 to 1934.

Year	CONSUMPTION Million Gallons	Per Capita	Per Adult	Consumer Expenditure In Million $
1950	135	0.90	1.39	551
1949	128	0.87	1.33	500
1948	119	0.82	1.36	475
1947	96	0.67	1.04	525
1946	133	0.95	1.45	635
1945	90	0.69	1.07	495
1944	94	0.71	1.10	505
1943	97	0.73	1.12	415
1942	112	0.84	1.31	410
1941	98	0.74	1.15	325
1940	87	0.66	1.03	260
1939	74	0.57	0.89	210
1938	66	0.51	0.81	190
1937	65	0.50	0.80	185
1936	59	0.47	0.75	170
1935	47	0.38	0.61	140
1934	32	0.26	0.42	90

Source: Jobson Publishing Co. (1985).

U.S. produced table wine was 747.5 and 1,126,7 million gallons for 1990 and 2000. These projected consumption levels represent a higher proportion of table wine to all other wines than exhibited in the past. The changing product mix was attributed to increasing preference in the market for table wines and the expected higher national income levels. Booze-Allen & Hamilton (1982) predicted total consumption in 1990 to hit just below 1,100 million gallons (Figure 4).

The United States ranked sixth among the wine producing countries of the world in 1985. France, Italy, the Soviet Union, Argentina and Spain had greater aggregate production (Table 22).

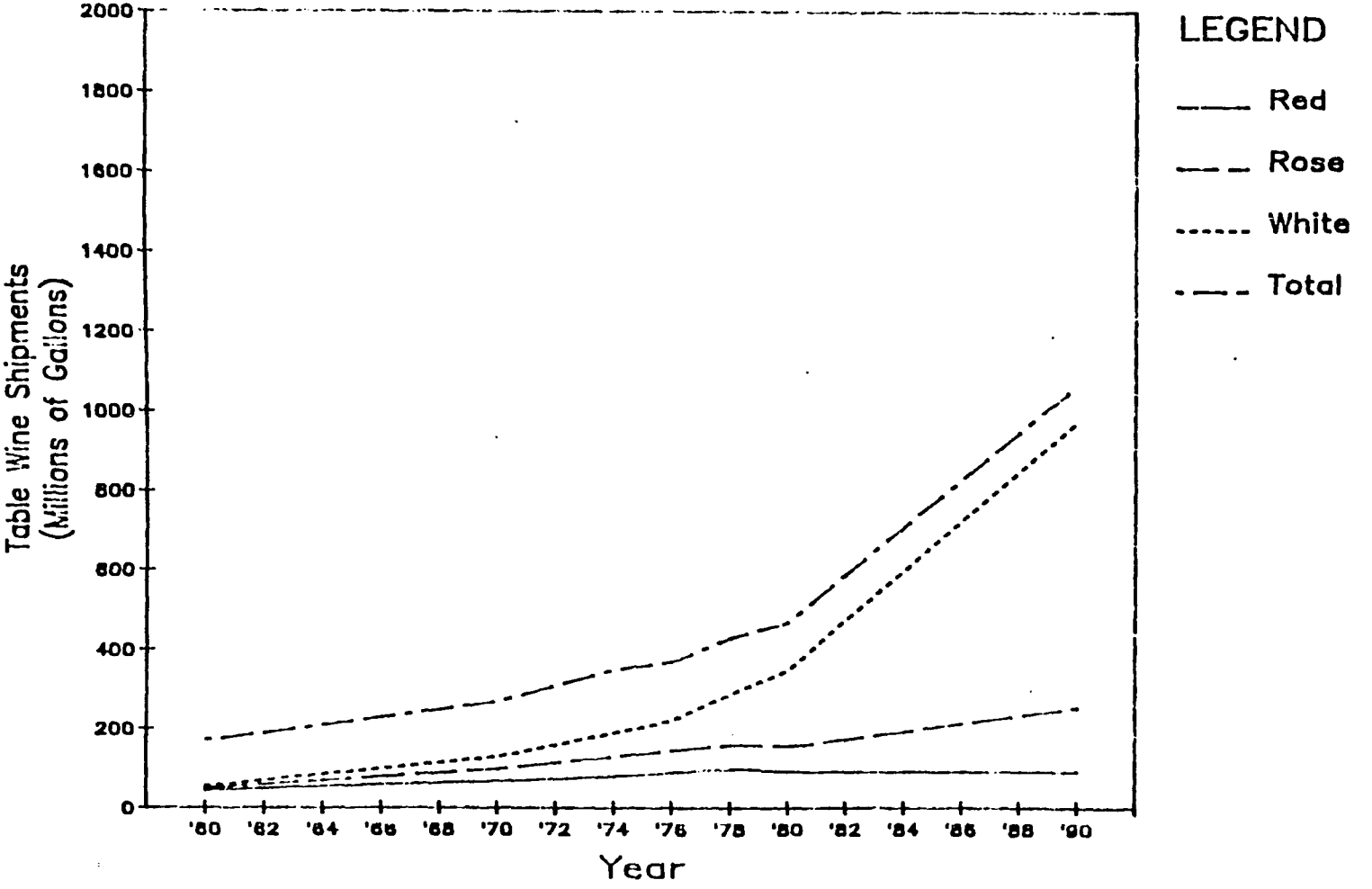
TABLE 22
Wine Production in the Six Largest Wine Producing Nations in Thousands of Gallons.

Country	1984	1983	1982	1981	1980	1979
Italy	1,855	2,200	1,919	1,862	2,286	2,228
France	1,683	1,799	2,092	1,506	1,828	2,207
Spain	938	825	984	908	1,114	1,322
U.S.S.R.	898	927	914	909	845	810
Argentina	496	558	660	571	615	711
U.S.A.	440	390	515	430	475	423

Source: Wines and Vines Magazine, July 1986.

Per capita wine consumption in the United States was significantly below that of other major wine producing countries of the world. The per capita consumption of these countries ranged from 3.43 gallons in the Soviet Union to

Figure 4. Forecast Growth of the U.S. Wine Market, 1980 to 1990.



Source: Booz-Allen & Hamilton (1982)

21.66 gallons in France (Table 23).

Table wine, which is defined as unflavored, still wine, not over 14 percent alcohol, accounted for 65.4 percent of the U.S. wine market, compared to only 53.3 percent in 1973, but down from the 76.4 percent figure set in 1983. The decline in market share from 1983 to 1985 was due to the dramatic increase in wine cooler sales.

Wine coolers are a blend of light wines with carbonated citrus juices. Jobson Publishing Corp. (1985) estimated that there was a 5.9 percent increase in sales for all wines including wine coolers in 1984 in the United States. Total wine sales without coolers were up 1.4 percent. Coolers recorded sales of 12.1 million cases in 1984 which represented a 253.7 percent increase from the previous year (Table 24). In 1984 consumer expenditures for wine amounted to $8.3 billion. Dollar sales for all wines, unadjusted for inflation, were found to have more than doubled since 1977.

In 1984 wine consumption accounted for 2.5 percent of the American consumer's total beverage intake. In the per capita consumption trends by beverage, wine ranked above only distilled spirits. Since 1969, soft drinks have doubled their per capita consumption, coffee and milk have declined and distilled spirits have remained about even. Beer, juices, bottled water and wines have advanced (Table 25). While the various beverages are not perfect substitutes,

TABLE 23
Estimated Per Capita Consumption of Wine, by Countries.

COUNTRY	1984	1980	1975	1970	1965
	Gallons				
Portugal	22.24	18.49	23.71	20.26	28.77
France	21.66	24.04	27.39	28.83	31.07
Italy	21.56	21.13	28.40	29.32	28.80
Argentina	17.52	20.15	22.11	24.25	22.67
Luxembourg	16.64	12.73	10.90	10.00	10.00
Spain	15.06	15.85	19.55	16.25	16.65
Switzerland	12.79	12.44	11.44	10.30	10.12
Greece	11.62	11.87	10.04	10.57	10.36
Chile	10.57	13.29	11.48	11.60	14.95
Austria	9.43	9.38	9.40	9.99	7.87
Hungary	7.93	9.25	9.77	9.96	8.67
Yogoslavia	7.66	7.45	7.56	7.11	6.21
Romania	7.40	7.63	8.72	6.10	7.71
Uruguay	7.40	6.60	6.63	6.87	8.00
West Germany	6.79	6.74	6.13	4.28	3.88
Bulgaria	5.81	5.81	5.28	4.91	5.47
Belgium	5.53	3.79	4.49	3.17	2.27
Australia	5.42	4.60	2.96	2.25	1.27
Denmark	4.86	3.38	3.03	1.56	1.08
Czechoslovakia	3.96	3.17	2.91	2.80	1.35
Holland	3.86	3.14	2.43	1.36	0.89
U.S.S.R.	3.43	3.80	3.53	3.01	2.60
New Zealand	3.30	N/A	2.32	1.44	0.76
Cyprus	3.14	2.59	1.64	2.17	3.17
S. Africa	2.86	2.40	2.77	2.96	1.85
Canada	2.53	2.21	1.76	0.58	0.73
United Kingdom	2.35	1.97	1.24	0.76	0.58
United States	2.35	2.21	1.71	1.31	0.98
Poland	1.59	2.59	1.95	1.48	1.27
Finland	1.23	1.26	1.35	1.08	0.70

SOURCE; Wines and Vines, July, 1986.

TABLE 24
U.S. Consumption of Wine by Type, (thousands of cases).

TYPE	1983	1984	CHANGE %
Wine Coolers	3416	12083	253.7
TABLE	138667	140324	1.2
Domestic	93801	92647	-1.2
Foreign	44866	47677	6.3
DESSERT	22157	21779	-1.7
Domestic	20984	20497	-2.3
Foreign	1173	1282	9.3
SPARKLING	15220	16176	6.3
Domestic	10889	10364	-4.8
Foreign	4331	5812	34.2
VERMOUTH	3135	2993	-4.5
Domestic	2030	1826	-10.0
Foreign	1105	1167	5.6
TOTAL WINES	182595	193355	5.9
Domestic	131120	137417	4.8
Foreign	51475	55938	8.7

Source: Jobson Publishing Corp. 1985.

TABLE 25
U.S. Per Capita Consumption Trends by Beverage, 1968-1984 (gallons).

BEVERAGE	1968	1973	1978	1983	1984
SOFT DRINKS	24.8	31.5	37.1	41.5	43.2
COFFEE	37.0	35.1	27.0	27.0	27.3
BEER	17.3	20.5	23.1	24.3	24.0
MILK	25.6	22.7	21.3	20.9	21.1
JUICES	4.7	5.2	6.5	7.7	8.1
TEA	6.6	7.2	7.7	7.2	7.3
POWERED DRINKS	N/A	N/A	6.1	6.5	6.3
BOTTLE WATER	N/A	N/A	1.4	2.7	3.0
WINE	1.1	1.7	2.1	2.4	2.5
DISTILLED SPIRITS	1.7	1.9	2.0	1.8	1.8
TOTAL	118.8	125.8	134.3	142.0	144.6

N/A - Not Available
Source: Jobson Publishing Corp. 1985.

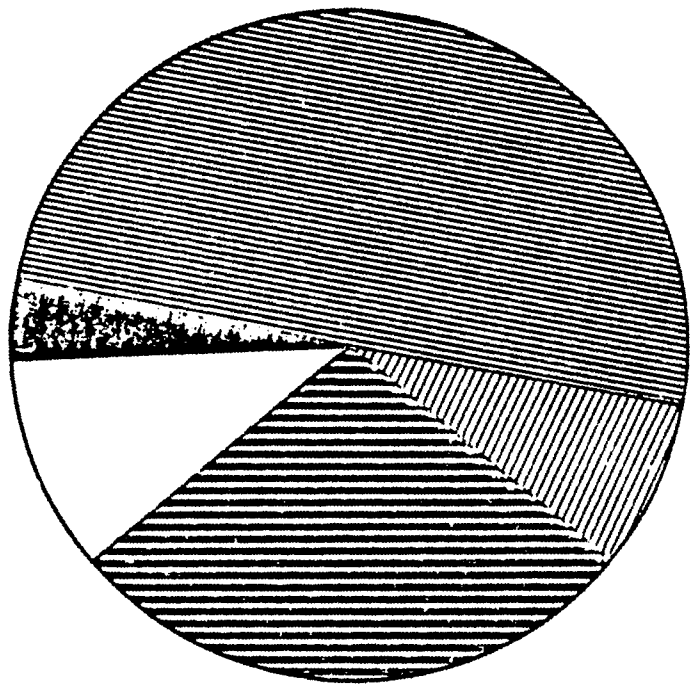
wine competes for market share with both alcoholic and non-alcoholic beverages.

Wines and Vines Magazine, (July 1986), reported that sales of all major traditional wine catagories were down in 1985, but that the 152.1 percent increase in wine cooler sales, fueled a 4.1 percent increase in total U.S. wine consumption. Wine shipments, including wine coolers, were up 6.9 percent to 440.5 million gallons. For the decade ending in 1985, total wine sales grew at an average annual rate of 4.6 percent (Figures Five A, B, C, and D). Wines and Vines (Sept 1986) reported that for the first six months of 1986, wine shipments from Calfornia were up 11.4 percent.

Arizona Consumption

Arizona consumed 3,022.6 thousand cases of wine in 1984 (7,254,240 gallons) up from 2,845.7 thousand cases (6,829,680 gallons) in 1983 and 1,330.0 thousand cases (3,192,000 gallons) in 1974 according to Jobson Publishing Corp (1985). Phoenix ranked 16th in the top metropolitan areas for total wine consumption in the U.S. and Tucson ranked 47th. Phoenix ranked 22nd in the 50 largest metropolitan areas by population and Tucson was not ranked. Wine consumption per adult in Arizona in 1984 was 3.82 gallons, up from 3.74 gallons in 1983. Arizona ranked 15th in the country in adult per capita consumption. In consumption per $1 million of income Arizona ranked 9th. In

Figure 5A. Share And Percentage Of The U.S. Wine Market 1970-1985.

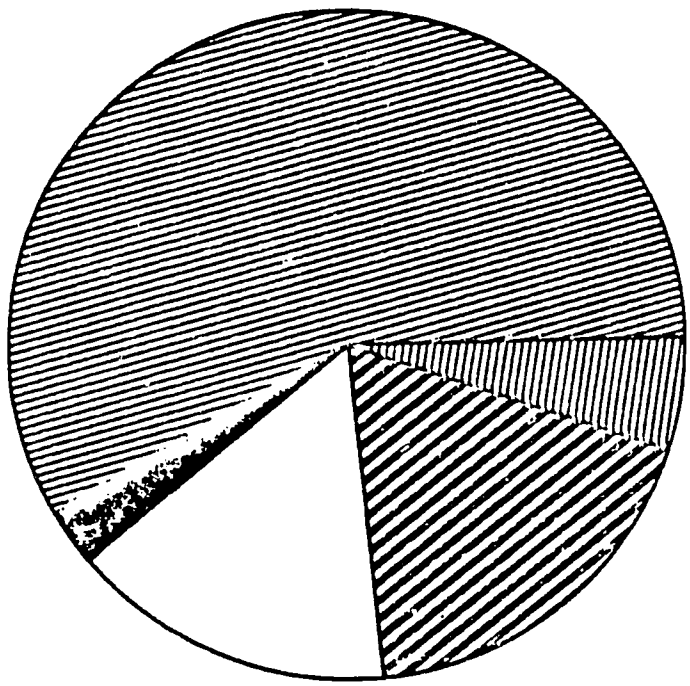


1970 (267 Million Gallons)

LEGEND		
Table	133 mil.	49.8%
Vermouth	10 mil.	3.7%
Special Natural	28 mil.	10.5%
Desert	74 mil.	27.7%
Sparkling	22 mil.	8.2%

Source: Booze-Allen & Hamilton (1982), And Wines And Vines (July 1985).

Figure 5B. Share And Percentage Of The U.S. Wine Market 1970-1985.



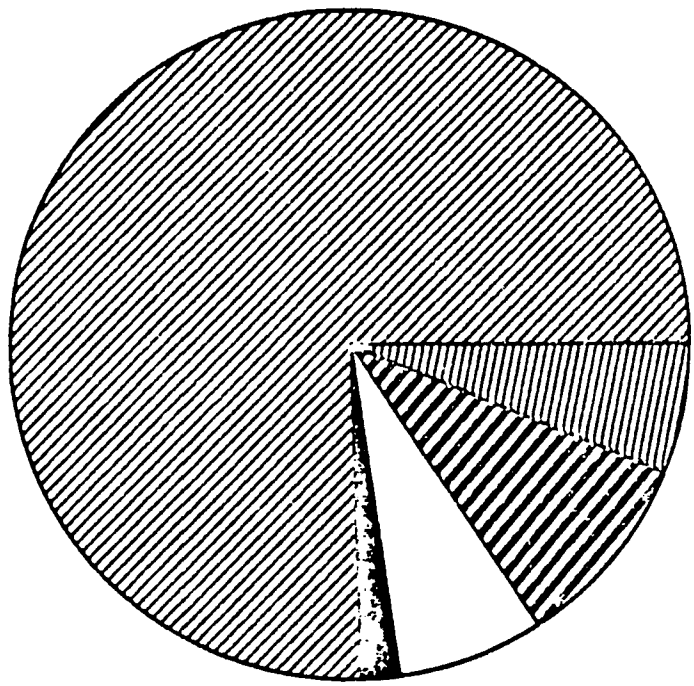
1975 (368 Million Gallons)

LEGEND

Table	213 mil.	58.0%
Vermouth	10 mil.	2.7%
Special Natural	57 mil.	15.5%
Desert	67 mil.	18.3%
Sparkling	20 mil.	5.4%

Source: Booze-Allen & Hamilton (1982), And Wines And Vines (July 1986).

Figure 5C. Share And Percentage Of The U.S. Wine Market 1970-1985.



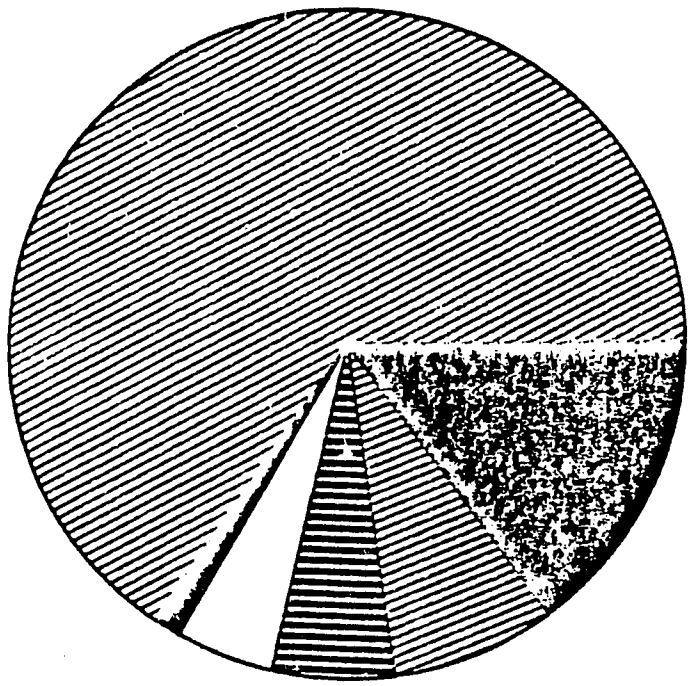
1980 (475.8 Million Gallons)

LEGEND

Table	358.5 mil.	75.4%
Vermouth	8.7 mil.	1.8%
Special Natural	33.1 mil.	7.0%
Desert	45.2 mil.	9.5%
Sparkling	29.8 mil.	6.3%

Source: Booze-Allen & Hamilton (1982), And Wines And Vines (July 1986).

Figure 5D. Share And Percentage Of The U.S. Wine Market 1970-1985.



1985 (577.2 Million Gallons)

LEGEND		
Table	377.3 mil.	65.4%
Vermouth	6.9 mil.	1.3%
Special Natural	26.9 mil.	4.6%
Desert	34.3 mil.	5.9%
Sparkling	45.6 mil.	7.9%
Wine Cooler	86.2 mil.	14.9%

Source: Booze-Allen & Hamilton (1982), And Wines And Vines (July 1986).

1985, Wines and Vines Magazine also showed Arizona 15th in per capita wine consumption with a 5.6% increase from 1984 (TABLE 26). Total wine consumption in Arizona in 1985 was 8,983,000 gallons. It is the author's estimation that Arizona produced roughly .002% of the wine it consumed in 1985, in state bonded wineries. In 1986 Arizona produced approximately .003% of the wine it consumed for that year.

The per capita wine consumption in Arizona has increased from 1.06 gallons in 1950 to 2.82 gallons in 1985. The average growth rate during this period has been 3%. From 1970 to 1980 the growth rate was 4.7%, and since 1980 it has been 5.5%. Changing per capita consumption levels accounted for 62% of the growth in wine consumption and 38% of the change was attributed to population advances. The partitioning of the growth on a per capita versus population basis was calculated by multiplying the 1950 per capita consumption level by the 1985 population level. That amount was then subtracted from the total consumption for 1985. The difference was attributed to the increase in the per capita consumption.

The projected consumption level for the years 2000 and 2015 were obtained from a per capita income - per capita consumption function relationship and forecasted income and population levels. The first phase consisted of setting up the consumption function. Income has been identified as the primary variable responsible for changes in the demand for

TABLE 26
Per Capita Wine Consumption in the U.S. by States.

STATE	1974	1984	1985	CHANGE FROM 1984 PERCENT	1985 RANK
	GALLONS				
Alabama	0.82	0.98	1.05	7.1	42
Alaska	2.29	3.27	3.30	0.9	9
Arizona	1.71	2.67	2.82	5.6	15
Arkansas	0.66	0.72	0.81	12.5	49
California	3.61	4.54	4.82	6.2	3
Colorado	2.04	2.86	3.10	8.4	14
Connecticut	1.85	3.19	3.22	0.9	12
Delaware	1.35	2.37	2.56	8.0	17
Florida	1.76	2.57	2.65	3.1	16
Georgia	0.79	1.46	1.62	11.0	31
Hawaii	1.88	2.50	2.50	0.0	18
Idaho	1.31	1.84	2.13	15.8	22
Illinois	1.71	2.26	2.29	1.3	20
Indiana	0.68	1.27	1.35	6.3	37
Iowa	0.46	0.81	1.28	58.0	40
Kansas	0.65	0.92	0.98	6.5	45
Kentucky	0.50	0.76	0.83	9.2	47
Louisiana	1.30	1.72	1.62	-5.8	31
Maine	1.23	1.99	2.14	7.5	21
Maryland	1.65	2.35	2.31	-1.7	19
Massachusetts	1.95	3.25	3.25	0.0	11
Michigan	1.44	1.92	2.01	4.7	24
Minnesota	1.02	1.67	1.93	15.6	27
Mississippi	0.55	0.62	0.61	-1.6	51
Missouri	0.97	1.57	1.61	2.5	33
Montana	0.88	1.93	1.98	2.6	25
Nebraska	0.75	1.24	1.32	6.5	38
Nevada	4.20	5.05	5.35	5.9	2
New Hampshire	2.14	3.70	3.31	-10.5	8
New Jersey	2.17	3.45	3.50	1.4	5
New Mexico	1.66	1.88	2.10	11.7	23
New York	2.32	3.11	3.12	0.3	13
North Carolina	1.07	1.52	1.71	12.5	29
North Dakota	0.74	0.99	1.13	14.1	41

Source: Wines and Vines Magazine, July 1986.

TABLE 26 (continued)
Per Capita Wine Consumption in the U.S. by States.

STATE	1974	1984	1985	CHANGE FROM 1984	1985
	GALLONS			PERCENT	RANK
Ohio	1.00	1.43	1.57	9.8	34
Oklahoma	0.72	0.95	0.92	-3.2	46
Oregon	2.75	3.25	3.41	4.9	7
Pennsylvania	1.19	1.39	1.29	-7.2	39
Rhode Island	2.29	3.34	3.27	-2.1	10
South Carolina	0.99	1.45	1.52	4.8	35
South Dakota	0.85	0.99	1.05	6.1	42
Tennessee	0.60	0.94	1.01	7.4	44
Texas	1.01	1.64	1.71	4.3	29
Utah	0.70	0.75	0.81	8.0	49
Vermont	2.50	3.04	3.43	12.8	6
Virginia	1.18	1.81	1.88	3.9	28
Washington	2.31	3.49	3.67	5.2	4
Washington D.C.	4.81	7.12	6.65	-6.6	1
West Virginia	0.49	0.75	0.82	9.3	48
Wisconsin	1.34	1.89	1.97	4.2	26
Wyoming	1.07	1.29	1.43	10.9	36
USA	1.65	2.34	2.42	3.4	

Source: Wines and Vines Magazine, July 1986.

wine (Folwell and Kirpes 1985, Wohlgenant 1985). Wine prices, prices of competing beverages and per capita education levels are not available for Arizona on an annual basis and are not included in this estimation. A simple regression model was set up with the wine consumption function expressed as follows,

$$C_t = a_t + b_t x_t + m_t$$

where C_t = the Arizona per capita consumption level of wine, X_t = the Arizona per capita income level deflated by the Consumer Price Index, a_t, b_t = the independent coefficients and m_t = the stochastic error term. The subscript t denotes the respective year.

Ordinary least squares was employed to estimate the parameters since this technique is known under the Gauss-Markov theorem to give the best linear unbiased estimators available (Salvatore 1982). The explanatory variable was pre-determined. Annual data sets for per capita income and per capita wine consumption in Arizona were used from 1950 to 1985. The year 1967 was the base year for personal income deflation (U.S Department of Commerce, 1985).

The results of the regression indicated a positive correlation between income and wine consumption. The adjusted R-squared was .966 (Table 27). The Hildreth-Lu Technique was employed in the regression to reduce problems associated with serial correlation. The resulting Durbin-Watson statistic is 2.27112. The independent coefficient was

TABLE 27
Regression Analysis for Wine Consumption and Income.

year	wine consump	per cap income	index cpi	deflated cpi
1950	1.05	1381	74.5	1786.577
1951	1.06	1567	82.8	1892.512
1952	1.17	1662	84.3	1971.530
1953	1.20	1685	86.3	1991.566
1954	1.14	1689	88	1960.144
1955	1.27	1677	91	2055.[illegible]
1956	1.19	1767	93	2149.892
1957	1.17	1803	96	2128.674
1958	1.22	1863	97	2105.064
1959	1.17	1943	97	2186.598
1960	1.10	2008	98	2209.259
1961	1.10	2077	99	2226.252
1962	1.05	2142	99	2254.300
1963	1.05	2211	99	2284.210
1964	1.05	2310	100	2310.000
1965	1.07	2486	100.4	2475.577
1966	1.10	2613	103.9	2510.596
1967	1.15	2746	106.4	2581.015
1968	1.27	2874	109.8	2744.308
1969	1.35	3077	113.5	2711.233
1970	1.42	3240	116.3	2785.225
1971	1.55	3307	121.3	2726.092
1972	1.62	3556	125.3	2838.050
1973	1.82	3877	133.1	2912.397
1974	1.69	4141	147.7	2804.197
1975	1.72	4310	161.2	2674.907
1976	1.80	4613	170.5	2705.572
1977	1.85	4846	181.5	2670.523
1978	1.89	5196	195.4	2659.161
1979	1.92	5705	217.4	2622.009
1980	1.99	6156	246.8	2494.733
1981	2.02	6613	272.4	2428.781
1982	2.09	6961	289.1	2408.442
1983	2.12	7383	298.4	2474.362

No. of Observations =	33	R2=	.967	(adj)=	.966
Mean of Dep. Var. =	1.58943	Std. Error of Reg.=			.106680
Log(likelihood) =	28.6645	Durbin-Watson =			2.27112
Schwarz Criterion =	27.2643	F 1, 31 =			959.307
Akaike Criterion =	26.6645	Significance =			.000000

Variable	Coefficient	Std Error	t-stat	Signf
^CONST	.000000	.000000	.000000	1.000
INCOME	.5[illegible]800E-03	.155085E-03	3.26935	.003
^RHO	.[illegible]0000	.000000	.000000	1.000

Source: Various Issues of Arizona Statistical Review, Wines and Vines, and Statistical Abstract of the United States.

0.000508, with a significance level of .003.

An ex post forecast was run to validate the forecast model. In an ex post forecast the forecast period is such that observations of both the dependent and independent variables are known with certainty. In this case the data for Arizona per capita income and per capita wine consumption was used from 1950 to 1984 to predict the level of consumption for 1985. The 1985 per capita consumption is known. The ex post forecast can be checked against the 1985 data to provide a means of evaluating the forecasting model (Pindyck and Rubinfeld, 1981).

The 1985 per capita consumption for Arizona was 2.82 gallons. The ex post forecast yielded an interval of 1.83 gallons to 2.29 gallons. This check indicates that projections based on this model will tend to error on the conservative side. Given the uncertainty and variability in long term forecasts, the preferred tendency would be to under estimate future consumption levels.

Future Wine Consumption

The second phase of the anaylsis was to extend the forecasted per capita consumption to the years 2000 and 2015. The estimated value of X_f , the total per capita income of Arizonans in the year 2000 deflated by the base year is $6,891 (BEA Regional Projections 1985). The new model takes the form,

$$C_f = a_f + b_f X_f + m_f$$

where C_f is the future value of C corresponding to X_f ,and m_f is the value of the disturbance term in this future period (Kelejian and Oates 1981).

The estimated forecast error variance is:

$$SF^2 = S^2 (1 + 1/N + (X_{t+1}-XBAR)^2 / SUM(X_t-XBAR)^2$$

The resulting value of SF^2 = .024. The 95 percent confidence interval is;

Y estimate $_{t+1}$ - t .05 SF less than or equal to Y_{t+1} less than or equal to Y estimate $_{t+1}$ + t .05 SF.

C_f = 3.50 plus or minus .31 for the year 2000 and

C_f = 4.04 plus or minus .36 for the year 2015.

The estimated population for Arizona in the year 2000 is 4,882,900 (Arizona Dept. of Economic Security). The range for per capita wine consumption is 3.81 gallons under optimistic conditions and 3.19 gallons under pessimistic conditions. Under the optimistic scenario total wine consumption would reach 18,603,849 gallons. This represents an increase of 962,0842 gallons over 1985 levels or a 107% increase in the 15 year interval. Under the pessimistic scenario, wine consumption will increase to 15,576,451 gallons which is an increase of 6,593,451 gallons or 73% (Table 28).

The estimated population of Arizona in 2015 is 6,740,000. The estimated value of X_f the total per capita income of Arizonans in the year 2015, deflated by the 1967

TABLE 28

FORECASTED ARIZONA WINE CONSUMPTION

YEAR	POPULATION	PER CAPITA CONSUMPTION	GALLONS
1985	3,197,700	2.82	8,983,000
2000	4,882,900		
Optimistic		3.81	18,603,849
Pessimistic		3.19	15,576,451
2015	6,740,000		
Optimistic		4.41	29,723,400
Pessimistic		3.69	24,870,600

SOURCES: Arizona Population Projections 1986, and BEA Regional Projections 1985.

base year is $7,978. The range for per capita consumption is 4.41 under ideal circumstances and 3.69 in the more conservative projections. Optimistic results yield total consumption of 29,723,400 gallons of wine in Arizona in 2015. This represents an increase of 11,119,551 gallons over the year 2000, and an increase of 20,740,400 gallons over consumption in 1985. The less favorable model shows consumption in the year 2015 to be 24,870,600 gallons. This figure is 9,294,149 gallons above consumption in the year 2000 and 15,887,600 gallons more than consumption in 1985.

Projected Vineyard and Winery Demand

A 10% market share of Arizona's own wine consumption, for native wines, is a target percentage being focused upon by the Arizona Wine Growers Association (Brady 1986). A model using forecasted consumption levels, with the assumption that 5% of the market is captured by the year 2000 and 10% by the year 2015 is used to determine the derived demand for vineyards and wineries necessary to be physically able to capture the stated market shares.

Vineyards are assumed to produce four tons per acre and one-hundred and fifty gallons of wine per ton. Wineries are assumed to have 25,000 gallon capacities. To achieve any level of market share it must be recognized that there is a seven year lag between planting a vineyard and full maturity. There is also a lag associated with aging wine and capturing market share.

Under optimistic conditions in the year 2000, Arizona would have to produce and sell 930,192 gallons of wine to attain a 5% market penetration. This would require 6,201 tons of fruit or 1,550 acres of vineyards. Vinification of the fruit would employ 37 bonded wineries (Table 29). The figures for the pessimistic conditions would be 778,822 gallons of wine, 5,192 tons of premium grapes, 1,298 acres of vineyards and 31 farm wineries in Arizona.

In the year 2015, if a 10% share of the indigenous market were to be gained, 2,972,340 gallons of table wine would be fermented by 118 small wineries. The crush would consist of 19,815 tons of grapes from 4,954 cultivated acres. Under less favorable conditions, 100 wineries would process 2,487,060 gallons of wine from 16,580 tons of fruit off of 4,145 acres of vineyards.

The model is not meant to predict the actual mix of vineyards and wineries but to demonstrate the potential scope of the Arizona wine industry under very modest growth projections. In the year 2015 if Arizona reached a 10% market goal, 90% of its own consumption would be imported from out of state. Following the same assumptions for instate vineyards and wineries, under conservative conditions, 22,383,540 gallons of wine would be imported from out-of-state. This figure represents 149,223 tons of fruit or 37,305 acres of grapes and 895 small wineries of

TABLE 29
Projected Vineyard and Winery Demand

Year	% Total Consumption	Gallons	Tons	Vineyard Acres	Wineries
2000	5%				
Optimistic		930,192	6,201	1,550	37
Pessimistic		778,822	5,192	1,298	31
2015	10%				
Optimistic		2,972,340	19,815	4,954	118
Pessimistic		2,487,060	16,580	4,145	100

25,000 gallons capacity.

There is precedence for such growth. In 1970 in the Napa Valley of California there were approximately 30 wineries, in 1985 there were approximately 150 wineries. In Virginia in 1970 the were no bonded farm wineries, in 1985 there were 32. Between 1980 and 1985, 467 new bonded wineries opened in the United States with approximately half of them located outside of California (Table 1, Chapter One).

Marketing

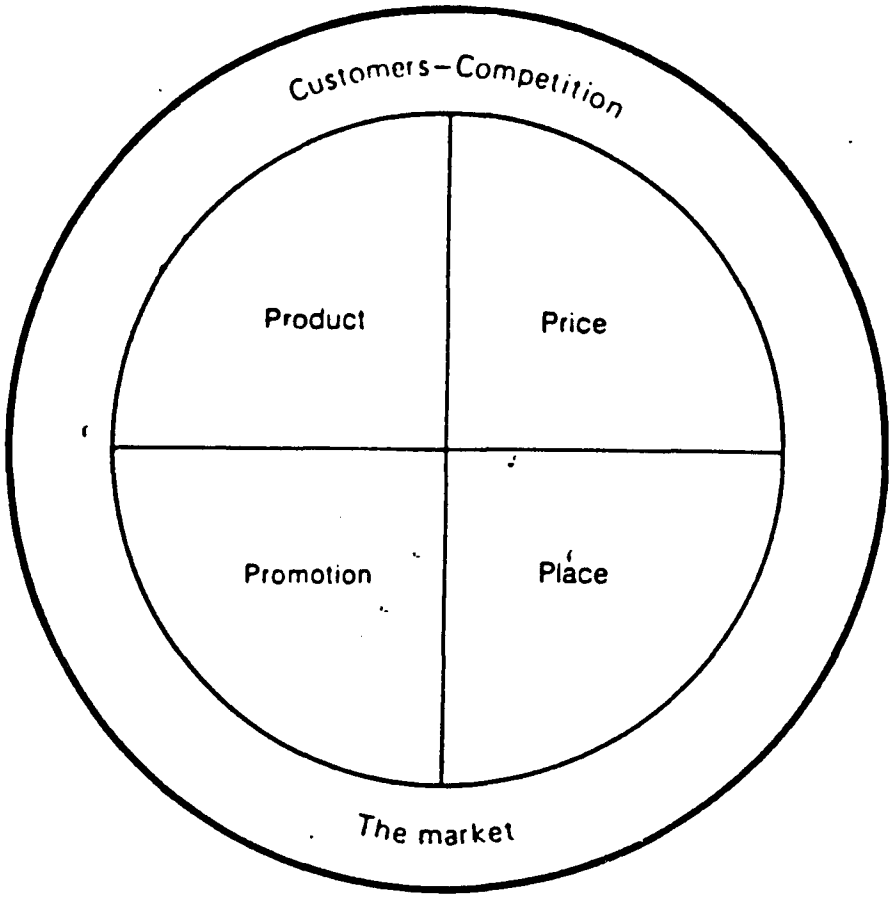
Cannon (1983) claimed; "Marketing will be the key to persuading consumers to increase their consumption of wine." Cimino and Filice (1984) defined marketing as: "a combination of activities designed to produce a profit through creatively stimulating and satisfying the needs and/or wants of a selected segement of the market." These activities are to begin prior to production and incorporate; consumer research, product mix, product positioning, new product concepts, financial and promotional planning, the marketing plan, packaging and marketing support materials, advertising, public relations and promotion, the sales and distribution plan and performance evaluations. Cimino and Filice stressed product positioning in order to enable the consumer to differentiate one wine from another within the same category.

Total market decisions for winegrowers revolve around two questions; which class of customers will be targeted and what is the competitive enviroment? The marketing plan then can be divided into four major decision areas called the marketing mix (Figure Six). The decision areas center around product, price, promotion, and place. The decisions in one area must complement those of another inorder to fully intergrate the marketing plan.

In Arizona the initial efforts at product definition will center around the uniqueness of Arizona wines. Small operators will focus on the premium class inorder to generate the returns necessary for long term economic viability. Communication of this position throughout the networks of distribution will ultimately reach the consumer. Consistent quality will be vital to early success. Winer (1984) stated: "It is the marketplace that determines a product's position. It is therefore the test of the marketer and advertiser to utilize the consumer's perception of the product to best achieve the sales objective both in the short and long term."

Small, premium wineries must devise strategies geared toward specific sub-divisions of the total market, rather than higher shares of the larger primary market. Sub-divisions upon which targeting could be based include sex, age, socio-economic patterns as well as localized markets and segmentation by taste appeal.

Figure 6. Marketing Matrix For Marketing Plan.



Source: Downey and Erickson, 1987.

The first wines produced in Arizona will be considered a specialty, with little price competition and a relatively good profit position. Over time as competition discovers the opportunity and enters the market, the wines will be viewed as a commodity. Commodity markets are usually highly competitive, low-profit markets (Downey and Erickson, 1987). Firms contemplating entry into the Arizona market would benefit from producing wines that they deem profitable both during the short term and the long term growth cycle of the Arizona industry.

Product decisions determine what types of wines to offer. For small operators the wines selected for the mix should complement each other technically, in the distribution channels and with consumers, to take full advantage of marketing efficiencies. The mix of red and white wines, and the amount of sweet, semi-sweet, and dry wines, constitute the major product decisions for winegrowers. These decisions are followed closely by what varieties will be used to achieve the desired mix.

Product definition was identified as a critical factor at a wine marketing seminar at the University of San Francisco (Cole 1983). Small premium companies where found to do well when highly focused. The need to specialize in the production of a few fine wines was stressed for small wineries. The optimal marketing strategy was to be at the top of the pyramid among wine products segmented by price,

with low-priced jug wines at the base and high-priced wines at the top.

Pricing strategies are based on actions by competitors, the responses of the consumers and considerations relating to costs of inputs. Pricing decisions will be critical to marketing success, since it influences the total revenue generated by the firm. Lower prices produce less income but usually result in more rapid inventory turn-over. Increased prices can result in slower sales but a better profit margin. The types of wines produced can help determine the pricing strategy. White wines often are sold when they are young and fresh, they should not be stored for extended periods. Red wines mature with age and can be held if sales lag.

Pricing was viewed by Cole as the lifestream of the wine business. "Marketing share is determined by percentage of sales within a particular price-range and the price of a bottle determines its competition and its consumer and therefore, the marketing strategy. Above all, the price must incorporate all costs incurred in production, distribution and promotion, including a margin of profit in line with production capacity." By far the most vital aspect of any marketing program according to Cole, is the quality and content of a winery's public image. "There is no better reputation than that built by word-of-mouth, and no better

way to achieve it than through featuring consistently good wine in wine tastings." (Appendix E and F)

Promotional activities in the wine industry are designed to accomplish one task; sell wine. The marketing strategy for wine is essentially a communication process intended to modify customer behavior toward a positive buying decision. The promotional mix is usually a combination of advertising, personal selling efforts, general publicity, and a sales support program. The particular mix for an individual firm will depend on their product definition, price and method of distribution.

On packaging and point-of-sale materials the message from wine marketers according to Cole was consistent: "Make it damn good or don't make it at all." Hairing (1986) noted that; "Studies indicate the greater the number and quality of wine displays, the more wine is sold. Because less than half the wine purchases in a wine or liquor store are planned - less than 25% in food stores - effective merchandising and selling should lead to increased impulse purchases....application of merchandising techniques has been shown to increase the wine sales of individual stores by 18 to 37%."

Place decisions concentrate on the manner and avenues of distribution that will maximize sales and profits. State farm winery bills that authorize on-premise, retail sales, offer unique opportunities for winegrowers to

sell directly to the consumer. A mix of retail sales and wholesale distribution is the norm for the wine industry. Since retail sales generate higher profits, small operators would benefit from concentrating on retail sales.

Gomberg (1986) reported that the winery tasting room was the gateway to future industry expansion. "Tasting rooms represent a major promotional instrument, particulary for small and medium-sized wineries, upon which success or failure many very well depend. Well-funded, well equipped and well managed tasting rooms can be major centers of profit. Plus, they provide an incomparable vehicle for sampling the public, for establishing person-to-person contact with customers, thus laying the foundation for consumer loyalty. No independently-owned and operated retail store can match this kind of direct contact with visitors to the winery itself."

Arizona

The marketing plan for Arizona premium wineries in the author's view should be predicated on drawing visitors to the on-site winery retail room. Direct retail sales can produce the largest profit margins. Wineries could be located and designed with retail sales in mind. Personel engaging in tours and tastings could be trained in sales techniques in order to maximize retail income. The key to marketing success will be repeat sales.

The wholesale trade will also be vital to the interests of the Arizona wine industry. Wines served in prestiges restuarants and resorts lend an aura of legitamacy to the trade which is especially welcomed in the initial stages of development. Many of the repeat customers will buy their wines in local grocery stores if they are available. There is a built in advantage for local wineries in that the can cultivate contacts with store managers and the consumer more readily that most competing, out-of-state concerns. These advantages must be exploited if the industry is to pass out of the novelty stage.

The primary consideration in marketing wine ultimately resides in the bottle. There is no substitution for quality. Good quality originates in the vineyards, with the choice of grapes and their care. It is said that the vines require the master's shadow as much as sunshine.

The same care must permeate every aspect of the vinification process, bottling and labeling. If the winegrower is expecting a high price for his wines, he must set a high standard of workmanship and create the perception of value. Cleanliness, order, aesthetics, professionalism, are details that have subtle influences on the consumer's taste preferences. They are details that can make or break a small winery.

The marketing plan should appeal to the chauvinistic

pride that Arizonans have in their state. Wine made in Arizona for Arizona is a natural ploy and one that will enable new, farm wineries to compete with established out-of-state firms. Local micro-climates, soils, history, and personalities should be woven with classical cultivars, viticultural practices and fermentation techniques to create an indigenous product. The process should be documented, told and retold to generate the same enthusiasm for the end produce that went into creating it.

CHAPTER FIVE

ADJUSTED INCOMES AND FINANCIAL ANALYSIS

Net present value analysis and internal rate of return evaluation are based on the adjusted incomes developed from the enterprise budgets presented in Chapter Three. The formula for adjusted income takes the form:

AI = NI -(T * (NI - D - I) - TP - M)

Where;

AI = Adjusted Income

NI = Net Income

T = Tax Rate

D = Depreciation

I = Interest Payment

TP = Total Loan Payment

M = Margin Of Owner Equity

The net income is the "net returns above cost shown" line on the enterprise budgets, minus interest expenses. The assumed tax rate for this exercise is the 15% individual rate under the 1986 Tax Reform Act. No investment tax credits are included.

Depreciation is based on the modified accelerated cost recovery system (MACRS) provided for in the 1986 law.

Under the MACRS most farm assets are written off in seven years. Long term capital improvements are depreciated over twenty years. The double (200%) declining balance depreciation method is used for property with a class life of three to ten years. For property in the fifteen to twenty year class, the 150% declining balance method is employed. All classes use a half-year convention, this treats all property as placed in service or disposed of, on the mid-point of that tax year. The depreciation schedules for the various vineyards and wineries are provided in tables 30 and 31.

There are multiple methods for financing a farming enterprise. The primary variable is the mixture of equity and borrowed capital. In this study a development loan is assumed to have been secured to cover the establishment period. The loan is for 75% of the needed investment capital, the required margin of owner equity is 25%. During the first seven years of the operation no payment is made on the loan, interest accrues and becomes part of the princple. In year eight interest and principle payments commence. The loan is paid off over ten years or by the end of the seventeenth year of operation. The interest rate on the loan is varied from 10% to 12% as part of the analysis.

Each adjusted income stream is evaluated on the basis of projected annual income and then under conditions where the enterprise is sold in the twentieth year of

Table 30. Vineyard Depreciation Schedules, Modified Accelerated Cost Recovery System.

DEPRECIATION TWENTY ACRE VINEYARD	REPLACE	MACRS YEARS	COST	1
MACHINERY	SEVEN YEARS	7	39500	5648
EQUIPMENT	SEVEN YEARS	7	16100	2302
STORAGE BUILDING	TWENTY YEARS	20	9000	968
WELL	TWENTY YEARS	20	10000	1075
IRRIGATION SYSTEM	TEN YEARS	7	20000	2860
TRELLIS	TWENTY YEARS	7	20000	2860
ROOTED CUTTINGS	FORTY YEARS	7	4200	601
TOTAL DEPRECIATION				16314

DEPRECIATION FIFTY ACRE VINEYARD	REPLACE	MACRS YEARS	COST	1
MACHINERY	SEVEN YEARS	7	75500	10797
EQUIPMENT	SEVEN YEARS	7	23300	3332
STORAGE BUILDING	TWENTY YEARS	20	11000	1183
WELL	TWENTY YEARS	20	10000	1075
IRRIGATION SYSTEM	TEN YEARS	7	50000	7150
TRELLIS	TWENTY YEARS	7	50000	7150
ROOTED CUTTINGS	FORTY YEARS	7	10500	1501
TOTAL DEPRECIATION				32188

DEPRECIATION HUNDRED ACRE VINEYARD	REPLACE	MACRS YEARS	COST	1
MACHINERY	SEVEN YEARS	7	106500	15229
EQUIPMENT	SEVEN YEARS	7	33000	4719
STORAGE BUILDING	TWENTY YEARS	20	16000	1720
WELL	TWENTY YEARS	20	20000	2150
IRRIGATION SYSTEM	TEN YEARS	7	100000	14300
TRELLIS	TWENTY YEARS	7	100000	14300
ROOTED CUTTINGS	FORTY YEARS	7	21000	3003
TOTAL DEPRECIATION				55421

2	3	4	5	6	7	8	9	10
9682	6913	4936	3524	2516	1796	10133	9682	6913
3946	2818	2012	1436	1026	732	4130	3946	2818
1727	1356	1064	835	656	515	404	317	249
1919	1506	1183	928	729	572	449	352	277
4902	3500	2499	1784	1274	910	5131	4902	3500
4902	3500	2499	1784	1274	910	5131	4902	3500
1029	735	525	375	267	191	1078	1029	735
28107	20328	14718	10666	7742	5626	26456	25130	17992

2	3	4	5	6	7	8	9	10
18505	13213	9434	6736	4809	3434	19369	18505	13213
5711	4078	2911	2079	1484	1060	5977	5711	4078
2111	1657	1301	1021	801	629	494	388	304
1919	1506	1183	928	729	572	449	352	277
12255	8750	6248	4461	3185	2274	12827	12255	8750
12255	8750	6248	4461	3185	2274	12827	12255	8750
2574	1838	1312	937	669	477	2693	2574	1838
55330	39792	28637	20623	14862	10720	54636	52040	37210

2	3	4	5	6	7	8	9	10
26104	18638	13307	9501	6784	4844	27322	26104	18638
8088	5775	4124	2944	2102	1501	8466	8088	5775
3070	2410	1892	1485	1166	915	719	564	443
3838	3013	2365	1856	1457	1144	898	705	553
24510	17500	12495	8922	6370	4548	25655	24510	17500
24510	17500	12495	8922	6370	4548	25655	24510	17500
5147	3675	2624	1874	1338	955	5387	5147	3675
95267	68511	49302	35504	25587	18455	94102	89628	64084

Years One Through Ten Shown Above.

Figure 31. Winery Depreciation Schedules, Modified Accelerated Cost Recovery System.

DEPRECIATION 12,000 GALLON WINERY	REPLACE	MACRS YEARS	COST	1
OAK BARRELS	FIVE YEARS	5	22500	3217
STAINLESS STEEL	TWENTY YEARS	15	57100	6138
PRODUCTION EQUIPMENT	SEVEN YEARS	7	107560	15381
CAPITAL IMPROVEMENTS	TWENTY YEARS	20	155000	16663
TOTAL DEPRECIATION				41399

DEPRECIATION 30,000 GALLON WINERY	REPLACE	MACRS YEARS	COST	1
OAK BARRELS	FIVE YEARS	5	56250	8044
STAINLESS STEEL	TWENTY YEARS	15	142950	15367
PRODUCTION EQUIPMENT	SEVEN YEARS	7	196820	28145
CAPITAL IMPROVEMENTS	TWENTY YEARS	20	335000	36013
TOTAL DEPRECIATION				87569

DEPRECIATION 60,000 GALLON WINERY	REPLACE	MACRS YEARS	COST	1
OAK BARRELS	FIVE YEARS	5	112500	16087
STAINLESS STEEL	TWENTY YEARS	15	241750	25988
PRODUCTION EQUIPMENT	SEVEN YEARS	7	279480	39966
CAPITAL IMPROVEMENTS	TWENTY YEARS	20	535000	57513
TOTAL DEPRECIATION				139554

2	3	4	5	6	7	8	9	10
5515	3938	2811	2007	1433	1024	5772	5515	3938
10957	8601	6752	5300	4161	3266	2564	2013	1580
26363	18823	13440	9596	6852	4892	27594	26363	18823
29742	23348	18328	14388	11294	8866	6960	5463	4289
72577	54710	41331	31291	23740	18048	42890	39354	28630

2	3	4	5	6	7	8	9	10
13787	9844	7028	5018	3583	2559	14431	13787	9844
27430	21533	16903	13269	10416	8177	6419	5039	3955
48241	34444	24593	17560	12537	8952	50493	48241	34444
64282	50462	39612	31096	24410	19162	15642	11808	9269
153740	116283	88136	66943	50946	38850	86185	78675	57512

2	3	4	5	6	7	8	9	10
27574	19688	14057	10037	7166	5117	28861	27574	19688
46389	36415	28586	22440	17615	13828	10855	8521	6689
68501	48910	34921	24934	17803	12711	71700	68501	48910
102660	80588	63261	49660	38983	30602	24023	18858	14803
245124	185601	140825	107071	81567	62258	135439	123454	90090

Years One Through Ten Shown Above.

operation. The purpose of including the sale of the business is to fully evaluate the overall profitability of each enterprise.

The valuation of the vineyards and wineries at year twenty is based on the income approach of real estate appraisal. Under this procedure anticipated income, to be derived from ownership of vineyards and wineries, is converted into a value estimate. The estimation of the future value of the property is calculated using the following equation:

$$V = (I/R + I20) - ((I/R + I20 - B) * T)$$

Where;

V = The Market Value

I = The Annual Net Income

R = The Market Capitalization Rate

I20 = The Net Income in Year Twenty

B = The Basis (fixed ownership costs minus interest, insurance and taxes)

T = The Tax Rate

The assumed capitalization rate or required rate of return is 10%. Once the apprasial is complete the value is substituted for the expected income in year twenty on the enterprise budget and becomes incorporated into the adjusted income. Net present value and internal rate of return analysis is conducted in each case on both the adjusted budget before sale of the property and after with the

interest rate for borrowed capital pegged at 10%, 11% and 12%.

Vineyard Analysis

Adjusted incomes are developed for twenty acre vineyards, fifty acre vineyards and one hundred acre vineyards. Appendix G, H, and I, illustrate the adjusted incomes with the price of fruit at $800 a ton. The price received from the sale of fruit was then varied from $800 a ton, to $900 a ton and finally $1000 a ton. A list of all the various adjusted incomes for vineyard analysis is provided in Appendix J.

Net present value and internal rate of return results for vineyards are displayed in table 32. The twenty acre vineyard has a negative net present value under most scenarios which suggests that a 10% required rate of return is unrealistic at this level of production given the assumptions employed for this study. The best results occur at $1000 a ton income from the sale of the fruit coupled with the sale of the enterprise. A 10.07% internal rate of return can be achieved when interest rates are held at 10%.

A grapegrower operating at this level may improve his return by substituting labor for capital inputs or utilizing alternative financing procedures. If the owner is drawing an income as the operator of the vineyard then the results would improve. A lower required rate of return would

Table 32. Financial Analysis For Vineyards.

NET PRESENT VALUES FOR ADJUSTED VINEYARD BUDGETS

TWENTY ACRE VINEYARD INTEREST	0.1	0.11	0.12
AT $800 TON	-117102	-119077	-120334
AT $800 TON WITH SALE	-86135	-93237	-98737
AT $900 TON	-82036	-87208	-91301
AT $900 TON WITH SALE	-42629	-54325	-63818
AT $1000 TON	-46970	-55340	-62268
AT $1000 TON WITH SALE	878	-15414	-28898
FIFTY ACRE VINEYARD			
INTEREST	0.1	0.11	0.12
AT $800 TON	-163800	-176503	-186699
AT $800 TON WITH SALE	-74945	-102359	-124730
AT $900 TON	-76135	-96831	-114116
AT $900 TON WITH SALE	33819	-5081	-37432
AT $1000 TON	11530	-17159	-41533
AT $1000 TON WITH SALE	142584	92196	49865
HUNDRED ACRE VINEYARD			
INTEREST	0.1	0.11	0.12
AT $800 TON	-80256	-121165	-155621
AT $800 TON WITH SALE	123263	48659	-13682
AT $900 TON	95074	38177	-10455
AT $900 TON WITH SALE	340794	243215	160913
AT $1000 TON	270404	197521	134709
AT $1000 TON WITH SALE	558324	437772	335510

INTERNAL RATE OF RETURN FOR ADJUSTED VINEYARD BUDGETS

TWENTY ACRE VINEYARD INTEREST	0.1	0.11	0.12
AT $800 TON	-9.15	-10.37	-11.64
AT $800 TON WITH SALE	2.25	1.77	1.28
AT $900 TON	-1.64	-2.62	-3.65
AT $900 TON WITH SALE	6.48	6.06	5.62
AT $1000 TON	4.06	3.3	2.5
AT $1000 TON WITH SALE	10.07	9.69	9.3
FIFTY ACRE VINEYARD			
INTEREST	0.1	0.11	0.12
AT $800 TON	-0.36	-1.27	-2.23
AT $800 TON WITH SALE	7.21	6.8	6.38
AT $900 TON	5.75	5.07	4.34
AT $900 TON WITH SALE	11.16	10.81	10.43
AT $1000 TON	10.58	10.05	9.48
AT $1000 TON WITH SALE	14.62	14.3	13.96
ONE HUNDRED ACRE VINEYARD			
INTEREST	0.1	0.11	0.12
AT $800 TON	7.54	6.93	6.29
AT $800 TON WITH SALE	12.37	12.03	11.68
AT $900 TON	12.62	12.15	11.66
AT $900 TON WITH SALE	16.12	15.83	15.51
AT $1000 TON	16.83	16.46	16.07
AT $1000 TON WITH SALE	19.47	19.21	18.94

also have a favorable impact on the financial analysis.

The fifty and one-hundred acre vineyards display some economies of size. Most of the expensive field machinery used in the twenty acre vineyard is the same utilized by the fifty acre operation. In going to one-hundred acres from fifty acres, the expenditures for machinery and equipment do not double. This represents the most significant variable input if land is assumed to have been purchased in all scenarios.

The net present value for the fifty acre vineyard turns positive when the price of fruit is $900 a ton, interest rates are 10% and the enterprise is sold. The net present value remains negative when calculated solely on the sale of grapes. A 10.58% internal rate of return is achieved on the income from grapes when the interest rate is held to 10% and the price for the grapes is $1000 a ton. The internal rate of return calculated on the income, combined with the sale of the property, achieves a high of 14.62%. Modifications in the assumptions for financing or required return could generate more favorable results.

The one-hundred acre vineyard has a positive net present value in cases where the price of grapes is $900 a ton and the interest rate is held to 11%, and where the price received for the grapes is $1000 a ton. When the price of grapes reaches $1000 a ton the internal rate of return on the income from grapes sold, ranges for 16.83% to

16.07%. The best internal rate of return is 19.47% when the property is sold with a price of $1000 a ton and interest rates held to 10%.

Winery Analysis

Adjusted income streams were developed for twelve thousand gallon, thirty thousand gallon and sixty thousand gallon wineries. Appendix K, L, and M, illustrate the adjusted incomes for wineries where the price of grapes is $800 a ton. The cost of grapes, purchased by the wineries, was then varied from $800 to $900 and then $1000 a ton. Interest rates for borrowed capital varied from 10% to 12%. The adjusted incomes were also evaluated under conditions where the wineries suffered a 10% loss of total receipts and where they gained a 10% increase in total receipts. Changes in total receipts could arise from changes in the sales ratio between retail and wholesale sales or in changes in the prices of the wines. All of the adjusted incomes for wineries are included in Appendix N. Financial analysis is provided in Table 33.

The net present value remains positive from the sale of wine for the twelve thousand gallon winery only when a ten percent increase in receipts is achieved and interest rates and grape prices remain favorable. A ten percent loss of receipts results in a negative net present value for all

Table 33. Financial Analysis For Wineries.

NET PRESENT VALUES FOR WINERY BUDGETS

TWELVE THOUSAND GALLON WINERY INTEREST	0.1	0.11	0.12
AT $800 TON	-342189	-356851	-367825
AT $800 TON WITH SALE	-191568	-231167	-262779
AT $900 TON	-402666	-413403	-420853
AT $900 TON WITH SALE	-260907	-295114	-321987
AT $1000 TON	-463144	-469955	-473881
AT $1000 TON WITH SALE	-330247	-359061	-381196
TWELVE THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-550855	-549077	-545366
AT $800 TON WITH SALE	-439564	-456229	-467764
AT $900 TON	-611333	-605629	-598395
AT $900 TON WITH SALE	-508924	-520175	-526973
AT $1000 TON	-671811	-662181	-651423
AT $1000 TON WITH SALE	-578264	-584122	-586182
TWELVE THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	-133524	-164627	-190284
AT $800 TON WITH SALE	56447	-6109	-57795
AT $900 TON	-194001	-221179	-243312
AT $900 TON WITH SALE	-12893	-70055	-117004
AT $1000 TON	-254479	-277731	-296341
AT $1000 TON WITH SALE	-82233	-134002	-176213

THIRTY THOUSAND GALLON WINERY INTEREST	0.1	0.11	0.12
AT $800 TON	-129513	-189940	-270337
AT $800 TON WITH SALE	299350	238923	28760
AT $900 TON	-274244	-334670	-397317
AT $900 TON WITH SALE	133519	73093	-112936
AT $1000 TON	-418974	-479401	-524298
AT $1000 TON WITH SALE	-32311	-92738	-254632
THIRTY THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-621184	-681610	-688662
AT $800 TON WITH SALE	-285048	-345475	-454235
AT $900 TON	-765914	-826341	-895642
AT $900 TON WITH SALE	-450386	-511312	-595936
AT $1000 TON	-910645	-971071	-1012623
AT $1000 TON WITH SALE	-616716	-677143	-737632
THIRTY THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	362157	301730	147967
AT $800 TON WITH SALE	883754	823327	511759
AT $900 TON	217427	156999	21007
AT $900 TON WITH SALE	717924	657497	370063
AT $1000 TON	72696	12269	-105974
AT $1000 TON WITH SALE	552093	491666	228367

SIXTY THOUSAND GALLON WINERY INTEREST	0.1	0.11	0.12
AT $800 TON	279551	103336	-49023
AT $800 TON WITH SALE	1154688	833584	561314
AT $900 TON	-9911	-167417	-302984
AT $900 TON WITH SALE	823027	527618	277922
AT $1000 TON	-299372	-438170	-556945
AT $1000 TON WITH SALE	491366	221651	-5471
SIXTY THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-673915	-774971	-860205
AT $800 TON WITH SALE	21293	-194863	-375355
AT $900 TON	-963376	-1045724	-1114160
AT $900 TON WITH SALE	-310368	-500830	-658747
AT $1000 TON	-1252837	-1316477	-1368127
AT $1000 TON WITH SALE	-642029	-806796	-942139
SIXTY THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	1233016	981641	762156
AT $800 TON WITH SALE	2288083	1862029	1497979
AT $900 TON	943555	710888	508195
AT $900 TON WITH SALE	1956927	1556485	1214940
AT $1000 TON	654093	440135	254234
AT $1000 TON WITH SALE	1624761	1250097	931195

Table 33. (Continued) Financial Analysis For Wineries.

	INTERNAL RATE OF RETURN FOR WINERY BUDGETS		
	TWELVE THOUSAND GALLON WINERY		
INTEREST	0.1	0.11	0.12
AT $800 TON	-10.79	-12.65	-14.48
AT $800 TON WITH SALE	4.58	3.77	2.99
AT $900 TON	-13.45	-15.18	-16.88
AT $900 TON WITH SALE	2.79	2.01	1.2
AT $1000 TON	-16.01	-17.62	-19.13
AT $1000 TON WITH SALE	1.07	0.29	-0.48
TWELVE THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-22.02	-23.44	-24.78
AT $800 TON WITH SALE	-2.66	-3.45	-4.23
AT $900 TON	-24.57	-25.91	-27.13
AT $900 TON WITH SALE	-4.51	-5.28	-6.08
AT $1000 TON	-27.17	-28.44	-29.68
AT $1000 TON WITH SALE	-6.34	-7.16	-7.98
TWELVE THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	1.33	-0.32	-2.3
AT $800 TON WITH SALE	11.51	10.8	9.98
AT $900 TON	-1.46	-3.57	-5.72
AT $900 TON WITH SALE	9.64	8.85	8.04
AT $1000 TON	-4.52	-6.53	-8.53
AT $1000 TON WITH SALE	7.8	7.03	6.23
THIRTY THOUSAND GALLON WINERY	THIRTY THOUSAND GALLON WINERY		
INTEREST	0.1	0.11	0.12
AT $800 TON	6.19	4.1	1.77
AT $800 TON WITH SALE	14.17	13.35	12.3
AT $900 TON	1.3	0.07	-2.21
AT $900 TON WITH SALE	11.78	10.98	10.13
AT $1000 TON	-1.47	-3.56	-5.7
AT $1000 TON WITH SALE	9.59	8.81	8
THIRTY THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-6.55	-10.53	-12.48
AT $800 TON WITH SALE	5.1	5.3	4.41
AT $900 TON	-11.66	-13.47	-15.21
AT $900 TON WITH SALE	4.04	3.23	2.41
AT $1000 TON	-14.6	-16.26	-17.88
AT $1000 TON WITH SALE	1.06	1.28	0.48
THIRTY THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	18.3	18.17	16.68
AT $800 TON WITH SALE	22.51	21.81	21.07
AT $900 TON	15.49	14.19	12.68
AT $900 TON WITH SALE	19.69	18.98	18.23
AT $1000 TON	11.8	10.32	8.61
AT $1000 TON WITH SALE	17.14	16.42	15.68
SIXTY THOUSAND GALLON WINERY	SIXTY THOUSAND GALLON WINERY		
INTEREST	0.1	0.11	0.12
AT $800 TON	14.31	12.8	11.02
AT $800 TON WITH SALE	19.11	18.33	17.51
AT $900 TON	9.85	8.16	6.13
AT $900 TON WITH SALE	16.15	15.38	14.57
AT $1000 TON	5.61	3.81	1.7
AT $1000 TON WITH SALE	13.5	12.75	11.98
SIXTY THOUSAND GALLON WINERY WITH -TEN% DECREASE IN RECEIPTS			
AT $800 TON	-1.46	-3.52	-5.73
AT $800 TON WITH SALE	10.16	9.34	8.48
AT $900 TON	-5.42	-7.28	-9.31
AT $900 TON WITH SALE	7.72	6.94	6.1
AT $1000 TON	-8.97	-10.65	-12.48
AT $1000 TON WITH SALE	5.46	4.71	3.3
SIXTY THOUSAND GALLON WINERY WITH +TEN% INCREASE IN RECEIPTS			
AT $800 TON	26.52	25.68	24.82
AT $800 TON WITH SALE	28.28	27.63	27
AT $900 TON	22.38	21.43	20.4
AT $900 TON WITH SALE	24.82	24.16	23.48
AT $1000 TON	18.42	17.34	16.13
AT $1000 TON WITH SALE	21.71	21.04	20.34

scenarios. A 4.58% internal rate of return can be gained when receipts are not adjusted, the price of grapes is $800 a ton, interest rates are 10% and the property is sold at the end of twenty years. A high of 16.61% internal rate of return is achieved under the most favorable conditions. As in the case of small vineyards, the small wineries may be required to rely on increased labor inputs, owner labor and creative finacing to achieve success.

The thirty thousand gallon winery has negative net present values under all conditions when a ten percent loss of receipts occurs. Positive results occur under unadjusted receipts when the price of grapes is held below $1000 a ton and the business is sold. The internal rate of return hits a high of 14.17%. When receipts rise, positive net present values are attained for both income from the sale of wine, and with the sale of the property added. The internal rate of return varies from 8.61% to 22.51%. This result implies that higher receipts from increased on premises, retail sales will be crucial to the success of small wineries.

Some economy of size is displayed by going to a sixty thousand gallon winery. Much of the bottling and labeling equipment is the same as the thirty thousand gallon winery but it operates at a more efficient rate in a larger winery. The same is true for pumps, hoses, presses, and filtering equipment.

A positive net present value can be achieved when

receipts are down, if the interest rate is limited to 10%, the price of grapes remains at $800 a ton and the property is sold. A rise in receipts can produce internal rates of return in the 16.13% to 28.28% range. Unadjusted receipts give positive net present values when the price of grapes is held to $800. Most scenarios that include the sale of the enterprise in the unadjusted cases result in positive net present values, with the internal rates of return between 19.11% and 11.95%.

Vineyard and Winery Analysis

Each vineyard enterprise budget and winery enterprise budget was combined with their appropriate sized counterparts to establish new budgets for the evaluation of joint vineyard/winery ventures. The twenty acre vineyards were combined with the twelve thousand gallon wineries, the fifty acre vineyards were combined with the thirty thousand gallon wineries and the one-hundred acre vineyards were combined with the sixty thousand gallon wineries.

A lag of two years was introduced before the wineries were constructed to reflect the development time in establishing vineyards. Under the previous winery budgets, the fruit was purchased and the wineries were filled to capacity immediately. In the combined budgets, the wineries are filled as production increases in the vineyards. Income from sale of wine is adjusted to shown the additional lag

associated with the vineyards' development. Since the vineyard is part of the winery no cost of fruit is incorporated into the study.

The resulting vineyard/winery depreciation schedules are contained in Table 34. The assumptions for financing the winegrowing operations are the same as in the vineyard and winery cases. The resulting adjusted incomes are set out in Appendix O, P, and Q.

Adjusted incomes are also developed for situations where there is a 10% decrease in receipts and a 10% increase. All the adjusted incomes for combined vineyards and wineries are listed in Appendix R. The results of the net present value analysis and internal rate of return analysis are presented in Table 35.

The twenty acre vineyard/twelve thousand gallon winery has a negative net present value unless receipts rise 10%. Given a ten percent increase in receipts and the sale of the enterprise, the best internal rate of return it can achieve is 10.48%.

The fifty acre vineyard/thirty thousand gallon winery also has a negative net present vlaue for all cases where the analysis is for income derived from the sale of wine and receipts are normal or 10% below normal. A positive net present value results when the property is sold, for cases where the receipts remain unchanged and where receipts

Table 34. Vineyard/Winery Depreciation, Modified Accelerated Cost Recovery System.

DEPRECIATION TWENTY ACRE VINEYARD AND TWELVE THOUSAND GALLON WINERY

YEAR	1	2	3	4
VINEYARD	16314	28107	20328	14718
WINERY	0	0	41399	72577
TOTAL	16314	28107	61727	87295

DEPRECIATION FIFTY ACRE VINEYARD AND THIRTY THOUSAND GALLON WINERY

YEAR	1	2	3	4
VINEYARD	32188	55330	39792	28637
WINERY	0	0	87569	153740
TOTAL	32188	55330	127361	182377

DEPRECIATION HUNDRED ACRE VINEYARD AND SIXTY THOUSAND GALLON WINERY

YEAR	1	2	3	4
VINEYARD	55421	95267	68511	49302
WINERY	0	0	139554	245124
TOTAL	55421	95267	208065	294426

5	6	7	8	9	10
10666	7742	5626	26456	25130	17992
54710	41331	31291	23740	18048	42859
65376	49073	36917	50196	43178	60852

5	6	7	8	9	10
20623	14862	10720	54636	52040	37210
116283	88136	66943	50946	38850	86388
136906	102998	77663	105582	90890	123598

5	6	7	8	9	10
35504	25587	18455	94102	89628	64084
185601	140825	107071	81567	62258	135438
221105	166412	125526	175669	151886	199529

Years One Through Ten Shown Above.

Table 35. Financial Analysis For Vineyards/Wineries.

NET PRESENT VALUES FOR VINEYARD/WINERY BUDGETS
TWENTY ACRE VINEYARD/TWELVE THOUSAND GALLON WINERY

INTEREST	0.1	0.11	0.12
NORMAL RECEIPTS	-365061	-382465	-408503
WITH PROPERTY SALE	-183473	-200877	-226914
TEN% RECEIPT DECREASE	-529335	-546740	-572777
WITH PROPERTY SALE	-387097	-404501	-430539
TEN% RECEIPT INCREASE	-200790	-218195	-244232
WITH PROPERTY SALE	20148	2744	-23293

FIFTY ACRE VINEYARD/THIRTY THOUSAND GALLON WINERY

INTEREST	0.1	0.11	0.12
NORMAL RECEIPTS	-200484	-245195	-291240
WITH PROPERTY SALE	316204	271573	225528
TEN% RECEIPT DECREASE	-587548	-632259	-678304
WITH PROPERTY SALE	-163515	-208226	-254271
TEN% RECEIPT INCREASE	186580	141869	95824
WITH PROPERTY SALE	796083	751371	705326

HUNDRED ACRE VINEYARD/SIXTY THOUSAND GALLON WINERY

INTEREST	0.1	0.11	0.12
NORMAL RECEIPTS	3387316	3135787	2876859
WITH PROPERTY SALE	10643985	10392456	10133528
TEN% RECEIPT DECREASE	1113584	862055	603128
WITH PROPERTY SALE	7159774	6908245	6649318
TEN% RECEIPT INCREASE	5661044	5409515	5150589
WITH PROPERTY SALE	14128191	13876662	13617736

INTERNAL RATE OF RETURN FOR VINEYARD/WINERY BUDGETS
TWENTY ACRE VINEYARD/TWELVE THOUSAND GALLON WINERY

INTEREST	0.1	0.11	.12
NORMAL RECEIPTS	-10.96	-12.21	-14.01
WITH PROPERTY SALE	5.38	4.95	4.29
TEN% RECEIPT DECREASE	-24.15	-25.24	-26.74
WITH PROPERTY SALE	-0.36	-0.81	-1.48
TEN% RECEIPT INCREASE	-0.13	-1.22	-2.91
WITH PROPERTY SALE	10.48	10.06	9.43

FIFTY ACRE VINEYARD/THIRTY THOUSAND GALLON WINERY

INTEREST	0.1	0.11	0.12
NORMAL RECEIPTS	5.66	4.57	3.38
WITH PROPERTY SALE	13.49	13.01	12.5
TEN% RECEIPT DECREASE	-4.64	-6.89	-7.58
WITH PROPERTY SALE	8.11	7.59	7.06
TEN% RECEIPT INCREASE	13.58	12.78	11.92
WITH PROPERTY SALE	18.51	18.06	17.59

HUNDRED ACRE VINEYARD/SIXTY THOUSAND GALLON WINERY

INTEREST	0.1	0.11	0.12
NORMAL RECEIPTS	13.99	13.21	12.37
WITH PROPERTY SALE	18.78	18.33	17.87
TEN% RECEIPT DECREASE	5.27	4.16	2.97
WITH PROPERTY SALE	13.25	12.76	12.26
TEN% RECEIPT INCREASE	20.97	20.4	19.78
WITH PROPERTY SALE	23.96	23.56	23.14

rise. The best internal rates of return occur where the interest rates remain at ten percent.

This implies that small, premium winegrowers must rely on creative alternative methods of marshalling their inputs and marketing their wines. Quality and value in the finished wines will be imperative for success which most likely will be predicated on higher prices and retail sales.

The one-hundred acre vineyard/sixty thousand gallon winery displays positive net present values for all cases, including those where a ten percent decrease in receipts occur. The internal rate of return varies under the analysis on income from the sale of wine, with the receipts unchanged, from 13.99% to 12.37%. At this level of production, retail sales are less crucial than in the case of smaller wineries. The challenge for larger premium wineries will be to set up an efficient distribution network to insure an orderly turnover of inventory. Currently no Arizona winery has achieved this level of production or market penetration.

CHAPTER SIX

SUMMARY AND CONCLUSIONS

In the mid 1960's the United States entered into an unprecedented wine boom based on premium grape varieties such as Chardonnay, Cabernet Sauvignon and Pinot Noir. Between 1975 and 1985, 720 new wineries opened with forty one states possessing at least one bonded winery. Half the winery growth occurred outside of California including four bonded wineries in Arizona.

Arizona's first commercial plantings of fine wine grapes occurred in the early 1980's, near Sonoita, in southeastern Arizona. Eco-niches were located at altitudes above 4,000 feet that combined the correct soils, climate and water availability to ripen classic vitis vinifera wine grapes to maturity, with excellent pH balances and good sugar and acid levels. The wines vinified from these vineyards have been of award winning quality.

The native industry produced an estimated .002% of Arizona's aggregate demand for wine in 1986. The balance was imported. Only 150 acres of fine wine grapes were available, with most of the acreage just reaching the bearing stage. Plantings in 1987 are expected to double

Arizona's total wine grape acreage. These vineyards will take seven years to reach full maturity.

Favorable demographics and population growth is forecasted by this study to push total wine consumption in Arizona from 9,000,000 gallons in 1987 to 33,000,000 gallons by the year 2015. This work predicts that if Arizona winegrowers are able to capture 10% of their state's wine consumption by the year 2015, as many as 130 small wineries and 5500 acres of grapes will be needed.

The bulk of this study examines the costs and returns of small, premium quality vineyards, wineries, and joint vineyards and wineries in Arizona. The central assumption of this thesis is that high grade materials, equipment, and labor must be employed to produce the highest calibre of grapes and wine. High standards of quality will be essential for small vineyards and wineries in Arizona to capture and retain market shares. Diseconomies of size will force them to compete on the premium level.

The results of this study indicate that grape growing and wine making are capital intensive endeavors. Large capital expenditures are required in the early years of the operations, while the benefits may accrue over as many as forty years. A long planning horizon is necessary to achieve a positive net present value. Even a small twenty acre vineyard can require several hundred thousand dollars

before required internal rates of return are generated. The costs of a small winery can easily double the expenditures necessary for a supporting vineyard, with the same long term investment outlook.

This study indicates that small, premium vineyards, wineries and joint vineyards and wineries can yield high rates of return and positive net present values under ideal conditions in Arizona. Economies of size were found to favor the returns generated from the largest sized operations. In going from a twenty acre vineyard to a one-hundred acre vineyard, and from a twelve thousand gallon capacity winery to a sixty thousand gallon capacity winery increased efficiencies are gained in employment of equipment and machinery.

The larger the vineyard or winery, the less sensitive the enterprise is to the price of grapes. the larger the joint vineyard and winery, the less sensitive the firm becomes to fluctuations in income. These findings are illustrated in Tables 36, 37, and 38.

Smaller vineyards and wineries in Arizona may have to substitute labor for capital, alter their financing or lower their expected return under the assumptions employed by this study inorder to gain more favorable results. The advantage smaller operations have will be in their control of inputs and output, and especially in marketing on a

Figure 7. Internal Rate Of Return For Vineyards.

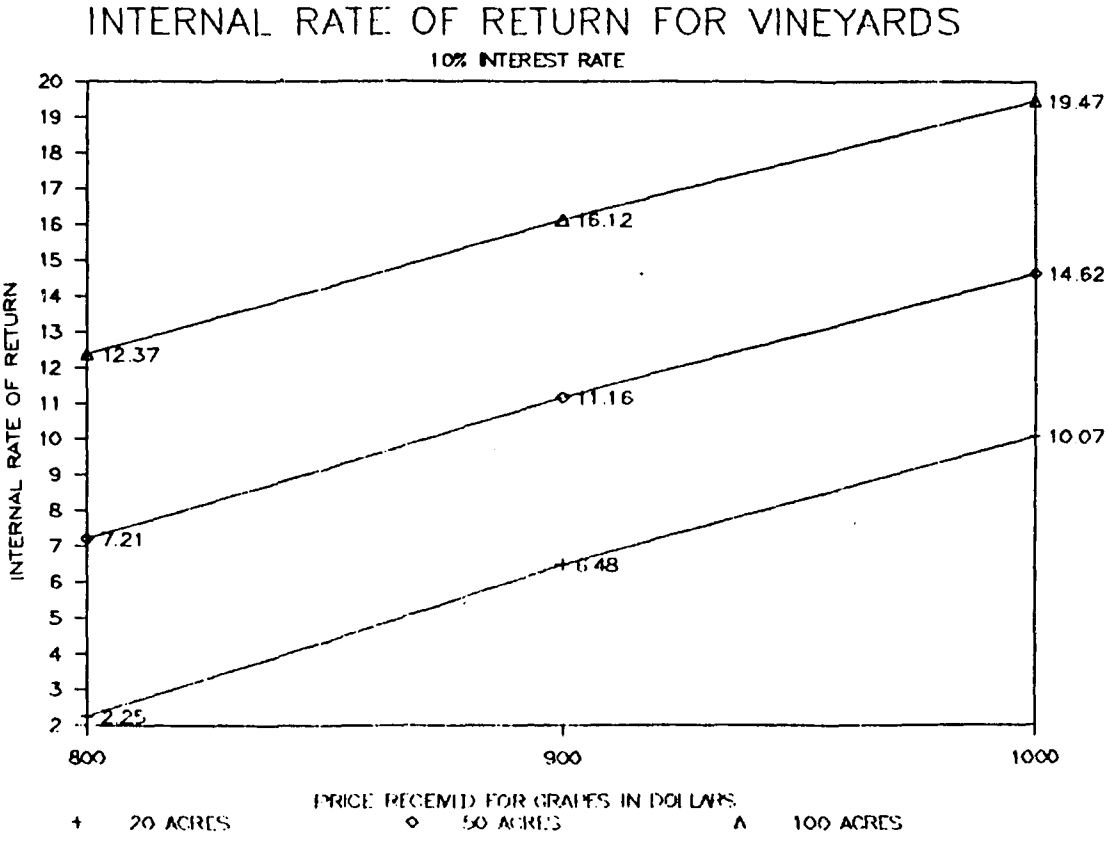


Figure 8. Internal Rate Of Return For Wineries.

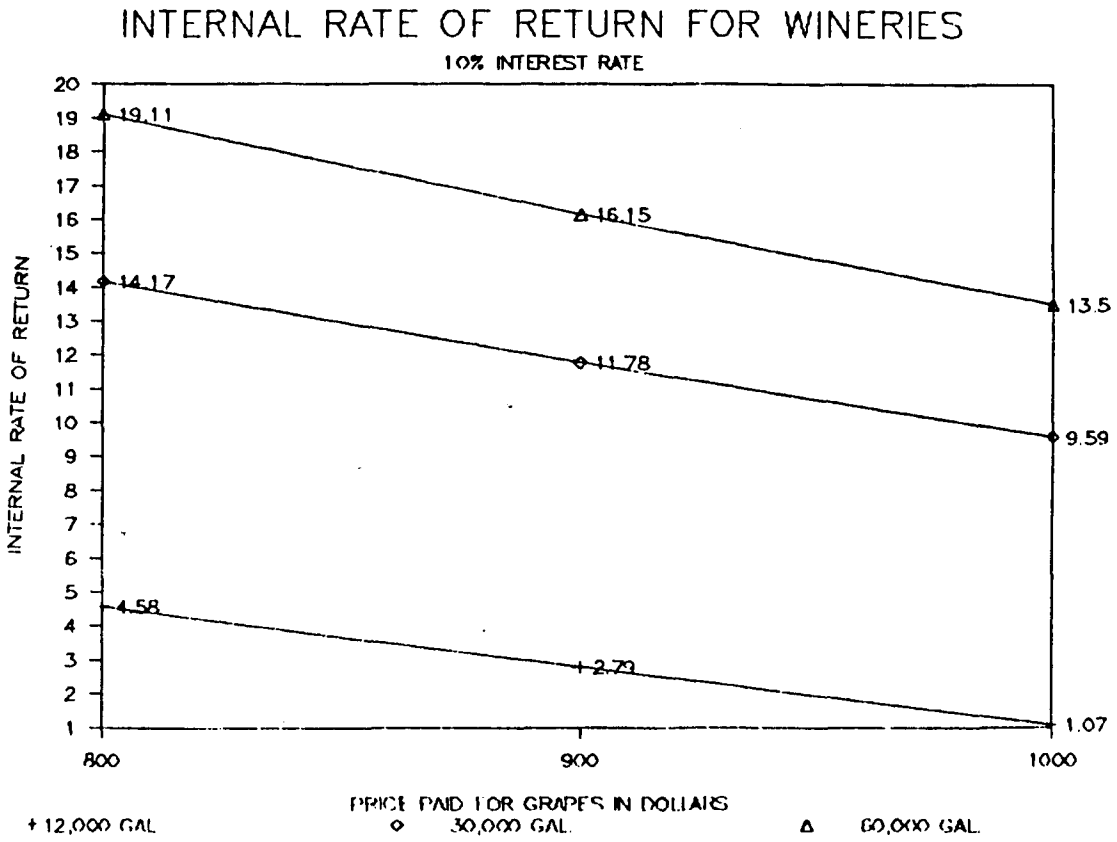
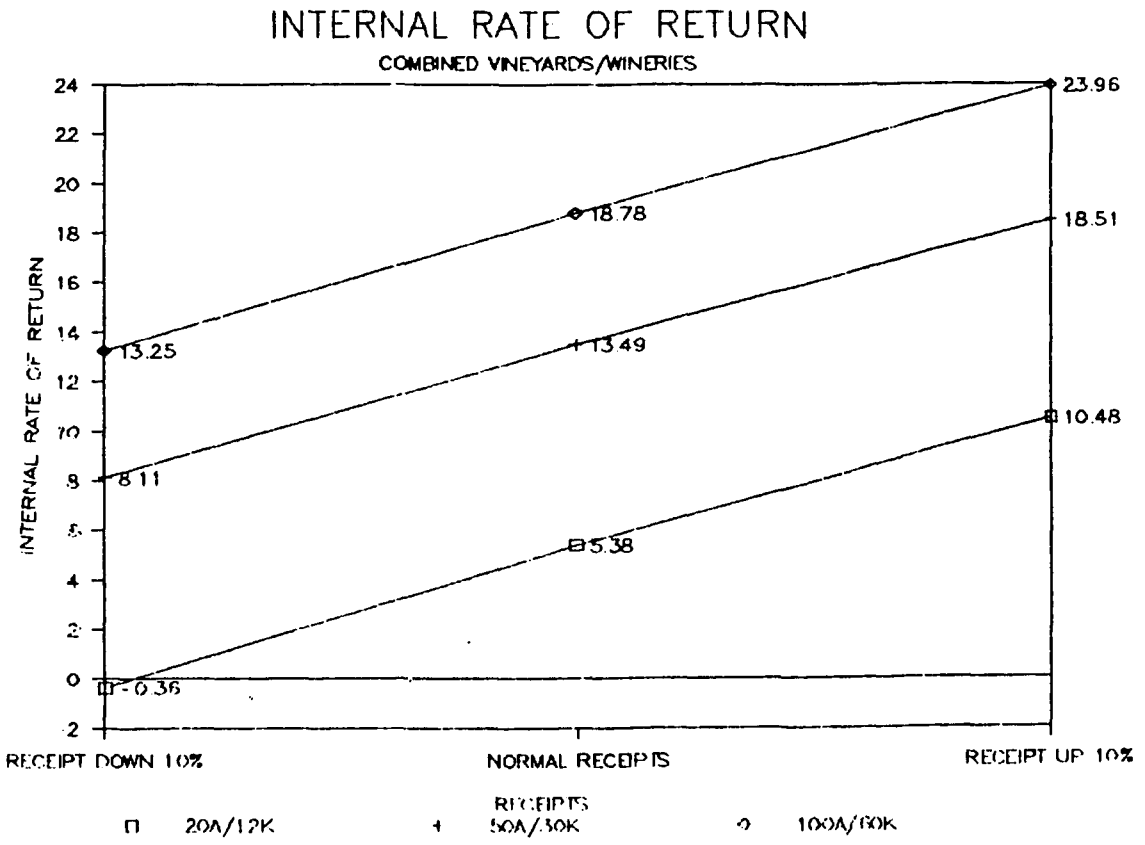


Figure 9. Internal Rate Of Return For Combined Vineyards/Wineries.



retail level. Larger firms will be pressed into expanding their marketing efforts into the wholesale realm with a corresponding loss of direct operator control, however they will be less sensitive to variations in the market place.

It appears that Arizona has a positive future as a wine producing state. The scope of this study has been confined primarily to the exclusive end of the wine industry, with a focus in southeastern Arizona and on small farm wineries. Favorable land costs, labor costs, climates, and growth in demand would seem to suggest that intermediate sized vineyards and wineries producing good table wines would also be successful in numerous regions of Arizona. The key to the future of the wine industry in Arizona lays not in the vineyards or wineries, where commercial quality standards have been achieved, but in the marketplace where consistent demand must be established.

APPENDIX A

The following is the wording of the 1982 Arizona Domestic Farm Winery Bill, from Arizona Revised Statutes, Annotated, 1986, Supplementary Pamphlet, Vol 2 Titles 1 to 8, page 189.

4-205.04 Domestic farm winery license; regulatory provisions.

A. The board may issue a domestic farm winery license to any domestic farm winery. The licensee may not transfer the domestic farm license from person to person or from location to location.

B. An applicant for a domestic farm winery license shall, at the time of filing the application for the license, accompany the application with the license fee. Persons holding a domestic farm winery license shall report annually at the end of each fiscal year, at such time and in such manner as the board may prescribe, the amount of wine manufactured by them during the fiscal year. If the total amount of wine manufactured during the year exceeds the amount permitted annually by the license, the licensee shall apply for a vintner's license.

C. Notwithstanding any other statute, the holder of a domestic farm winery license may sell wine produced or

manufactured on the premises in the original container for consumption off the premises and may make sales and deliveries of wine to persons licensed to sell wine under this title. A holder of a domestic farm winery license may serve wine produced or manufactured on the premises for the purpose of sampling the wine.

D. Not withstanding 4-101, paragraph 8, the superintendent may allow a percentage of out-of-state agricultural products greater than twenty-five per cent in wine manufactured or produced by a domestic farm winery if the domestic farm winery can demonstrate to the satisfaction of the superintendent that sufficient in-state agricultural products are not available because of an unexpected failure of suitable in-state crops due to natural causes. The exemption shall remain in effect only for the period of time during which such shortages actually exist.

E. The superintendent shall prescribe rules and regulations in order to administer this section

APPENDIX B

The following was wording for the proposed rules for the Sonoita viticultural area from the Federal Register, Vol. 49, No 96, May 16, 1984.

ESTABLISHMENT OF SONOITA VITICULTURAL AREA

AGENCY: Bureau of Alcohol, Tobacco and Firarms, Department of the Treasury.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Bureau of Alcohol, and Firearms (ATF) is considering the establishment of a viticultural area in Arizona to be known as "Sonoita". This proposal is the result of a petition from Mr. Blake Brophy, a grape grower in the area. The establishment of viticultural areas and the subsequent use of viticultural area names in wine labeling and advertising will enable winemakers to label wines more precisely and will help consumers to better identify the wines they purchase.

SUPPLEMENTARY INFORMATION

BACKGROUND: ATF regulations in 27 CFR Part 4 provide for the establishment of definite viticultural areas. The regulations also allow the name of an approved viticultural area to be used as an appellation of origin on wine labels and in wine advertisements.

Part 9 of 27 CFR provides for the listing of approved American viticultural areas, the names of which may be used as appellations of origin.

Section 4.25a(e)(1), title 27, CFR, defines an American viticultural area as a delimited grape-growing region distinguishable by geographical features. Section 4.25a(e)(2) outlines the procedure for proposing an American viticultural area. Any interested person may petition ATF to establish a grape-growing region as a viticultural area. The petition should include-

(a) Evidence that the name of the proposed viticultral area is locally and/or nationally known as referring to the area specified in the petition;

(b) Historical or current evidence that the boundaries of the viticultural area are as specified in the petition;

(c) Evidence relating to the geographical features (climate, soil, elevation, physical features, etc.) which distinguish the viticultural features of the proposed area from surrounding areas;

(d) A description of the specific boundaries of the viticultural area, based on features which can be found on United States Geological Survey (U.S.G.S.) maps of the largest applicable scale; and

(e) A copy of the appropriate U.S.G.S. map(s) with the boundaries prominently marked.

PETITION: ATF has received a petition from Mr. A. Blake Brophy of the Babocamari Ranch Company, proposing an area near Sonoita, Arizona, as a viticultural area to be known as "Sonoita." The area contains about 325 square miles. It is located in extreme southern Arizona, near the Mexican border. There are about 40 acres of grapes currently planted in the proposed area. the petitioner states that plans call for 360 additional acres to be planted. A winery is currently under construction. Soils in the area that are suitable for wine-grape production include White House-Bernardino-Hathaway and the Caralumpi-Hathaway associations. Grapes are being grown on the floor of the proposed viticultural area at altitudes of between 4,500 and 5,000 feet.

The petitioner claims that the proposed viticultural area is known by the name "Sonoita" and is associated with grape growing for the following reasons;

(a) "Sonoita" is the name of the only viable community in the area. (The town of Sonoita is centrally located within the proposed viticultural area.)

(b) Historically the name "Sonoita" is derived from a visita established in 1691 by the missionary-explorer, Father Eusebio Francisco Kino. At that time, the name given to this small settlement of Sobaipuri Indians was "Los Santos Reyes de Sonoita."

(c) Since 1975, the Babocamari Ranch Company has been cooperating with the University of Arizona in the growing of vitis vinifera grapes in the area and in the making of wine from those grapes. These efforts have been described in an article in The American Journal of Enology and Viticulture, Vol. 32 No. 4, pp. 209-296, entitled "The Use of Soils for the Delineation of Viticultural Zones in the Four Corners Region". This article calls the proposed area "Sonoita": for example: "Other sites such as Sonoita... produce much better fruit than expected" (p.291).

The Petitioner claims that the proposed viticultural area is distinguished geographically from the surrounding areas for the following reasons:

(1) Topographically, the area is separated from the surrounding areas by three major mountain ranges: the Santa Rita Mountains, the Huachuca Mountains, and the Whetstone Mountains. These mountains rise from 2,500 to 4,500 feet above the floor of the viticultural area.

(2) The "old timers" used to call the area "Sonoita Valley", because it resembles a valley in appearance. But geologically, the area is technically a basin rather than a valley, because it comprises the headwaters for three distinct drainages; Sonoita Creek to the south, Cienega Creek to the north, and the Babocamari River to the east. (In technical geological terms, a "valley" would comprise only a single drainage.)

(3) The most obvious geographical distinction to the area is that in its native state, it is classified as "high desert grassland", while the surrounding terrain is either mountain or woody shrub desert. (See Humphrey, Robert R., The Desert Grassland, University of Arizona Press.)

The boundaries of the proposed viticultural area may be found on seven U.S.G.S. quardrangle maps in the 7.5 minute series: Benson, Fort Huachuca, Sunnyside, Elgin, Lochiel, Mount Wrightson, and the Empire Mountains.

REGULATORY FLEXIBILITY ACT: The provisions of the Regulatory Flexibility Act relating to an initial and final regulatory flexibility analysis (5 U.S.C.603,604) are not applicable to this proposal because the notice of proposal rulemaking, if promulgated as a final rule, will not have a significant economic impact on a substantial number of small entities. The proposal is not expected to have significant secondary or incidental effects on a substantial number of small entities, because the value of the proposed viticultural area designation is intangible and subject to influence by unrelated factors. Further, the proposal will not impose, or otherwise cause a significant increase in the reporting, recordkeeping, or other compliance burdens on a substantial number of small entities.

PUBLIC PARTICIPATION-WRITTEN COMMENTS: ATF requests comments concerning this proposed viticultural area from all

interested persons.

Futhermore, while this document proposes possible boundaries for the Sonoita viticultural area, comments concerning other possible boundaries for this viticultural area will be given consideration.

Comments received before the closing date will be carefully considered. Comments received after the closing date and too late for consideration will be treated as possible suggestions for future ATF action.

ATF will not recognize any material or comments as confidential. Comments may be disclosed to the public. Any material which the commentor considers to be confidential or inappropriate for disclosure to the public should not be included in the comment. The name of the persons submitting is not exempt from disclosure.

PART 9-AMERICAN VITICULTURAL AREAS: Sonoita.

(a) Name. The name of the viticultural area described in this section is "Sonoita".

(b) Approved maps. The appropriate maps for determining the boundaries of Sonoita viticultural area are seven U.S.G.S maps. They are titled:

(1)Benson Quadrangle, 7.5 minute series, 1958.

(2) Fort Huachuca Quadrangle, 7.5 minute series, 1958.

(3) Elgin Quadrangle, 7.5 minute series, 1958.

(4) Lochiel Quadrangle, 7.5 minute series, 1958.

(5) Mount Wrightson Quadrangle, 7.5 minute series, 1958.

(6) Sunnyside Quadrangle, 7.5 minute series, 1958.

(7) Empire Mountains Quadrangle, 7.5 minute series, 1958.

(c) Boundary-(1) General. The Sonoita viticultural area is located in Arizona. The starting point of the following description is the summit of Mount Wrightson (9,543 feet) in the Santa Rita Mountains.

(2) Boundary Description-(i) From the starting point southeastward in a straight line for approximately 24 miles, to the summit of Lookout Knob (6,171 feet) in the Canelo Hills.

(ii) From there in a straignt line eastward for approximately 10 miles, to the summit of Huachuca Mountains.

(iii) From there north-northwestward for approximately 21 miles in a straight line to the summit of Granite Peak (7,413 feet) in the Whetstone Mountains.

(iv) From there west-southwestward in a straight line for approximately 26 miles to the summit of Mount Wrightson (the point of beginning).

APPENDIX C

Check List of Decisions to be Completed Prior to Building the Winery.

I. BUSINESS PLAN
  A. Type of Product Produced
    1. Table Wines
    2. Desert Wines
    3. Sparkling Wines
    4. Brandy
    5. Special Natural
    6. Other
  B. Volume of Product Produced
  C. Price Level of Product Produced
    1. Main Product Line
    2. Secondary Product Line
    3. Private Labels
    4. Bulk
  D. Quality Level of Product Produced
  E. Marketing Plan
II. SOURCE OF RAW MATERIAL
  A. Is the source of raw material consistent with the expected company inage above?
  B. Can the winery be built reasonably close to the vineyard?
III. SOURCE OF CAPITAL
  A. Is the source of capital consistent with the expected company inage above?
  B. Is the source of capital consistent with projected profit picture?
  C. Can the source of capital accept expansion, at least 100% beyond expectations?
IV. PERSONNEL
  A. Is the personnel plan consistent with the expected company image above?
  B. Professionalism.

SOURCE: Peterson (1975).

APPENDIX D
EQUIPMENT FOR 12,000 GALLON WINERY

ITEM	PRICE	NUMBER	COST
OAK BARRELS	150	150	22500
55 GAL SS	375	6	2250
600 GAL SS	3600	2	7200
1000 GAL SS	4000	5	20000
2000 GAL SS	6500	4	26000
FITTINGS	150	11	1650
CRUSHER STEMMER	2400	1	2400
BATCH PRESS (1 TON)	9500	1	9500
MUST PUMP	3600	1	3600
MUST LINE	500	1	500
AGITATOR	700	1	700
FITTINGS	600	1	600
TRANSFER PUMP	3000	1	3000
TRANSFER HOSE	600	1	600
BARREL WASHER	400	1	400
TANK WASHER	400	1	400
PLATE FILTER	5000	1	5000
LAB EQUIPMENT	6000	1	6000
REFRIGERATION	30000	1	30000
BOTTLE WASHER	700	1	700
BOTTLE FILLER	200	1	200
CORKER	150	1	150
FOIL SPINNER	650	1	650
LABELLER	300	1	300
BOTTLING LINE	3000	1	3000
STERILE FILTER	1000	1	1000
PALLET LIFTER	800	1	800
HAND CART	60	1	60
FORK LIFT	6000	1	6000
TRUCK	12000	1	12000
MISC	20000	1	20000
TOTAL EQUIPMENT			187160
COST PER GALLON			15.60

APPENDIX D (Continued)
EQUIPMENT FOR 30,000 GALLON WINERY

ITEM	PRICE	NUMBER	COST
OAK BARRELS	150	375	56250
55 GAL SS	375	10	3750
600 GAL SS	3600	5	18000
1000 GAL SS	4000	13	52000
2000 GAL SS	6500	10	65000
FITTINGS	150	28	4200
CRUSHER STEMMER	12000	1	12000
BATCH PRESS (5 TON)	20000	1	20000
MUST PUMP	6000	1	6000
MUST LINE	500	1	500
AGITATOR	700	1	700
FITTINGS	1000	1	1000
TRANSFER PUMP	3500	1	3500
TRANSFER HOSE	600	1	800
BARREL WASHER	400	1	400
TANK WASHER	400	1	400
PLATE FILTER	5000	1	5000
LAB EQUIPMENT	15000	1	15000
REFRIGERATION	40000	1	40000
BOTTLE WASHER	700	1	700
BOTTLE FILLER	1400	1	1400
CORKER	6000	1	6000
FOIL SPINNER	3000	1	3000
LABELLER	10000	1	10000
BOTTLING LINE	4000	1	4000
STERILE FILTER	2500	1	2500
PALLET LIFTER	800	1	800
HAND CART	60	2	120
FORK LIFT	6000	1	6000
TRUCK	12000	1	12000
MISC	20000	1	20000
TOTAL EQUIPMENT			396020
COST PER GALLON			13.20

APPENDIX D (Continued)
EQUIPMENT FOR 60,000 GALLON WINERY

ITEM	PRICE	NUMBER	COST
OAK BARRELS	150	750	112500
55 GAL SS	375	20	7500
600 GAL SS	3600	10	36000
1000 GAL SS	4000	15	60000
5000 GAL SS	13000	10	130000
FITTINGS	150	35	5250
CRUSHER STEMMER	17000	1	17000
BATCH PRESS (7 TON)	35000	1	35000
MUST PUMP	7000	1	7000
MUST LINE	700	1	700
AGITATOR	700	1	700
FITTINGS	2000	1	2000
TRANSFER PUMP	3800	1	3800
TRANSFER HOSE	1000	1	1000
BARREL WASHER	400	1	400
TANK WASHER	400	1	400
PLATE FILTER	9000	1	9000
LAB EQUIPMENT	25000	1	25000
REFRIGERATION	60000	1	60000
BOTTLE WASHER	900	1	900
BOTTLE FILLER	2100	1	2100
CORKER	7000	1	7000
FOIL SPINNER	3000	1	3000
LABELLER	15000	1	15000
BOTTLING LINE	5000	1	5000
STERILE FILTER	1000	1	1000
PALLET LIFTER	800	1	800
HAND CAR	60	3	180
FORK LIFT	14000	1	14000
TRUCK	16000	1	16000
MISC	50000	1	50000
TOTAL EQUIPMENT			630730
COST PER GALLON			10.51

APPENDIX E

Sam Sebastiani, past-president of the family winery, commented on the American wine industry at the 1985 Wine Industry Technical Symposium (Sebastiani 1985). He stated that the wine business was in transition to maturity and five major changes were effecting the competitive enviroment.

"1. Slowing growth means more competition for market share. The competition begins to attack the market share of others. The biggest mistake that I see the new small wineries making is that they are trying to become national brands....there is a need to focus your brand....attack specific markets and specific segments of the market.

2. Transition to industry maturity requires that wineries increasingly sell to experienced, repeat buyers. Merely telling the customer that your wine is better than the other guy's is not marketing. That is not brand awareness. That's not positioning.

3. In the transition to industry maturity, competition often shifts toward greater emphasis on cost and service. Have you focused your brand so that you can control cost and service?

4. The transition to industry maturity is marked by the emergence of significant international competition. It

has happened in dozens of industries....The garment, the automobile and tractor and calculator and computer industries and everyone in this room clearly understands the degree to which it has happened in the wine industry.

5 Transition to industry maturity forces distributor margins to fall, but their power increases. For the same reason that our profits are often depressed, distributor margins also are squeezed. Some distributors drop out of the business and when this happens it suddenly becomes harder to find and hold on to a distributor.

I don't know what the next 10 or 15 years holds for the California wine industry, but looking back, there have been only four years of double-digit growth, 1969-1972. The last three years, 1982-1984 represent the first time in those 25 years that we have had three consecutive years of below 3% growth.

If I had to guess, I would think that we should develop a strategy for even smaller increments of growth. Slow, steady, solid growth. A kind of growth that is not dependent upon fads and trendiness....but a growth that encourages the use of wine as a gracious part of everyday American life."

APPENDIX F

Elliott Fine, president of his own marketing company and former president of Paul Masson offered "Ten Commandments" for marketing wine at the 11th Wine Industry Technical Symposium Marketing Sessions (Wines and Vines, March 1985).

1. "Thow Shalt Focus On The Consumer." Producers must make what consumers want.
2. "Thou Shalt Not Pay Too Much Attention To The Numbers." Industry figures have little relevance for small wineries with miniscule market shares. Numbers are "nothing more than a weather report."
3. "Thou Shalt Not Be Afraid Of The Giants." Brands are built by entrepreneurs, not corporations.
4. "Thou Shalt Have A Plan." It must be specific with close attention paid to price.
5. "Thy Products Will Fit The System." Wholesaler needs must be identified and satisfied.
6. "Thou Shalt Be Different." Product differentiation is essential to sales.
7. "Thou Shalt Not Introduce Another Me-Too Product." Focus must be on a few products done well, rather than multiple efforts.

8. "Remember The Paradox Of The Wholesalers." There are half as many wholesalers today as there were twenty years ago, and up to three times as many brands. Suppliers must give wholesalers support in the form of personnel, advertising, and sales materials.

9. "Thou Shalt Cherish Your Wholesaler." People and support are necessary to nourish a good working relationship with wholesalers.

10. "Thou Shalt Have The Right Tools." Wines that can produce profits are the key to success.

Appendix G. Adjusted Incomes For Twenty Acre Vineyards.

TWENTY ACRE VINEYARD 10% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	52231	29380	31180	32635	34980	37180	38380
MARGIN	13058	7345	7795	8159	8745	9295	9595
NEW CREDIT	39173	22035	23385	24476	26235	27885	28785
INTEREST	0	3917	2204	2339	2448	2624	2789
LOAN	39173	25952	25589	26815	28683	30509	31574
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	211174						
TERM	TEN YR						
ANNUAL PAYMENT	34368						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29380	-23180	-16780	-2980	10820	25620
DEPRECIATION	16314	28107	20328	14718	10666	7742	5626
ADJUSTED INCOME	-55007	-28102	-24449	-20214	-9678	1063	13026
NET PRESENT VALUE	-117102						
INTERNAL RATE OF RETURN	-9.14697						

TWENTY ACRE VINEYARD 11% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	52231	29380	31180	32635	34980	37180	38380
MARGIN	13058	7345	7795	8159	8745	9295	9595
NEW CREDIT	39173	22035	23385	24476	26235	27885	28785
INTEREST	0	4309	2424	2572	2692	2886	3067
LOAN	39173	26344	25809	27048	28927	30771	31852
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	213090						
TERM	TEN YR						
ANNUAL PAYMENT	36183						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29380	-23180	-16780	-2980	10820	25620
DEPRECIATION	16314	28107	20328	14718	10666	7742	5626
ADJUSTED INCOME	-55007	-28102	-24449	-20214	-9678	1063	13026
NET PRESENT VALUE	-119077.						
INTERNAL RATE OF RETURN	-10.3715						

TWENTY ACRE VINEYARD 12% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	52231	29380	31180	32635	34980	37180	38380
MARGIN	13058	7345	7795	8159	8745	9295	9595
NEW CREDIT	39173	22035	23385	24476	26235	27885	28785
INTEREST	0	4701	2644	2806	2937	3148	3346
LOAN	39173	26736	26029	27282	29172	31033	32131
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	215010						
TERM	TEN YR						
ANNUAL PAYMENT	38053						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29380	-23180	-16780	-2980	10820	25620
DEPRECIATION	16314	28107	20328	14718	10666	7742	5626
ADJUSTED INCOME	-55007	-28102	-24449	-20214	-9678	1063	13026
NET PRESENT VALUE	-120334.						
INTERNAL RATE OF RETURN	-11.6375						

Years One Through Seven Shown Above.

Appendix G. Adjusted Incomes For Twenty Acre Vineyards.

8	9	10	11	12	13	14	15
38380	38380	38380	38380	38380	38380	38380	38380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
2879	0	0	0	0	0	0	0
2879	0	0	0	0	0	0	0
21117	19792	18335	16731	14968	13028	10894	8546
13251	14576	16033	17637	19400	21340	23474	25822
34368	34368	34368	34368	34368	34368	34368	34368
25620	25620	25620	25620	25620	25620	25620	25620
26456	25130	17992	12883	9227	6611	4739	25760
-5455	-5853	-7142	-8143	-8962	-9645	-10246	-7445

8	9	10	11	12	13	14	15
38380	38380	38380	38380	38380	38380	38380	38380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
3166	0	0	0	0	0	0	0
3166	0	0	0	0	0	0	0
23440	22038	20482	18755	16838	14710	12348	9726
12743	14145	15701	17428	19345	21473	23835	26457
36183	36183	36183	36183	36183	36183	36183	36183
25620	25620	25620	25620	25620	25620	25620	25620
26456	25130	17992	12883	9227	6611	4739	25760
-6922	-7331	-8635	-9660	-10496	-11208	-11843	-9083

8	9	10	11	12	13	14	15
38360	38380	38380	38380	38380	38380	38380	38380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
3454	0	0	0	0	0	0	0
3454	0	0	0	0	0	0	0
25801	24331	22684	20840	18774	16461	13870	10968
12252	13722	15369	17213	19279	21592	24183	27085
38053	38053	38053	38053	38053	38053	38053	38053
25620	25620	25620	25620	25620	25620	25620	25620
26456	25130	17992	12883	9227	6611	4739	25760
-8437	-8857	-10175	-11218	-12076	-12815	-13485	-10767

Years Eight Through Fifteen Shown Above.

Appendix H. Adjusted Incomes For Fifty Acre Vineyards.

FIFTY ACRE VINEYARD 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	119060	60915	65415	69415	74915	80415	83415
MARGIN	29765	15229	16354	17354	18729	20104	20854
NEW CREDIT	89295	45686	49061	52061	56186	60311	62561
INTEREST	0	8930	4569	4906	5206	5619	6031
LOAN	89295	54616	53630	56967	61392	65930	68592
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	456678						
TERM	TEN YR						
ANNUAL PAYMENT	74322						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-45415	-29415	5085	39585	76585
DEPRECIATION	32188	55330	39792	28637	20623	14862	10720
ADJUSTED INCOME	-126138	-58707	-48988	-38061	-11313	15773	45851
NET PRESENT VALUE	-163800.						
INTERNAL RATE OF RETURN	-0.35520						

FIFTY ACRE VINEYARD 11% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	119060	60915	65415	69415	74915	80415	83415
MARGIN	29765	15229	16354	17354	18729	20104	20854
NEW CREDIT	89295	45686	49061	52061	56186	60311	62561
INTEREST	0	9822	5025	5397	5727	6180	6634
LOAN	89295	55508	54086	57458	61913	66491	69195
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	460628						
TERM	TEN YR						
ANNUAL PAYMENT	78249						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-45415	-29415	5085	39585	76585
DEPRECIATION	32188	55330	39792	28637	20623	14862	10720
ADJUSTED INCOME	-126138	-58707	-48988	-38061	-11313	15773	45851
NET PRESENT VALUE	-176503.						
INTERNAL RATE OF RETURN	-1.26994						

FIFTY ACRE VINEYARD 12% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	119060	60915	65415	69415	74915	80415	83415
MARGIN	29765	15229	16354	17354	18729	20104	20854
NEW CREDIT	89295	45686	49061	52061	56186	60311	62561
INTEREST	0	10715	5482	5887	6247	6742	7237
LOAN	89295	56401	54543	57948	62433	67053	69798
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	464978						
TERM	TEN YR						
ANNUAL PAYMENT	82294						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-45415	-29415	5085	39585	76585
DEPRECIATION	32188	55330	39792	28637	20623	14862	10720
ADJUSTED INCOME	-126138	-58707	-48988	-38061	-11313	15773	45851
NET PRESENT VALUE	-186699.						
INTERNAL RATE OF RETURN	-2.24730						

·Years One Through Seven Shown Above.

Appendix H. Adjusted Incomes For Fifty Acre Vineyards.

8	9	10	11	12	13	14	15
83415	83415	83415	83415	83415	83415	83415	83415
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
6256	0	0	0	0	0	0	0
6256	0	0	0	0	0	0	0
45668	42802	39650	36183	32369	28174	23559	18483
28654	31520	34672	38139	41953	46148	50763	55839
74322	74322	74322	74322	74322	74322	74322	74322
76585	76585	76585	76585	76585	76585	76585	76585
54636	52040	37210	26609	19031	13613	9740	53867
5821	5002	2304	194	-1515	-2957	-4230	1628

8	9	10	11	12	13	14	15
83415	83415	83415	83415	83415	83415	83415	83415
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
6882	0	0	0	0	0	0	0
6882	0	0	0	0	0	0	0
50691	47660	44295	40560	36414	31812	26704	21034
27558	30589	33954	37689	41835	46437	51545	57215
78249	78249	78249	78249	78249	78249	78249	78249
76585	76585	76585	76585	76585	76585	76585	76585
54636	52040	37210	26609	19031	13613	9740	53867
2647	1803	-926	-3076	-4835	-6338	-7685	-1917

8	9	10	11	12	13	14	15
83415	83415	83415	83415	83415	83415	83415	83415
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
7507	0	0	0	0	0	0	0
7507	0	0	0	0	0	0	0
55797	52618	49057	45068	40601	35598	29994	23718
26497	29676	33237	37226	41693	46696	52300	58576
82294	82294	82294	82294	82294	82294	82294	82294
76585	76585	76585	76585	76585	76585	76585	76585
54636	52040	37210	26609	19031	13613	9740	53867
-632	-1498	-4257	-6445	-8252	-9815	-11237	-5559

Years Eight Through Fifteen Shown Above.

Appendix I. Adjusted Incomes For One Hundred Acre Vineyards.

ONE HUNDRED ACRE VINEYARD 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	224690	99141	107691	115291	125266	135716	141416
MARGIN	56173	24785	26923	28823	31317	33929	35354
NEW CREDIT	168518	74356	80768	86468	93950	101787	106062
INTEREST	0	16852	7436	8077	8647	9395	10179
LOAN	168518	91208	88204	94545	102597	111182	116241
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	783101						
TERM	TEN YR						
ANNUAL PAYMENT	127446						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-67691	-35291	34734	104284	178584
DEPRECIATION	55421	95267	68511	49302	35504	25587	18455
ADJUSTED INCOME	-238846	-94765	-74184	-51425	3533	58550	119211
NET PRESENT VALUE	-80256.6						
INTERNAL RATE OF RETURN	7.544945						

ONE HUNDRED ACRE VINEYARD 11% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	224690	99141	107691	115291	125266	135716	141416
MARGIN	56173	24785	26923	28823	31317	33929	35354
NEW CREDIT	168518	74356	80768	86468	93950	101787	106062
INTEREST	0	18537	8179	8884	9511	10335	11197
LOAN	168518	92893	88947	95352	103461	112122	117259
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	790219						
TERM	TEN YR						
ANNUAL PAYMENT	134180						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-67691	-35291	34734	104284	178584
DEPRECIATION	55421	95267	68511	49302	35504	25587	18455
ADJUSTED INCOME	-238846	-94765	-74184	-51425	3533	58550	119211
NET PRESENT VALUE	-121165.						
INTERNAL RATE OF RETURN	6.934648						

ONE HUNDRED ACRE VINEYARD 12% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	224690	99141	107691	115291	125266	135716	141416
MARGIN	56173	24785	26923	28823	31317	33929	35354
NEW CREDIT	168518	74356	80768	86468	93950	101787	106062
INTEREST	0	20222	8923	9692	10376	11274	12214
LOAN	168518	94578	89691	96160	104326	113061	118276
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	797337						
TERM	TEN YR						
ANNUAL PAYMENT	141116						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-67691	-35291	34734	104284	178584
DEPRECIATION	55421	95267	68511	49302	35504	25587	18455
ADJUSTED INCOME	-238846	-94765	-74184	-51425	3533	58550	119211
NET PRESENT VALUE	-155621.						
INTERNAL RATE OF RETURN	6.281934						

Years One Through Seven Shown Above.

Appendix I. Adjusted Incomes For One Hundred Acre Vineyards.

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
10606	0	0	0	0	0	0	0
10606	0	0	0	0	0	0	0
78310	73397	67992	62046	55506	48312	40399	31694
49136	54049	59454	65400	71940	79134	87047	95752
127446	127446	127446	127446	127446	127446	127446	127446
178584	178584	178584	178584	178584	178584	178584	178584
94102	89628	64084	45827	32777	23446	16774	92782
50212	48804	44162	40531	37593	35114	32926	43022

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
11667	0	0	0	0	0	0	0
11667	0	0	0	0	0	0	0
96924	81726	75956	69551	62442	54551	45792	36069
47256	52454	58224	64629	71738	79629	88388	98111
134180	134180	134180	134180	134180	134180	134180	134180
178584	178584	178584	178584	178584	178584	178584	178584
94102	89628	64084	45827	32777	23446	16774	92782
44770	43320	38622	34923	31899	29316	27001	36944

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
12727	0	0	0	0	0	0	0
12727	0	0	0	0	0	0	0
95680	90228	84122	77282	69622	61043	51434	40672
45436	50888	56994	63834	71494	80073	89682	100444
141116	141116	141116	141116	141116	141116	141116	141116
178584	178584	178584	178584	178584	178584	178584	178584
94102	89628	64084	45827	32777	23446	16774	92782
39148	37659	32911	29147	26040	23354	20912	30699

Years Eight Through Fifteen Shown Above.

Appendix J. Adjusted Incomes For Vineyard Analysis.

APPENDIX L
NET INCOMES FOR VINEYARDS

TWENTY ACRE VINEYARD	YEAR	1	2	3	4	5
AT $800 TON		-52231	-29380	-23180	-16780	-2980
AT $800 TON WITH PROPERTY SALE		-52231	-29380	-23180	-16780	-2980
AT $900 TON		-52231	-29380	-22180	-14780	1020
AT $900 TON WITH PROPERTY SALE		-52231	-29380	-22180	-14780	1020
AT $1000 TON		-52231	-29380	-21180	-12780	5020
AT $1000 TON WITH PROPERTY SALE		-52231	-29380	-21180	-12780	5020

FIFTY ACRE VINEYARD	YEAR	1	2	3	4	5
AT $800 TON		-119060	-60915	-45415	-29415	5085
AT $800 TON WITH PROPERTY SALE		-119060	-60915	-45415	-29415	5085
AT $900 TON		-119060	-60915	-42915	-24415	15085
AT $900 TON WITH PROPERTY SALE		-119060	-60915	-42915	-24415	15085
AT $1000 TON		-119060	-60915	-40415	-19415	25085
AT $1000 TON WITH PROPERTY SALE		-119060	-60915	-40415	-19415	25085

HUNDRED ACRE VINEYARD	YEAR	1	2	3	4	5
AT $800 TON		-224690	-99141	-67691	-35291	34734
AT $800 TON WITH PROPERTY SALE		-224690	-99141	-67691	-35291	34734
AT $900 TON		-224690	-99141	-62691	-25291	54734
AT $900 TON WITH PROPERTY SALE		-224690	-99141	-62691	-25291	54734
AT $1000 TON		-224690	-99141	-57691	-15291	74734
AT $1000 TON WITH PROPERTY SALE		-224690	-99141	-57691	-15291	74734

6	7	8	9	10
10820	25620	25620	25620	25620
10820	25620	25620	25620	25620
16820	33620	33620	33620	33620
16820	33620	33620	33620	33620
22820	41620	41620	41620	41620
22820	41620	41620	41620	41620

6	7	8	9	10
39585	76585	76585	76585	76585
39585	76585	76585	76585	76585
54585	96585	96585	96585	96585
54585	96585	96585	96585	96585
69585	116585	116585	116585	116585
69585	116585	116585	116585	116585

6	7	8	9	10
104284	178584	178584	178584	178584
104284	178584	178584	178584	178584
134284	218584	218584	218584	218584
134284	218584	218584	218584	218584
164284	258584	258584	258584	258584
164284	258584	258584	258584	258584

Years One Through Ten Shown Above.

Appendix J. Adjusted Incomes For Vineyard Analysis.

11	12	13	14	15	16	17	18	19	20
25620	25620	25620	25620	25620	25620	25620	25620	25620	25620
25620	25620	25620	25620	25620	25620	25620	25620	25620	270721
33620	33620	33620	33620	33620	33620	33620	33620	33620	33620
33620	33620	33620	33620	33620	33620	33620	33620	33620	345521
41620	41620	41620	41620	41620	41620	41620	41620	41620	41620
41620	41620	41620	41620	41620	41620	41620	41620	41620	420321

11	12	13	14	15	16	17	18	19	20
76585	76585	76585	76585	76585	76585	76585	76585	76585	76585
76585	76585	76585	76585	76585	76585	76585	76585	76585	779343
96585	96585	96585	96585	96585	96585	96585	96585	96585	96585
96585	96585	96585	96585	96585	96585	96585	96585	96585	966843
116585	116585	116585	116585	116585	116585	116585	116585	116585	116585
116585	116585	116585	116585	116585	116585	116585	116585	116585	1153843

11	12	13	14	15	16	17	18	19	20
178584	178584	178584	178584	178584	178584	178584	178584	178584	178584
178584	178584	178584	178584	178584	178584	178584	178584	178584	1789386
218584	218584	218584	218584	218584	218584	218584	218584	218584	218584
218584	218584	218584	218584	218584	218584	218584	218584	218584	2163386
258584	258584	258584	258584	258584	258584	258584	258584	258584	258584
258584	258584	258584	258584	258584	258584	258584	258584	258584	2537386

Years Eleven Through Twenty Shown Above.

Appendix K. Adjusted Incomes For Twelve-Thousand Gallon Wineries.

TWELVE THOUSAND GALLON WINERY 10% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	174210	198060	212222	222300	226380	226380	226380
MARGIN	43553	49515	53056	55575	56595	56595	56595
NEW CREDIT	130658	148545	159167	166725	169785	169785	169785
INTEREST	0	13066	14855	15917	16673	16979	16979
LOAN	130658	161611	174022	182642	186458	186764	186764
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	1225898						
TERM	TEN YR						
ANNUAL PAYMENT	199509						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-174210	-87042	9814	75210	146604	146604	146604
DEPRECIATION	41399	72577	54710	41331	31291	23740	18048
ADJUSTED INCOME	-185422	-112614	-36508	14553	72712	71579	70726
NET PRESENT VALUE	-277784						
INTERNAL RATE OF RETURN	-7.42720						

TWELVE THOUSAND GALLON WINERY 11% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	174210	198060	212222	222300	226380	226380	226380
MARGIN	43553	49515	53056	55575	56595	56595	56595
NEW CREDIT	130658	148545	159167	166725	169785	169785	169785
INTEREST	0	14372	16340	17508	18340	18676	18676
LOAN	130658	162917	175507	184233	188125	188461	188461
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	1237038						
TERM	TEN YR						
ANNUAL PAYMENT	210051						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-174210	-87042	9814	75210	146604	146604	146604
DEPRECIATION	41399	72577	54710	41331	31291	23740	18048
ADJUSTED INCOME	-185422	-112614	-36508	14553	72712	71579	70726
NET PRESENT VALUE	-297115						
INTERNAL RATE OF RETURN	-9.44747						

TWELVE THOUSAND GALLON WINERY 12% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	174210	198060	212222	222300	226380	226380	226380
MARGIN	43553	49515	53056	55575	56595	56595	56595
NEW CREDIT	130658	148545	159167	166725	169785	169785	169785
INTEREST	0	15679	17825	19100	20007	20374	20374
LOAN	130658	164224	176992	185825	189792	190159	190159
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	1248183						
TERM	TEN YR						
ANNUAL PAYMENT	220909						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-174210	-87042	9814	75210	146604	146604	146604
DEPRECIATION	41399	72577	54710	41331	31291	23740	18048
ADJUSTED INCOME	-185422	-112614	-36508	14553	72712	71579	70726
NET PRESENT VALUE	-312270						
INTERNAL RATE OF RETURN	-11.3981						

Years One Through Seven Shown Above.

Appendix K. Adjusted Incomes For Twelve-Thousand gallon Wineries.

8	9	10	11	12	13	14	15
226380	226380	226380	226380	226380	226380	226380	226380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
16979	0	0	0	0	0	0	0
16979	0	0	0	0	0	0	0
122590	114898	106437	97130	86892	75630	63242	49615
76919	84611	93072	102379	112617	123879	136267	149894
199509	199509	199509	199509	199509	199509	199509	199509
146604	146604	146604	146604	146604	146604	146604	146604
42890	39354	28630	20858	15220	11124	8144	35115
-50074	-51758	-54636	-57197	-59579	-61883	-64188	-62186

8	9	10	11	12	13	14	15
226380	226380	226380	226380	226380	226380	226380	226380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
18676	0	0	0	0	0	0	0
18676	0	0	0	0	0	0	0
136074	127937	118904	108878	97749	85396	71684	56463
73977	82114	91147	101173	112302	124655	138367	153588
210051	210051	210051	210051	210051	210051	210051	210051
146604	146604	146604	146604	146604	146604	146604	146604
42890	39354	28630	20858	15220	11124	8144	35115
-58593	-60344	-63308	-65977	-68492	-70960	-73463	-71701

8	9	10	11	12	13	14	15
226380	226380	226380	226380	226380	226380	226380	226380
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
20374	0	0	0	0	0	0	0
20374	0	0	0	0	0	0	0
149782	141247	131687	120981	108989	95559	80517	63670
71127	79662	89222	99928	111920	125350	140392	157239
220909	220909	220909	220909	220909	220909	220909	220909
146604	146604	146604	146604	146604	146604	146604	146604
42890	39354	28630	20858	15220	11124	8144	35115
-67395	-69205	-72248	-75020	-77664	-80293	-82996	-81478

Years Eight Through Fifteen Shown Above.

Appendix L. Adjusted Incomes For Thirty-Thousand Gallon Wineries.

THIRTY THOUSAND GALLON WINERY 10% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	365551	415951	450751	475651	485851	485851	485851
MARGIN	91388	103988	112688	118913	121463	121463	121463
NEW CREDIT	274163	311963	338063	356738	364388	364388	364388
INTEREST	0	27416	31196	33806	35674	36439	36439
LOAN	274163	339379	369259	390544	400062	400827	400827
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	2611500						
TERM	TEN YR						
ANNUAL PAYMENT	425010						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-365551	-154651	71849	225149	393149	393149	393149
DEPRECIATION	87569	153740	116283	88136	66943	50946	38850
ADJUSTED INCOME	-388971	-212380	-34174	85684	222755	220356	218541
NET PRESENT VALUE	-129513						
INTERNAL RATE OF RETURN	6.191792						

THIRTY THOUSAND GALLON WINERY 11% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	365551	415951	450751	475651	485851	485851	485851
MARGIN	91388	103988	112688	118913	121463	121463	121463
NEW CREDIT	274163	311963	338063	356738	364388	364388	364388
INTEREST	0	30158	34316	37187	39241	40083	40083
LOAN	274163	342121	372379	393925	403629	404471	404471
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	2635242						
TERM	TEN YR						
ANNUAL PAYMENT	447468						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-365551	-154651	71849	225149	393149	393149	393149
DEPRECIATION	87569	153740	116283	88136	66943	50946	38850
ADJUSTED INCOME	-388971	-212380	-34174	85684	222755	220356	218541
NET PRESENT VALUE	-189940						
INTERNAL RATE OF RETURN	4.103791						

THIRTY THOUSAND GALLON WINERY 12% INTEREST							
DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	365551	415951	450751	475651	485851	485851	485851
MARGIN	91388	103988	112688	118913	121463	121463	121463
NEW CREDIT	274163	311963	338063	356738	364388	364388	364388
INTEREST	0	32900	37436	40568	42809	43727	43727
LOAN	274163	344863	375499	397306	407197	408115	408115
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	2658985						
TERM	TEN YR						
ANNUAL PAYMENT	470598						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-365551	-154651	71849	225149	393149	393149	393149
DEPRECIATION	87569	153740	116283	88136	66943	50946	38850
ADJUSTED INCOME	-388971	-212380	-34174	85684	222755	220356	218541
NET PRESENT VALUE	-270337						
INTERNAL RATE OF RETURN	1.771443						

Years One Through Seven Shown Above.

Appendix L. Adjusted Incomes For Thirty-Thousand Gallon Wineries.

8	9	10	11	12	13	14	15
485851	485851	485851	485851	485851	485851	485851	485851
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
36439	0	0	0	0	0	0	0
36439	0	0	0	0	0	0	0
261150	244764	226739	206912	185103	161112	134722	105693
163860	180246	198271	218098	239907	263898	290288	319317
425010	425010	425010	425010	425010	425010	425010	425010
393149	393149	393149	393149	393149	393149	393149	393149
86385	78875	57512	42002	30727	22518	16533	68866
-38703	-42288	-48196	-53496	-58459	-63289	-68145	-64650

8	9	10	11	12	13	14	15
485851	485851	485851	485851	485851	485851	485851	485851
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
40083	0	0	0	0	0	0	0
40083	0	0	0	0	0	0	0
289677	272542	253300	231941	208233	181917	152707	120283
157591	174926	194168	215527	239235	265551	294761	327185
447468	447468	447468	447468	447468	447468	447468	447468
393149	393149	393149	393149	393149	393149	393149	393149
86385	78875	57512	42002	30727	22518	16533	68866
-56852	-60579	-66670	-72200	-77447	-82626	-87905	-84919

8	9	10	11	12	13	14	15
485851	485851	485851	485851	485851	485851	485851	485851
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
43727	0	0	0	0	0	0	0
43727	0	0	0	0	0	0	0
319078	300896	280532	257724	232179	203568	171525	135636
151520	169702	190066	212874	238419	267030	299073	334962
470598	470598	470598	470598	470598	470598	470598	470598
393149	393149	393149	393149	393149	393149	393149	393149
86385	78875	57512	42002	30727	22518	16533	68866
-75602	-79456	-85715	-91462	-96985	-102508	-108213	-105746

Years Eight Through Fifteen Shown Above.

Appendix M. Adjusted Incomes For Sixty-Thousand Gallon Wineries.

SIXTY THOUSAND GALLON WINERY 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	636694	747494	827094	876894	897294	897294	897294
MARGIN	159174	186874	206774	219224	224324	224324	224324
NEW CREDIT	477521	560621	620321	657671	672971	672971	672971
INTEREST	0	47752	56062	62032	65767	67297	67297
LOAN	477521	608373	676383	719703	738738	740268	740268
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	4768551						
TERM	TEN YR						
ANNUAL PAYMENT	776060						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-636694	-242492	182910	480858	808206	808206	808206
DEPRECIATION	139554	245124	185601	140825	107071	81567	62259
ADJUSTED INCOME	-679431	-356224	-23460	210629	478712	474886	471990
NET PRESENT VALUE	279551						
INTERNAL RATE OF RETURN	14.30844						

SIXTY THOUSAND GALLON WINERY 11% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	636694	747494	827094	876894	897294	897294	897294
MARGIN	159174	186874	206774	219224	224324	224324	224324
NEW CREDIT	477521	560621	620321	657671	672971	672971	672971
INTEREST	0	52527	61668	68235	72344	74027	74027
LOAN	477521	613148	681989	725906	745315	746998	746998
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	4811902						
TERM	TEN YR						
ANNUAL PAYMENT	817068						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-636694	-242492	182910	480858	808206	808206	808206
DEPRECIATION	137343	203966	193347	147442	144232	59690	71105
ADJUSTED INCOME	-679762	-362397	-22298	211622	484286	471605	473317
NET PRESENT VALUE	103336						
INTERNAL RATE OF RETURN	12.79988						

SIXTY THOUSAND GALLON WINERY 12% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED INCOME	636694	747494	827094	876894	897294	897294	897294
MARGIN	159174	186874	206774	219224	224324	224324	224324
NEW CREDIT	477521	560621	620321	657671	672971	672971	672971
INTEREST	0	57303	67275	74439	78921	80757	80757
LOAN	477521	617924	687596	732110	751892	753728	753728
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	4855256						
TERM	TEN YR						
ANNUAL PAYMENT	859303						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-636694	-242492	182910	480858	808206	808206	808206
DEPRECIATION	137343	203966	193347	147442	144232	59690	71105
ADJUSTED INCOME	-679762	-362397	-22298	211622	484286	471605	473317
NET PRESENT VALUE	-49023						
INTERNAL RATE OF RETURN	11.02306						

Years One Through Seven Shown Above.

Appendix M. Adjusted Incomes For Sixty-Thousand Gallon Wineries.

8	9	10	11	12	13	14	15
897294	897294	897294	897294	897294	897294	897294	897294
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
67297	0	0	0	0	0	0	0
67297	0	0	0	0	0	0	0
476855	446935	414022	377818	337994	294188	246000	192994
299205	329125	362038	398242	438066	481872	530060	583066
776060	776060	776060	776060	776060	776060	776060	776060
808206	808206	808206	808206	808206	808206	808206	808206
135439	123454	90090	65850	48215	35366	25989	106968
2759	-3527	-13468	-22535	-31154	-39652	-48287	-44091

8	9	10	11	12	13	14	15
897294	897294	897294	897294	897294	897294	897294	897294
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
74027	0	0	0	0	0	0	0
74027	0	0	0	0	0	0	0
529309	497656	462520	423520	380230	332178	278840	219635
287759	319412	354548	393548	436838	484890	538228	597433
817068	817068	817068	817068	817068	817068	817068	817068
808206	808206	808206	808206	808206	808206	808206	808206
109229	85026	81160	109285	123910	64095	22470	64394
-34312	-42691	-48541	-50172	-54472	-70652	-84896	-87489

8	9	10	11	12	13	14	15
897294	897294	897294	897294	897294	897294	897294	897294
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
80757	0	0	0	0	0	0	0
80757	0	0	0	0	0	0	0
582631	549430	512245	470598	423954	371712	313201	247669
276672	309873	347058	388705	435349	487591	546102	611634
859303	859303	859303	859303	859303	859303	859303	859303
808206	808206	808206	808206	808206	808206	808206	808206
109229	85026	81160	109285	123910	64095	22470	64394
-68549	-77160	-83317	-85345	-90148	-106957	-121977	-125518

Years Eight Through Fifteen Shown Above.

Appendix N. Adjusted Incomes For Winery Analysis,

NET INCOMES FOR WINERIES TWELVE THOUSAND GALLON WINERY	YEAR	1	2	3	4
AT $800 TON		-174210	-95832	316	65208
AT $800 TON WITH PROPERTY SALE		-174210	-95832	316	65208
AT $900 TON		-182210	-104232	-8084	56808
AT $900 TON WITH PROPERTY SALE		-182210	-104232	-8084	56808
AT $1000 TON		-190210	-112632	-16484	48408
AT $1000 TON WITH PROPERTY SALE		-190210	-112632	-16484	48408
TWELVE THOUSAND GALLON WITH - TEN% RECEIPT DECREASE					
AT $800 TON		-174210	-106933	-21687	35457
AT $800 TON WITH PROPERTY SALE		-174210	-106933	-21887	35457
AT $900 TON		-182210	-115333	-30287	27057
AT $900 TON WITH PROPERTY SALE		-182210	-115333	-30287	27057
AT $1000 TON		-190210	-123733	-38687	18657
AT $1000 TON WITH PROPERTY SALE		-190210	-123733	-38687	18657
TWELVE THOUSAND GALLON WITH + TEN% RECEIPT INCREASE					
AT $800 TON		-174210	-84730	22519	94959
AT $800 TON WITH PROPERTY SALE		-174210	-84730	22519	94959
AT $900 TON		-182210	-93130	14119	86559
AT $900 TON WITH PROPERTY SALE		-182210	-93130	14119	86559
AT $1000 TON		-190210	-101530	5719	78159
AT $1000 TON WITH PROPERTY SALE		-190210	-101530	5719	78159
THIRTY THOUSAND GALLON WINERY					
AT $800 TON		-365551	-154651	71849	225149
AT $800 TON WITH PROPERTY SALE		-365551	-154651	71849	225149
AT $900 TON		-385551	-174651	51849	205149
AT $900 TON WITH PROPERTY SALE		-385551	-174651	51849	205149
AT $1000 TON		-405551	-194651	31849	185149
AT $1000 TON WITH PROPERTY SALE		-405551	-194651	31849	185149
THIRTY THOUSAND GALLON WITH - TEN% RECEIPT DECREASE					
AT $800 TON		-365551	-180781	19589	155069
AT $800 TON WITH PROPERTY SALE		-365551	-180781	19589	155069
AT $900 TON		-385551	-200781	-411	135069
AT $900 TON WITH PROPERTY SALE		-385551	-200781	-411	135069
AT $1000 TON		-405551	-220781	-20411	115069
AT $1000 TON WITH PROPERTY SALE		-405551	-220781	-20411	115069
THIRTY THOUSAND GALLON WITH + TEN% RECEIPT INCREASE					
AT $800 TON		-365551	-128521	124109	295229
AT $800 TON WITH PROPERTY SALE		-365551	-128521	124109	295229
AT $900 TON		-385551	-148521	104109	275229
AT $900 TON WITH PROPERTY SALE		-385551	-148521	104109	275229
AT $1000 TON		-405551	-168521	84109	255229
AT $1000 TON WITH PROPERTY SALE		-405551	-168521	84109	255229
SIXTY THOUSAND GALLON WINERY					
AT $800 TON		-636694	-242492	182910	480858
AT $800 TON WITH PROPERTY SALE		-636694	-242492	182910	480858
AT $900 TON		-676694	-282492	142910	440858
AT $900 TON WITH PROPERTY SALE		-676694	-282492	142910	440858
AT $1000 TON		-716694	-322492	102910	400858
AT $1000 TON WITH PROPERTY SALE		-716694	-322492	102910	400858
SIXTY THOUSAND GALLON WITH - TEN% RECEIPT DECREASE					
AT $800 TON		-636694	-292992	81909	345082
AT $800 TON WITH PROPERTY SALE		-636694	-292992	81909	345082
AT $900 TON		-676694	-332992	41909	305082
AT $900 TON WITH PROPERTY SALE		-676694	-332992	41909	305082
AT $1000 TON		-716694	-372992	1909	265082
AT $1000 TON WITH PROPERTY SALE		-716694	-372992	1909	265082
SIXTY THOUSAND GALLON WITH + TEN% RECEIPT INCREASE					
AT $800 TON		-636694	-191991	283910	616633
AT $800 TON WITH PROPERTY SALE		-636694	-191991	283910	616633
AT $900 TON		-676694	-231991	243910	576633
AT $900 TON WITH PROPERTY SALE		-676694	-231991	243910	576633
AT $1000 TON		-716694	-271991	203910	536633
AT $1000 TON WITH PROPERTY SALE		-716694	-271991	203910	536633

Years One Through Four Shown Above.

Appendix N. Adjusted Incomes For Winery Analysis.

5	6	7	8	9	10	20
136398	136398	136398	136398	136398	136398	136398
136398	136398	136398	136398	136398	136398	1328520
127998	127998	127998	127998	127998	127998	127998
127998	127998	127998	127998	127998	127998	1249980
119598	119598	119598	119598	119598	119598	119598
119598	119598	119598	119598	119598	119598	1171440
99099	99099	99099	99099	99099	99099	99099
99099	99099	99099	99099	99099	99099	979774
90699	90699	90699	90699	90699	90699	90699
90699	90699	90699	90699	90699	90699	901234
82299	82299	82299	82299	82299	82299	82299
82299	82299	82299	82299	82299	82299	822694
173696	173696	173696	173696	173696	173696	173696
173696	173696	173696	173696	173696	173696	1677256
165296	165296	165296	165296	165296	165296	165296
165296	165296	165296	165296	165296	165296	1598716
156896	156896	156896	156896	156896	156896	156896
156896	156896	156896	156896	156896	156896	1520176
393149	393149	393149	393149	393149	393149	393149
393149	393149	393149	393149	393149	393149	3787471
373149	373149	373149	373149	373149	373149	373149
373149	373149	373149	373149	373149	373149	3600471
353149	353149	353149	353149	353149	353149	353149
353149	353149	353149	353149	353149	353149	3413471
305249	305249	305249	305249	305249	305249	305249
305249	305249	305249	305249	305249	305249	2965660
285249	285249	285249	285249	285249	285249	285249
285249	285249	285249	285249	285249	285249	2778606
265249	265249	265249	265249	265249	265249	265249
265249	265249	265249	265249	265249	265249	2591606
481049	481049	481049	481049	481049	481049	481049
481049	481049	481049	481049	481049	481049	4609336
461049	461049	461049	461049	461049	461049	461049
461049	461049	461049	461049	461049	461049	4422336
441049	441049	441049	441049	441049	441049	441049
441049	441049	441049	441049	441049	441049	4235336
808206	808206	808206	808206	808206	808206	808206
808206	808206	808206	808206	808206	808206	7734660
768206	768206	768206	768206	768206	768206	768206
768206	768206	768206	768206	768206	768206	7360660
728206	728206	728206	728206	728206	728206	728206
728206	728206	728206	728206	728206	728206	6986660
637656	637656	637656	637656	637656	637656	637656
637656	637656	637656	637656	637656	637656	6140018
597656	597656	597656	597656	597656	597656	597656
597656	597656	597656	597656	597656	597656	5766018
557656	557656	557656	557656	557656	557656	557656
557656	557656	557656	557656	557656	557656	5392018
978756	978756	978756	978756	978756	978756	978756
978756	978756	978756	978756	978756	978756	9329304
938756	938756	938756	938756	938756	938756	938756
938756	938756	938756	938756	938756	938756	8959304
898756	898756	898756	898756	898756	898756	898756
898756	898756	898756	898756	898756	898756	8581303

Years Five Through Ten And Year Twenty Shown Above.

Appendix O. Adjusted Incomes For Twenty Acre Vineyard And Twelve Thousand Gallon Winery.

TWENTY ACRE VINEYARD AND TWELVE THOUSAND GALLON WINERY 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	52231	29380	31180	32635	34980	37180	38380
NEEDED WINERY INCOME	0	0	166210	182060	180222	174300	162380
TOTAL NEEDED INCOME	52231	29380	197390	214695	215202	211480	200760
MARGIN	13058	7345	49348	53674	53801	52870	50190
NEW CREDIT	39173	22035	148043	161021	161402	158610	150570
INTEREST	0	3917	2204	14804	16102	16140	15861
LOAN	39173	25952	150247	175825	177504	174750	166431
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	924939						
TERM	TEN YR						
ANNUAL PAYMENT	150530						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29380	-197390	-112467	-2664	92028	162018
DEPRECIATION	16314	28107	61727	87295	65376	49073	36917
ADJUSTED INCOME	-55007	-28102	-207870	-136177	-46259	32715	93063
NET PRESENT VALUE	-365061						
INTERNAL RATE OF RETURN	-10.9643						

TWENTY ACRE VINEYARD AND TWELVE THOUSAND GALLON WINERY 11% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	52231	29380	31180	32635	34980	37180	38380
NEEDED WINERY INCOME	0	0	166210	182060	180222	174300	162380
TOTAL NEEDED INCOME	52231	29380	197390	214695	215202	211480	200760
MARGIN	13058	7345	49348	53674	53801	52870	50190
NEW CREDIT	39173	22035	148043	161021	161402	158610	150570
INTEREST	0	4309	2204	14804	16102	16140	15861
LOAN	39173	26344	150247	175825	177504	174750	166431
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	925331						
TERM	TEN YR						
ANNUAL PAYMENT	157123						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29380	-197390	-112467	-2664	92028	162018
DEPRECIATION	16314	28107	61727	87295	65376	49073	36917
ADJUSTED INCOME	-55007	-28102	-207870	-136177	-46259	32715	93063
NET PRESENT VALUE	-382465						
INTERNAL RATE OF RETURN	-12.2121						

TWENTY ACRE VINEYARD AND TWELVE THOUSAND GALLON WINERY 12% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	52231	29380	31180	32635	34980	37180	38380
NEEDED WINERY INCOME	0	0	166210	182060	180222	174300	162380
TOTAL NEEDED INCOME	52231	29380	197390	214695	215202	211480	200760
MARGIN	13058	7345	49348	53674	53801	52870	50190
NEW CREDIT	39173	22035	148043	161021	161402	158610	150570
INTEREST	0	4701	2644	17765	19323	19368	19033
LOAN	39173	26736	150687	178786	180725	177978	169603
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	941756						
TERM	TEN YR						
ANNUAL PAYMENT	166676						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-52231	-29330	-197390	-112467	-2664	92028	162018
DEPRECIATION	16314	28107	61727	87295	65376	49073	36917
ADJUSTED INCOME	-55007	-28102	-207870	-136177	-46259	32715	93063
NET PRESENT VALUE	-408503						
INTERNAL RATE OF RETURN	-14.0069						

Years One Through Seven Shown Above.

Appendix O. Adjusted Incomes For Twenty Acre Vineyard And Twelve Thousand Gallon Winery.

8	9	10	11	12	13	14	15
38380	38380	38380	38380	38380	38380	38380	38380
162380	162380	162380	162380	162380	162380	162380	162380
200760	200760	200760	200760	200760	200760	200760	200760
0	50190	50190	50190	50190	50190	50190	50190
0	0	0	0	0	0	0	0
15057	0	0	0	0	0	0	0
15057	0	0	0	0	0	0	0
92494	86690	80306	73284	65559	57062	47715	37434
58036	63840	70224	77246	84971	93468	102815	113096
150530	150530	150530	150530	150530	150530	150530	150530
162018	162018	162018	162018	162018	162018	162018	162018
50196	43178	52237	37857	27469	19959	36884	32728
8589	-43525	-43123	-46334	-49051	-51452	-50315	-52480

8	9	10	11	12	13	14	15
38380	38380	38380	38380	38380	38380	38380	38380
162380	162380	162380	162380	162380	162380	162380	162380
200760	200760	200760	200760	200760	200760	200760	200760
0	50190	50190	50190	50190	50190	50190	50190
0	0	0	0	0	0	0	0
15057	0	0	0	0	0	0	0
15057	0	0	0	0	0	0	0
101786	95699	88943	81443	73118	63878	53621	42235
55337	61424	68180	75680	84005	93245	103502	114888
157123	157123	157123	157123	157123	157123	157123	157123
162018	162018	162018	162018	162018	162018	162018	162018
50196	43178	52237	37857	27469	19959	36884	32728
3390	-48766	-48421	-51703	-54510	-57022	-56022	-58353

8	9	10	11	12	13	14	15
38380	38380	38380	38380	38380	38380	38380	38380
162380	162380	162380	162380	162380	162380	162380	162380
200760	200760	200760	200760	200760	200760	200760	200760
0	50190	50190	50190	50190	50190	50190	50190
0	0	0	0	0	0	0	0
18068	0	0	0	0	0	0	0
18068	0	0	0	0	0	0	0
113011	106571	99358	91280	82233	72099	60750	48039
53665	60105	67318	75396	84443	94577	105926	118637
166676	166676	166676	166676	166676	166676	166676	166676
162018	162018	162018	162018	162018	162018	162018	162018
50196	43178	52237	37857	27469	19959	36884	32728
-4480	-56688	-56411	-59780	-62695	-65342	-64506	-67038

Years Eight Through Fifteen Shown Above

Appendix P. Adjusted Incomes For Fifty Acre Vineyard And Thirty Thousand Gallon Winery.

FIFTY ACRE VINEYARD AND THIRTY THOUSAND GALLON WINERY 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	119060	60915	65415	74915	80415	83415	84315
NEEDED WINERY INCOME	0	0	345551	375951	370751	355651	325851
TOTAL NEEDED INCOME	119060	60915	410966	450866	451166	439066	410166
MARGIN	29765	15229	102742	112717	112792	109767	102542
NEW CREDIT	89295	45686	308225	338150	338375	329300	307625
INTEREST	0	8930	4569	30823	33815	33838	32930
LOAN	89295	54616	312794	368973	372190	363138	340555
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	1932324						
TERM	TEN YR						
ANNUAL PAYMENT	314477						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-410966	-189566	71434	261734	468834
DEPRECIATION	32188	55330	127361	182377	136906	102998	77663
ADJUSTED INCOME	-126138	-58707	-432959	-246492	-31537	128157	307616
NET PRESENT VALUE	-200484						
INTERNAL RATE OF RETURN	5.666037						

FIFTY ACRE VINEYARD AND THIRTY THOUSAND GALLON WINERY 11% PERCENT

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	119060	60915	65415	74915	80415	83415	84315
NEEDED WINERY INCOME	0	0	345551	375951	370751	355651	325851
TOTAL NEEDED INCOME	119060	60915	410966	450866	451166	439066	410166
MARGIN	29765	15229	102742	112717	112792	109767	102542
NEW CREDIT	89295	45686	308225	338150	338375	329300	307625
INTEREST	0	9822	5025	33905	37197	37221	36223
LOAN	89295	55508	313250	372055	375572	366521	343848
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	1949888						
TERM	TEN YR						
ANNUAL PAYMENT	331094						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-410966	-189566	71434	261734	468834
DEPRECIATION	32188	55330	127361	182377	136906	102998	77663
ADJUSTED INCOME	-126138	-58707	-432959	-246492	-31537	128157	307616
NET PRESENT VALUE	-245195						
INTERNAL RATE OF RETURN	4.567473						

FIFTY ACRE VINEYARD AND THIRTY THOUSAND GALLON WINERY 12% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	119060	60915	65415	74915	80415	83415	84315
NEEDED WINERY INCOME	0	0	345551	375951	370751	355651	325851
TOTAL NEEDED INCOME	119060	60915	410966	450866	451166	439066	410166
MARGIN	29765	15229	102742	112717	112792	109767	102542
NEW CREDIT	89295	45686	308225	338150	338375	329300	307625
INTEREST	0	10715	5482	36987	40578	40605	39516
LOAN	89295	56401	313707	375137	378953	369905	347141
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	1967454						
TERM	TEN YR						
ANNUAL PAYMENT	348208						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-119060	-60915	-410966	-189566	71434	261734	468834
DEPRECIATION	32188	55330	127361	182377	136906	102998	77663
ADJUSTED INCOME	-126138	-58707	-432959	-246492	-31537	128157	307616
NET PRESENT VALUE	-291240						
INTERNAL RATE OF RETURN	3.383478						

Years One Through Seven Shown Above.

Appendix P. Adjusted Incomes For Fifty Acre Vineyard And Thirty Thousand Gallon Winery.

7	8	9	10	11	12	13	14	15
84315	84315	84315	84315	84315	84315	84315	84315	84315
325851	325851	325851	325851	325851	325851	325851	325851	325851
410166	410166	410166	410166	410166	410166	410166	410166	410166
102542	0	102542	102542	102542	102542	102542	102542	102542
307625	0	0	0	0	0	0	0	0
32930	30763	0	0	0	0	0	0	0
340555	30763	0	0	0	0	0	0	0
0	193232	181108	167771	153100	136963	119211	99685	78206
0	121245	133369	146706	161377	177514	195266	214792	236271
0	314477	314477	314477	314477	314477	314477	314477	314477
468834	468834	468834	468834	468834	468834	468834	468834	468834
77663	105582	90890	123595	105484	76543	55615	40467	76385
307616	128854	22290	25195	20278	13516	7714	2513	4679

7	8	9	10	11	12	13	14	15
84315	84315	84315	84315	84315	84315	84315	84315	84315
325851	325851	325851	325851	325851	325851	325851	325851	325851
410166	410166	410166	410166	410166	410166	410166	410166	410166
102542	0	102542	102542	102542	102542	102542	102542	102542
307625	0	0	0	0	0	0	0	0
36223	33839	0	0	0	0	0	0	0
343848	33839	0	0	0	0	0	0	0
0	214488	201661	187423	171620	154077	134606	112992	89001
0	116606	129433	143671	159474	177017	196488	218102	242093
0	331094	331094	331094	331094	331094	331094	331094	331094
468834	468834	468834	468834	468834	468834	468834	468834	468834
77663	105582	90890	123595	105484	76543	55615	40467	76385
307616	115425	6756	11526	6439	-534	-6594	-12108	-10319

7	8	9	10	11	12	13	14	15
84315	84315	84315	84315	84315	84315	84315	84315	84315
325851	325851	325851	325851	325851	325851	325851	325851	325851
410166	410166	410166	410166	410166	410166	410166	410166	410166
102542	0	102542	102542	102542	102542	102542	102542	102542
307625	0	0	0	0	0	0	0	0
39516	36915	0	0	0	0	0	0	0
347141	36915	0	0	0	0	0	0	0
0	236094	222641	207573	190697	171795	150626	126916	100361
0	112114	125567	140635	157511	176413	197582	221292	247847
0	348208	348208	348208	348208	348208	348208	348208	348208
468834	468834	468834	468834	468834	468834	468834	468834	468834
77663	105582	90890	123595	105484	76543	55615	40467	76385
307616	101552	-5211	-2566	-7814	-14990	-21305	-27134	-25729

Years Eight Through Fifteen Shown Above.

Appendix Q. Adjusted Incomes For One Hundred Acre Vineyard And Sixty Thousand Gallon Winery.

ONE HUNDRED ACRE VINEYARD AND SIXTY THOUSAND GALLON WINERY 10% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	224690	99141	107691	115291	125266	135716	141416
NEEDED WINERY INCOME	0	0	596694	667494	667094	636894	577294
TOTAL NEEDED INCOME	224690	99141	704385	782785	792360	772610	718710
MARGIN	56173	24785	176096	195696	198090	193153	179678
NEW CREDIT	168518	74356	528289	587089	594270	579458	539033
INTEREST	0	16852	7436	52829	58709	59427	57946
LOAN	168518	91208	535725	639918	652979	638885	596979
INTEREST RATE	0.1						
TOTAL LOAN AMOUNT	3378115						
TERM	TEN YR						
ANNUAL PAYMENT	549773						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-704385	-277783	217644	585142	986790
DEPRECIATION	55421	95267	208065	294426	221105	166412	125526
ADJUSTED INCOME	-238846	-94765	-743614	-387648	20073	329180	677922
NET PRESENT VALUE	3387316						
INTERNAL RATE OF RETURN	13.99513						

ONE HUNDRED ACRE VINEYARD AND SIXTY THOUSAND GALLON WINERY 11% INTEREST

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	224690	99141	107691	115291	125266	135716	141416
NEEDED WINERY INCOME	0	0	596694	667494	667094	636894	577294
TOTAL NEEDED INCOME	224690	99141	704385	782785	792360	772610	718710
MARGIN	56173	24785	176096	195696	198090	193153	179678
NEW CREDIT	168518	74356	528289	587089	594270	579458	539033
INTEREST	0	18537	8179	58112	64580	65370	63740
LOAN	168518	92893	536468	645201	658850	644828	602773
INTEREST RATE	0.11						
TOTAL LOAN AMOUNT	3408825						
TERM	TEN YR						
ANNUAL PAYMENT	578823						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-704385	-277783	217644	585142	986790
DEPRECIATION	55421	95267	208065	294426	221105	166412	125526
ADJUSTED INCOME	-238846	-94765	-743614	-387648	20073	329180	677922
NET PRESENT VALUE	3135787						
INTERNAL RATE OF RETURN	13.21619						

ONE HUNDRED ACRE VINEYARD AND SIXTY THOUSAND GALLON WINERY

DEVELOPMENT LOAN	YR 1	2	3	4	5	6	7
NEEDED VINEYARD INCOME	224690	99141	107691	115291	125266	135716	141416
NEEDED WINERY INCOME	0	0	596694	667494	667094	636894	577294
TOTAL NEEDED INCOME	224690	99141	704385	782785	792360	772610	718710
MARGIN	56173	24785	176096	195696	198090	193153	179678
NEW CREDIT	168518	74356	528289	587089	594270	579458	539033
INTEREST	0	20222	8923	63395	70451	71312	69535
LOAN	168518	94578	537212	650484	664721	650770	608568
INTEREST RATE	0.12						
TOTAL LOAN AMOUNT	3439535						
TERM	TEN YR						
ANNUAL PAYMENT	608743						
INTEREST PAYMENT	0	0	0	0	0	0	0
PRINCIPAL PAYMENT	0	0	0	0	0	0	0
TOTAL PAYMENT	0	0	0	0	0	0	0
NET INCOME	-224690	-99141	-704385	-277783	217644	585142	986790
DEPRECIATION	55421	95267	208065	294426	221105	166412	125526
ADJUSTED INCOME	-238846	-94765	-743614	-387648	20073	329180	677922
NET PRESENT VALUE	2876659						
INTERNAL RATE OF RETURN	12.37713						

Years One Through Seven Shown Above.

Appendix Q. Adjusted Incomes For One Hundred Acre Vineyard And Sixty Thousand Gallon Winery.

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
577294	577294	577294	577294	577294	577294	577294	577294
718710	718710	718710	718710	718710	718710	718710	718710
0	179678	179678	179678	179678	179678	179678	179678
0	0	0	0	0	0	0	0
53903	0	0	0	0	0	0	0
53903	0	0	0	0	0	0	0
337812	316615	293300	267652	239440	208407	174270	136720
211961	233158	256473	282121	310333	341366	375503	413053
549773	549773	549773	549773	549773	549773	549773	549773
986790	986790	986790	986790	986790	986790	986790	986790
175669	151886	199523	169281	122867	89296	64989	128148
366021	179596	183244	174860	163667	153976	145209	149051

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
577294	577294	577294	577294	577294	577294	577294	577294
718710	718710	718710	718710	718710	718710	718710	718710
0	179678	179678	179678	179678	179678	179678	179678
0	0	0	0	0	0	0	0
59294	0	0	0	0	0	0	0
59294	0	0	0	0	0	0	0
374971	352547	327657	300028	269361	235320	197535	155593
203852	226276	251166	278795	309462	343503	381288	423230
578823	578823	578823	578823	578823	578823	578823	578823
986790	986790	986790	986790	986790	986790	986790	986790
175669	151886	199523	169281	122867	89296	64989	128148
342545	155935	159348	150667	139105	128963	119649	122832

8	9	10	11	12	13	14	15
141416	141416	141416	141416	141416	141416	141416	141416
577294	577294	577294	577294	577294	577294	577294	577294
718710	718710	718710	718710	718710	718710	718710	718710
0	179678	179678	179678	179678	179678	179678	179678
0	0	0	0	0	0	0	0
64684	0	0	0	0	0	0	0
64684	0	0	0	0	0	0	0
412744	389224	362882	333379	300335	263326	221876	175452
195999	219519	245861	275364	308408	345417	386867	433291
608743	608743	608743	608743	608743	608743	608743	608743
986790	986790	986790	986790	986790	986790	986790	986790
175669	151886	199523	169281	122867	89296	64989	128148
316290	131517	134711	125750	113831	103244	93380	95691

Years Eight Through Fifteen Shown Above.

Appendix R. Adjusted Incomes For Joint Vineyard And Winery Analysis.

NET INCOMES FOR VINEYARD/WINERY			
TWENTY ACRE VINEYARD/TWELVE THOUSAND GALLON WINERY	YEAR	1	2
TOTAL		-52231	-29380
TOTAL WITH PROPERTY SALE		-52231	-29380
WITH TEN% RECEIPT DECREASE			
TOTAL		-52231	-29380
TOTAL WITH PROPERTY SALE		-52231	-29380
WITH TEN% RECEIPT INCREASE			
TOTAL		-52231	-29380
TOTAL WITH PROPERTY SALE		-52231	-29380
FIFTY ACRE VINEYARD/THIRTY THOUSAND GALLON WINERY	YEAR	1	2
TOTAL		-119060	-60915
TOTAL WITH PROPERTY SALE		-119060	-60915
WITH TEN% RECEIPT DECREASE			
TOTAL		-119060	-60915
TOTAL WITH PROPERTY SALE		-119060	-60915
WITH TEN% RECEIPT INCREASE			
TOTAL		-119060	-60915
TOTAL WITH PROPERTY SALE		-119060	-60915
HUNDRED ACRE VINEYARD/SIXTY THOUSAND GALLON WINERY	YEAR	1	2
TOTAL		-224690	-99141
TOTAL WITH PROPERTY SALE		-224690	-99141
WITH TEN% RECEIPT DECREASE			
TOTAL		-224690	-99141
TOTAL WITH PROPERTY SALE		-224690	-99141
WITH TEN% RECEIPT INCREASE			
TOTAL		-224690	-99141
TOTAL WITH PROPERTY SALE		-224690	-99141

Years One And Two Shown Above.

Appendix R. Adjusted Incomes For Joint Vineyard And Winery Analysis.

3	4	5	6	7	8	9	10	20
-197390	-112467	-2664	92028	162018	162018	162018	162018	162018
-197390	-112467	-2664	92028	162018	162018	162018	162018	1599241
-197390	-123568	-24867	62277	124719	124719	124719	124719	124719
-197390	-123568	-24867	62277	124719	124719	124719	124719	1250495
-197390	-101365	19539	121779	199316	199316	199316	199316	199316
-197390	-101365	19539	121779	199316	199316	199316	199316	1947978

3	4	5	6	7	8	9	10	20
-410966	-189566	71434	261734	466834	466834	466834	466834	466834
-410966	-189566	71434	261734	466834	466834	466834	466834	4558899
-410966	-215696	19174	191654	380934	380934	380934	380934	380934
-410966	-215696	19174	191654	380934	380934	380934	380934	3737034
-410966	-163436	123694	331814	556734	556734	556734	556734	556734
-410966	-163436	123694	331814	556734	556734	556734	556734	5380764

3	4	5	6	7	8	9	10	20
-704385	-277783	217644	585142	986790	986790	986790	986790	986790
-704385	-277783	217644	585142	986790	986790	986790	986790	9524048
-704385	-328283	116643	449366	816240	816240	816240	816240	816240
-704385	-328283	116643	449366	816240	816240	816240	816240	7929405
-704385	-227282	318644	720917	1157340	1157340	1157340	1157340	1157340
-704385	-227282	318644	720917	1157340	1157340	1157340	1157340	11118690

Years Three Through Ten And Year Twenty Shown Above.

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