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Assuring the Provenance of Fine Wine

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Abstract

Despite the wine industry's dramatic increase in international export, very little has been done to assure the quality of wine shipments to final consumers. Today, wine shipments are largely uncontrolled, and the chemical and organoleptical implications of poor transport and storage conditions on wine quality remains anecdotal. Accordingly, there is a need for a systematic approach to a quality control process in wine distribution.

***Purpose**: This paper reviews the activity and research of eProvenance on the quality of transport and storage conditions of domestic and international wine shipments, and the resulting impact on wine quality.*

***Design**: eProvenance has assembled the technology and expertise to assure provenance by placing active RFID temperature sensors on cases or pallets of wine and compiling the resulting information about temperature conditions during shipping and storage in a comprehensive online database. The resulting data enables members of the wine distribution chain to make changes to improve the environmental conditions their wines encounter during transport and storage.*

***Findings and practical implications**: The temperature monitoring performed by eProvenance since 2007 demonstrates a wide range of shipment quality and an overall ignorance of the temperature fluctuations endured by a wine from producer to consumer. In addition, these results show the financial implications for cases of damaged wine, and conversely, the immense marketing potential for total quality, provenance assured wines.*

1. INTRODUCTION

Fine wine does not take kindly to overheating or freezing. Wine needs a cool, constant environment, yet is too often shipped around the world with less care than cartons of lettuce. Despite the great care winemakers devote to every step in the vineyards and winery, transport and storage conditions can ruin wine before it ever reaches the consumer. The topic of temperature conditions has always been elusive – the dark secret that everyone knew was lurking but no one wanted to discuss or address.

Over the last 200 years, there have been few changes in the way wine is shipped to market. One innovation was "Mise en bouteille au château," another the reefer container and reefer truck. However, the use of reefer containers varies widely: Approximately 50% of shipments from Bordeaux to Japan use reefers, whereas they are used for only 5% of shipments from Bordeaux to China. (source JF Hillebrand) More importantly, the reefer container covers only a portion of the wine's journey from producer to consumer. Very few efforts have been made to assure that the world's fine wine is delivered in the best conditions possible to the final consumer, using the "cold chain" practices common in the food and pharmaceutical industry. The cold chain assures that proper temperatures are maintained at every step of the journey and each participant in the distribution chain has a responsibility to uphold.

1.1. Changes in the Structure of the Wine Market

The evolution of a global wine market is relatively recent. Historically, wine traveled mostly from Bordeaux and Burgundy to the UK and Europe. In 2009, the world's vineyards produced 36 billion bottles of wine. 35% of the wine was drunk locally and quickly. 47% of the wine, or 17 billion bottles were stored and transported within domestic markets. 18% of the wine, or 6 billion bottles were exported from the world's wine producing countries, representing $23 billion dollars of wine. (Source: Australian Wine & Brandy Corporation)

1.2. What is happening to these wines in transit?

When exposed to temperatures above 30° Celsius for too long, on both domestic and international shipments, wine can be "cooked." According to eProvenance temperature measurements from 2007 to 2011, the percent of wine cases exceeding 30 degrees Celsius during shipment was 10.6 percent. More than 29.7% of wines were exposed to temperatures over 25°C. While less frequent, wines can also be damaged when exposed to temperatures below freezing, resulting in tartaric precipitations and even frozen bottles that can break. 17.12% of wine cases reached temperatures below 5 degrees Celsius as per eProvenance 2007 to 2011 measurements, and 3.42% reached below 0°C.

The temperature of fine wine sent from France to the US, UK, China, and Japan is typically stable during the ocean voyage but wide temperature fluctuations appeared both before and after. Air shipments are not necessarily better. While the hold of the airplane is fine, few air shipment channels are organized to maintain a cold chain during offloading, customs, and local transport. Cases shipped to Hong Kong recently via airfreight reached 35° Celsius. In the USA, FedEx and UPS are not fully organized to provide temperature-controlled chains for wine. Such services are provided for pharmaceuticals and temperature control may be provided for portions of the wine's journey (e.g. the hold of the airplane).

1.3. What problems result from these temperature fluctuations?

Unfortunately, the sturdiness of the glass wine bottle disguises the fragility of the organic contents. Independent research carried out by ETS Laboratories in St Helena in 2008 (financed by eProvenance), demonstrated that wine can be damaged by excessive heat before any signs of visible deterioration (leakage, corks pushing) can be discerned. Exposure to temperatures exceeding 30°C for a duration of 18

hours or more can significantly damage the wine's color, clarity, aromas and taste. A decrease in free sulfur dioxide also occurs, decreasing the wine's ability to age over time. The damage is not obvious, and is discernable only by tasting or chemical testing. Damage often remains undiscovered until years later, and often a "cooked wine" is not differentiated from a "corked wine." Consumers view it as bad wine, and simply do not re-purchase it, negatively affecting the value of the brand.

1.4. Who is responsible for this situation?

The wine industry involves a complex, multi-step distribution chain, and no one has responsibility for the entire process. Many players in this distribution system work on thin margins, and tend to avoid the "extra" expense of climate control. Some industry participants have stated they would rather not have the storage and shipping information, fearing economic consequences.

As much as $2.2 billion in wine experiences improper temperature conditions during transport and storage, but the industry cannot manage what it does not measure. While there is no systematic measuring or monitoring system in place across the distribution channel, ultimately we are all responsible for what happens to fine wine on its journey to the consumer.

We all care deeply about wine quality, and what happens to wine during transit and storage in global distribution channels is cause for serious concern.

2. ASYMMETRY BETWEEN CONSUMER DEMAND AND WHAT THE MARKET DELIVERS

The consumer is in the vulnerable position of having to put faith in the seller, so it is very important to buy from a trusted source. The consumer has virtually no access to any data on transport and storage conditions, and must depend only on the presence of physical evidence of damage such as leakage or corks pushing.

The topic of provenance has gained more and more attention over the last few years, notably from the press (refer to articles in appendices) and therefore also from the consumer. Consumers are eager to have as much information about where the wine came from and in what conditions. As specified by Ella Lister in the article "Liquid Assets,"[1] Provenance "encompasses the notions of pedigree, source, previous ownership, travel history and living conditions, for wine is a living thing that continues to develop and be affected by its surroundings."

Today's consumer is becoming increasingly concerned about the transport and storage conditions of wines. AND they are willing to pay top dollar for wines with excellent provenance, as evidenced by record-breaking auctions in Hong Kong and New York in 2010 and 2011 where the impeccable provenance of the wines was the major selling factor[2]. So why is the market so slow to respond to this consumer demand for better information and better conditions?

[1] Fine Wine Magazine, « Liquid Assets; Fine Wine Movements » by Ella Lister, Issue 30, 2010

[2] Bloomberg, « Bordeaux Wines Bust Price Records With High-Tech Radio ID Tags" by Ellen McCoy, Dec 6, 2010

3. THE EPROVENANCE SOLUTION

Working with leading wineries, importers, distributors and transporters, eProvenance helps create "cold chains" for fine wine, similar to those used to protect food and pharmaceuticals.

eProvenance applies advanced technology to monitor fine wines from producer (winery) to consumer. Our technology makes it possible to define and certify the first eProvenance *Fine Wine Cold Chain*™ systems. This high-tech solution is based on our patent-pending portable RFID temperature sensor, which measures and stores the temperature history of each case or pallet of wine.

Combining a passion for fine wine, entrepreneurial savvy and technology expertise, Eric Vogt founded eProvenance in 2007 to assure the provenance of fine wine. In 2009, the American-based company established a French subsidiary, directed by Bertrand Déchery, owner of two Premier Cru vineyards in Burgundy and a former Boston Consulting Group colleague of Eric Vogt.

3.1. Provenance Concerns:

- Storage temperatures of fine wine during shipment vary widely and are seldom monitored or recorded.
- Bottles and cases of fine wine sold at retail seldom have a verifiable pedigree, in terms of temperature conditions during their journey to retail.
- Wine consumers have had no way of verifying provenance, and no way of independently assuring the next buyer that the wine has been properly distributed through a high-quality *eProvenance Fine Wine Cold Chain*™.

3.2. eProvenance Solution

- A "pedigree" for every case of fine wine can be established using our RFID temperature sensor on each case to monitor and record temperature during transport and storage.

4. METHODOLOGY

The eProvenance system is a flexible and customizable solution that can be used and applied by all members of the wine distribution chain, be they producer, négociant, importer or retailer.

4.1. The eProvenance Technology:

- **eProvenance Sensors:** a password-protected RFID sensor attached to the case that can monitor the environmental conditions in transport, including temperature and humidity, over a period of days, months or years.
- **Handheld and desktop RFID Readers:** a dedicated eProvenance reader with the capacity to read the sensor data from outside the case and transmit the data to the eProvenance Online Monitoring System (OMS).
- **eProvenance Online Monitoring System (OMS):** a high-speed, password-protected database designed to receive information from the eProvenance sensors, then categorize and display both individual case temperature/humidity profiles, as well as summary statistics and reports by multiple dimensions.

An eProvenance Sensor is attached to each case or pallet of wine. This sensor measures the temperature several times a day and stores the information in memory for future analysis. The recorded temperature

data is read by an eProvenance reader and uploaded to the eProvenance *Online Monitoring System* (OMS) for easy and secure access.

With the goal of improving transport conditions and protecting the quality of fine wine, eProvenance helps its customers create Fine Wine Cold Chains across global distribution channels. eProvenance also assists its customers to differentiate and promote their superior levels of service as a competitive advantage.

eProvenance has established a straightforward three-step process to achieve a certified *eProvenance Fine Wine Cold Chain*™:

1. Audit Monitoring
2. Ongoing Monitoring
3. Marketing, Communication and Brand Differentiation

In Bordeaux and Burgundy, eProvenance has also initiated Provenance Collaboratives. These consortiums of Producers, Négociants, and Importers worldwide, seek to ensure that the fine wines of these producing regions arrive at the consumer in the same impeccable condition as when they started their journey at the winery.

5. EPROVENANCE RESULTS

Over the past four years, eProvenance has gathered over 650,000 temperature readings from shipments worldwide. Some shipments have been catastrophic, while others have been reassuringly impeccable (see Annex, Figure 1). Overall, our current statistics (January 2010) paint a clear picture for shipments from France to the rest of the world (see Annex, Figure 2).

Over the past eighteen months, the eProvenance System and resulting Feedback Reports provided more than enough evidence to begin changing the global distribution system for fine wine and led to the following actions:

- A high-quality Burgundy domain changed to a new transporter for shipments to Italy.
- A top-five London merchant changed how they unload containers in Hong Kong.
- A second London merchant discovered that their local delivery trucks in Japan were not turning on their cooling units. The flaw was corrected immediately.
- A leading shipper in Napa Valley changed distributors in Arizona and Texas.
- A Bordeaux négociant added 11,000 cubic meters of additional insulation to their main warehouse.
- A “cult wine” producer from Napa Valley discovered that 1% of their FedEx shipments had been exposed to extreme heat. They replaced the wine as a commitment to brand quality.

6. WHAT DOES THIS MEAN FOR THE QUALITY & VALUE OF FINE WINE?

How do these unstable and unfavorable conditions affect the fine wine market? What are the financial and logistical implications? How can we help improve the wine distribution system? When we look at the statistics for wine transport and storage, the wine industry is noticeably underperforming, and the amount of potential damage to wine in today’s distribution system is far from insignificant. The figures below estimate the potential financial damage as a result of poor transport and storage conditions in the fine wine industry based upon eProvenance statistics (see Annex, Figure 3).

However, the full cost of damaged wine has to be measured in terms of the loss of long-term market share when a customer tastes a damaged bottle and says, "*I guess I do not like this wine after all.*" This potential loss in market share and in customer satisfaction is practically immeasurable as there has been, until now, no existing feedback system that allows the wine industry to ASSURE that a wine has not been tainted by poor transport and storage conditions.

What we do know is that the value of provenance has long been established; when the Baroness Philippine de Rothschild released some wines from the Château Mouton Rothschild cellars to auction with Sotheby's in 2007, 99% of the lots were sold beyond their high estimates[1]. In a November 2010 New York auction, Bordeaux Winebank broke six world records on "5 Star Provenance" lots from the 2000 vintage because of document-based provenance records and temperature monitoring of the wines during all phases of transport[2]. These exceptional prices clearly demonstrate the value of impeccable provenance and storage conditions in the market of fine and rare wines, and the consumer's willingness to pay a premium for provenance.

We also know that impeccable distribution channels do exist already today, as the two examples below demonstrate (see Annex, Figure 4). By working with the wine industry's most innovative and quality oriented professionals, eProvenance is helping the industry provide fine wine consumers worldwide a guarantee of total wine quality.

We are currently working with leading Bordeaux châteaux and négociants, as well as estates in Burgundy, wineries in the Napa-Sonoma region, and leading wine merchants in London. Our goal is to help all the participants in the wine industry (vineyards, wine producers, négociants, shippers, importers, retailers) create an environment of cooperative and continuous improvement across global distribution channels, and establish *ePrevenance Fine Wine Cold Chain*™ systems for the safe storage and distribution of fine wine.

Several industry players are also considering an initiative with eProvenance to create a new "*Preferred Wine Distribution Channel*" that would guarantee proper temperature conditions and handling through transport and storage. This initiative is very intriguing for the trade as it presents a significant opportunity to leverage a marketing advantage and for the consumer, as it begins to guarantee provenance.

Monitoring and improving the conditions in the distribution channel presents a significant upside for all players in the fine wine industry. Five key areas of value created by the eProvenance system and services:

- **Quality Control and Feedback** during the entire journey of the case.
- A **Marketing Advantage** for importers and retailers.
- A Potential for **Higher Price Realization** for wines with assured provenance.
- **Higher Resale Value** for collections at auction.
- **Higher Quality** for the consumer.

1 Howard G Goldberg (2007), "Top Bordeaux Wines sold - First Growth Mouton Rothschild makes US$2m in New York," available at: http://www.bxwinex.com/Bordeaux_Wine_Tours_Blog/?p=87

2 Ellen McCoy, Dec 6, 2010, "Bordeaux Wines Bust Price Records With High-Tech Radio ID Tags", Bloomberg. Available at: http://www.bloomberg.com/news/2010-12-06/bordeaux-wines-bust-price-records-with-high-tech-radio-tags-elin-mccoy.html

Annexe

Figure 1:

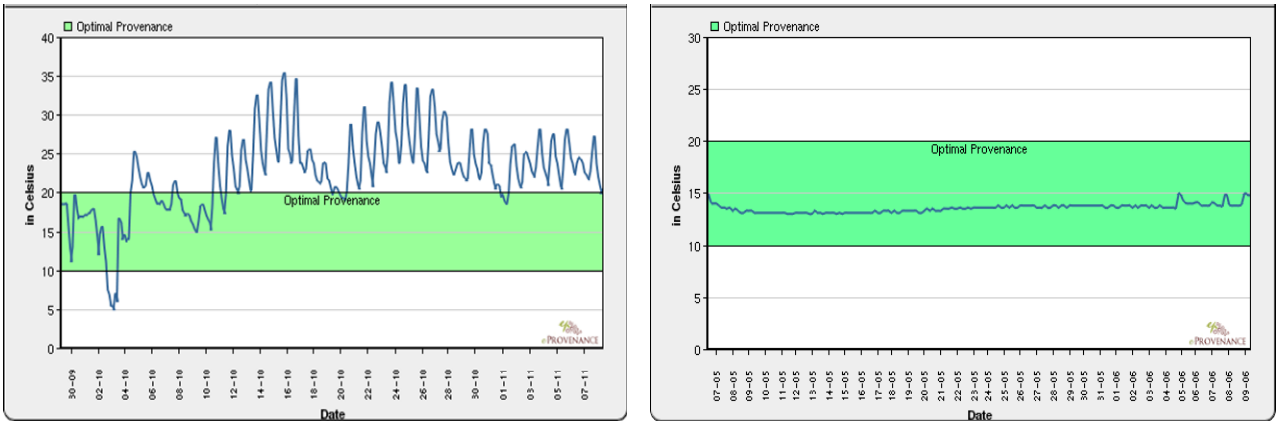

Figure 2:

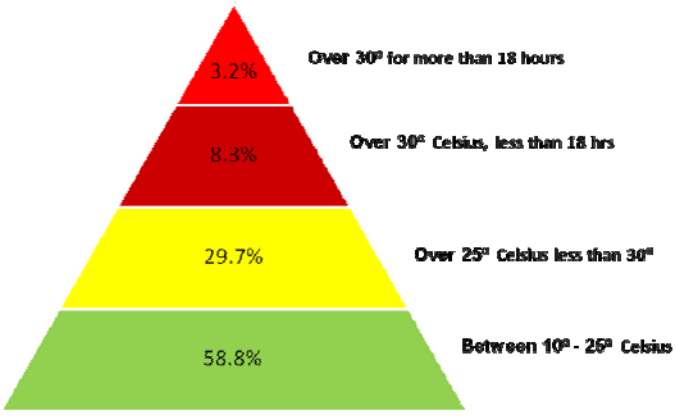

Figure 3:

Figure 4: