

Vienna 2019 Abstract Submission

Title

Brettanomics I: The Cost of Brettanomyces in California Wine Production

I want to submit an abstract for:

Conference Presentation

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Keywords

Wine faults, Brettanomyces, damage mitigation, cost, case study

Research Question

This paper combines information from diverse sources to develop an initial understanding of the economics of Brettanomyces (Brett) and alternative management practices to mitigate its consequences.

Methods

Analysis of detailed confidential data from three wineries in California to evaluate costs of resources to prevent, detect, and mitigate damage from Brett, supported by an online survey.

Results

Brettanomyces is expensive. Some wineries incur significant costs to reduce risk of Brett infection; others in treating infected wines, from wines being downgraded and devalued or dumped, and reputation effects.

Abstract

The yeast, *Brettanomyces bruxellensis* (Brett) is said to be the most significant cause of quality defects associated with wine spoilage. At least some wine producers spend significant resources to prevent, detect, and mitigate damage from Brett, and many express concern about it; but some producers and consumers say they like it in small doses. Brett damage is especially of concern in premium red wine, and has become more of a concern to producers in recent years as consumers have become better informed about it.

This paper—the first study of the economics of Brettanomyces in wine—combines information from diverse sources to develop an initial understanding of the economics of Brettanomyces and alternative management practices to mitigate its consequences. Our analysis of detailed confidential data from three wineries in California, reveals that

at least some wineries are incurring very significant costs to reduce the risk of infection with *Brettanomyces*. Some other wineries that opt not to spend so much on prevention are incurring very high costs in treating infected wines and in lost value from wines being downgraded to lower-valued blends.

Our study of *Brettanomyces* exemplifies a broader set of issues. Improvements in technology of winemaking over the past 20 years and more have significantly reduced the incidence of various faults in wine. At the same time, however, the wine-consuming public and wine experts are better educated about these faults and better at spotting them. Since even advanced winemaking still uses traditional methods and materials, the risk of these flaws remains a threat.

Economically important faults are associated with the presence of excessive amounts of particular odor-active chemical compounds including those associated with cork taint (2, 4, 6, Trichloroanisole or TCA), oxidation (mainly ethanol), volatile acidity (mainly acetic acid), and ethylphenols, generated by *Brettanomyces bruxellensis* (4-ethylphenol and 4-ethylguaiacol). At low concentrations these chemicals might not be discernible, or not a bother, and in some instances some amount may even be desired by some consumers. A fault, then, reflects an excessive amount of these compounds relative to that desired by the winemaker, the quantity that will maximize the value of the wine in question. In turn this depends on consumer preferences and perceptions. However, consumers' perceptions of a particular fault differ by wine variety, winemaking style, bottle price, personal experience, and so on, making the winemaker's optimization problem more complicated. Winemakers use various methods to manage these potential faults.

In this paper we estimate the costs of *Brettanomyces* in wine produced in California under alternative management regimes. As well as being of specific interest, this work serves as a case study exemplifying the more general issue of the costs of wine faults and the benefits from precision winemaking technology that reduces the incidence of those faults and their costs.

The analysis of this paper uses detailed (confidential) data from wineries in California to document the consequences of *Brettanomyces* for the economics of wine production using typical current technology, depending on the prevalence of the problem; the costs of preventive measures, detection and treatment; and the costs of mitigation in terms of the loss in value of wine that has to be downgraded. The three case-study wineries are all located in California's northern coastal valleys (i.e., Napa and Sonoma), known for their production of premium red wines. This is a context in which *Brettanomyces* is likely to be comparatively important to producers because of the extensive use of oak barrels, which is a source of infection, and the high value of the wine being produced, which determines the cost of wine spoilage.

Our analysis at the level of individual wineries explores the determinants of the costs including (a) the frequency of testing of individual lots of wine and the sampling strategy employed, (b) the scale of the winery in terms of total value and volume of wine being produced, (c) the type(s) of wine being produced (different varieties and styles being more or less susceptible), (d) the prevalence of the problem in the winery currently (which might not be known) and in the past (which may be known), and (e) the potential value per unit of the wine, which affects the scale of the loss from being downgraded).

We draw on the results from an online survey of industry participants to extrapolate from our analysis of winery-specific data. The survey was designed such that a range of industry professionals—winery owners, winemakers, enologists, cellar staff, and others—could participate. The online survey was shared with numerous wineries and promoted at the American Society for Enology and Viticulture (ASEV) National Annual Conference in Monterey, CA, and the link to the survey was distributed to all ASEV members. We collected responses from 181 individuals, representing a wide range of wineries from around the globe. The survey yielded information about the respondents' overall attitude to Brett, the costs incurred by wineries attributable to Brett, and the degree to which wineries control for Brett and the methods they use to do so, by winery size, location, and product price range.

In addition to exploring these micro-level differences, we extrapolate from our analysis of winery-specific data to infer a value for the costs of *Brettanomyces* to the California wine industry as a whole, drawing on the survey results and less formal discussions with wine producers, including anecdotes about specific instances of Brett problems causing substantial wine losses and reputation effects that extend across brands within a winery to other

producers within the same region.

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