



ASEV 2018 Extension Distinction Award

69th National Conference • Monterey, California • Extension Distinction Award Presentation

Engaging Industry as Citizen Scientists to Address Fundamental Production Issues

Patty Skinkis, PhD, Viticulture Extension Specialist and Associate Professor, OSU



I am pleased and honored to receive this award. Extension is something I have always wanted to do. Some people wish for fame and glory in their careers, but for me—I just wanted to help people, and more importantly, help people with their livelihood. It gives me great pleasure to share with you

my career path into Extension and how that led to my integrated research and Extension program designed to address industry production issues.

My story starts on a dairy farm outside of Green Bay, Wisconsin. I grew up working on the family farm where I learned first-hand what it meant to be a family-owned business. We were 100% family run; it was my parents' full-time job, and we did not, like many at the time, supplement with outside income. My siblings and I each had a part in working on the farm, even at a young age. What I learned in that process was how important it was to figure out how to make things work. It is not always the easy way or the fun way, but there is always a way. I learned that farming is not easy, but it is something you do. My grandfathers made a good living as dairy farmers, but my parents were not so lucky. Farming in the 1980s was difficult; it was hard to make ends meet when milk prices were at an all-time low. One had to grow their dairy farm significantly and move toward the factory farm model to become profitable, and this was something my parents vehemently opposed. They were small and wanted to focus on quality.

I grew up with an awareness of Extension, as it was a critical resource for dairy farmers who needed to know what was possible when working at the margins of profitability. My dad had stacks of trade journals such as *Hay & Forage*, *Hoard's Dairymen*, and *Dairy Herd*. I remember reading articles by Extension agents who

were providing practical information to help producers. I admired the fact that someone was reading those articles, taking that advice, and applying it to their business in order to make the farm more profitable. That admiration fueled my interest in pursuing a career in Extension where I could do research and outreach to serve farmers.

My undergraduate studies took me away from the dairy industry and into the "exotic" world of horticulture. I determined early in my college career that I wanted to work in production agriculture and began focusing on vegetable and fruit crops. My first internship with the University of Wisconsin Extension in my home county exposed me to public horticulture. I dealt with general gardening questions and training for a community garden project. I quickly learned that community horticulture was not for me—I was more interested in helping farmers manage their production risk than in diagnosing a single sick plant for a local gardener. My second internship with the University of Wisconsin Peninsular Ag Research Station exposed me to tree fruit research. There was a small grape variety trial at the station, and the challenges of producing grapes in the Midwest intrigued me. Therefore, I decided to pursue the challenges faced by Midwestern grapegrowers and worked on a PhD degree at Purdue University under Dr. Bruce Bordelon. My thesis research focused on canopy management of Traminette, an interspecific winegrape new to the Midwest.

Immediately after finishing my PhD program, I began my position as Viticulture Extension Specialist at Oregon State University. When I came to Oregon, the industry was rapidly expanding, and there was a significant need for outreach and applied research. There were already people doing good research in Oregon, but the industry needed the connection to the research that they had been missing for years. This was my opportunity to begin the integration of research with Extension and build upon the "transformational university."

The transformational educational model (Blewett et al. 2008) challenges Extension to consider our academic strengths in outreach and focus on adoption in a community. As academics, we do most of our work in content generation. While generating content takes work, there is substantially more work required to transmit that content to the end user and facilitate the process by which to enact change or adoption. Achieving transformational education (adoption) requires the significant effort of integrating content transmission *and* facilitation within the communities we serve. There are six components of achieving transformational education: complex issue, community, capacity, experimentation, evaluation, and success. This model is best applied to a multi-faceted **complex issue**—something that has impact industry-wide. A **community** is also required (the winegrape industry). **Capacity** is defined by who is available to you to address the issue. We have a cadre of research and Extension faculty in Oregon who can gather to address an issue. **Experimentation** is required to obtain the data required to elicit change. **Evaluation** is critical to obtain feedback, make modifications, and ultimately lead to **success** (adoption).

I applied this transformational education model to Oregon's complex issue—quality. Researchers and producers alike are required to address quality in Oregon, given the luxury-tier production focus. Quality demands have significant cost in vineyard production, and producers are uncertain how to change vineyard practices without compromising quality. The single-most common quality parameter in Oregon is yield. The yield-quality focus is evident in historical yield data from 1990 to 2016 (range 1.5 to 2.5 tons/acre). The 26-year average for Pinot noir yield is 2.2 tons/acre, which is achieved by cluster thinning 25-50%. Back in 1990, vineyards had lower vine densities and were likely achieving 2 tons/acre without crop thinning. By the year 2000, vineyard densities had nearly doubled, but reported yields remained the same. This was undoubtedly due to increases in cluster thinning. Based on information from an industry survey in 2012, the majority of vineyards reduce crop level in order to achieve ripeness in our cool climate. The majority are thinning 25-50% of the crop, and this comes at significant cost (\$700-800/acre in more than one pass). Despite differences in cultivar and region in Oregon, the majority of industry reported yield targets of 2-2.5 tons/acre. Surely, yield management could be improved by assessing individual vineyard merits?

I began designing crop-thinning research trials in 2008 to explore the yield-quality paradigm in small-scale research trials. I did so quietly because fellow researchers warned me that the industry would not be receptive of these sorts of trials, in part because of the demand for quality and the growing season limitations. The first trials

began in 2010, at the peak of the economic recession, when industry had to cut costs and increase yields to improve farm economics. We conducted replicated trials in the Willamette Valley and southern Oregon to address timing and intensity of crop thinning Pinot noir. As I shared those research results with industry during the years that followed, they were not convinced of the results because the vineyards were not similar to their vineyards and/or wines were not made on a commercial scale.

I took this opportunity to enlist a broader range of industry collaborators who would join in a research project to explore the impacts of yield in vineyards across the region. A small industry group had already conducted a non-scientific based study in the late 1990s that showed that they could increase yield without compromising quality. They were eager to take a strategic approach to the study and have discernable data. We collaborated as an advisory group to expand upon my prior work and developed the *Statewide Crop Load Project*. We enlisted vineyard cooperators who would carry out the project directly in their vineyards, collect the data, and make the wines at a commercial scale to their quality standards at their wineries. We bypassed analytics and went straight to sensory because that is how winemakers make their blending decisions and quality distinctions (bottle price, production tier). I also enlisted a team of researchers, including James Osborne (Extension enologist) to help with the winemaking protocols, Elizabeth Tomasino (sensory scientist) to conduct wine sensory evaluation, Paul Schreiner, plant physiologist to help explore long-term impacts on vine nutrition, and a statistician, Katie McLaughlin, to help with the multiyear, multisite data set. As a team, we set out to develop better yield management guidelines. Together, we worked with an advisory group that was in place two years prior to the onset of the project to determine whether this project would work. The overall objective was to determine improved yield management guidelines to achieve both quality and sound production economics.

The first goal was to determine whether we could effectively engage industry as citizen scientists. Being a long-term project (10 years) involving many vineyards to address vintage and site variability, the project had to be conducted efficiently and in a cost-effective way. Each producer set up their own trials and was responsible for collecting the data. It was critical to have industry engaged directly to help them see the impacts firsthand in their vineyards and wineries. Although I am not the first to study crop-thinning impacts in the vineyard, this was our chance to see how we could facilitate adoption through research. Experimentation with crop levels was a key part of this project, so we collected vineyard data, climate data, and wine sensory results to help us develop a robust data set from which to develop yield management guidelines

that would be suited to different production goals, recognizing that not all producers target the same product tiers.

Industry participants have been the key to this project's success. Since 2012, we have engaged 23 companies across five counties and six AVAs in western Oregon. The majority of producers have been with us for at least three years and five have been with us for seven years. The project was replicated in each vineyard, and training was provided for growers for experimental design set-up and data collection. Producers compared two or more crop levels in their vineyards, and data collection was limited to the most important information capture, including fruitfulness in spring (clusters/shoot), lag phase cluster counts and weights to understand crop estimation, tissue nutrient samples (petioles and leaf blades at veraison), fruit composition at harvest, and ripening curve up to harvest. We also monitored air temperature, calculated GDD, and had growers submit phenology reports. Wines were produced at 1.5-ton lots per crop level, bottled, and aged two years prior to sensory analysis.

The company involvement spread to staff on multiple levels, often exposing some of them to research and the university/Extension for the first time. This gave them a sense of pride to be involved in something bigger than their one vineyard or winery. Collaborators got a sense of the contribution of their individual studies during our annual collaborator meetings where we share results across the research team. We gathered all summary data, anonymized the results, and walked through the data with the industry team to discuss our findings. Participants see all of the data, which helps foster understanding between the quantitative data and their vineyard and winery observations.

Results of the six years have shown that crop thinning inconsistently affects fruit composition and wine sensory perception. Collaborators are often surprised that there is so little (or no) difference in the fruit composition numbers at harvest. We find the same to be true for wine sensory. There has not been any relationship between yield and wine sensory perception when analyzing within a winery or across all wineries. There are greater differences by vintage year and company than by crop level. There is no difference in vine size (pruning weights) or nutrient status, and this suggests that we have not reached over-cropping stress. However, when we combined all of the vineyard sites and all years, we found some yield-quality relationships. However, regressions that were statistically significant were often practically insignificant, indicating that greater yield advances beyond our production capabilities would be required to have an appreciable fruit and wine quality impact. Likewise, descriptive analysis of four vintages to date

indicate that yield does not relate to sensory qualities, even within a given producer.

The numbers told us what was happening quantitatively, but we wanted to know what the collaborators were observing during the research process. We conducted surveys followed by interviews to determine what they were seeing in the vineyard and/or winery, what they had learned from it, and to learn about any production changes. They recognized that there is higher yield-to-quality potential than they had ever expected. However, the highest crop level was likely not the best. We experienced some of our highest crop levels on record during this project, which provides us with an interesting perspective into the yield-quality paradigm. However, there was no visual impact on vine size even though some vineyards had full crop for six years. Some collaborating vineyard managers reported frustration with their winemakers who preferred lower crop levels despite the fact there was no difference in the data. To address this, we are comparing quantitative data with observations and perceptions. We learned that we did a great job in reaching and working with viticulturists, as they are our most astute collaborators. The viticulturists were typically the staff who encouraged companies to join the project, as they were motivated by their convictions that low yields do not ensure quality. Winemakers came along with the project out of necessity to make the wines. For some companies, this connection was natural, while others have had somewhat of an internal battle to participate fully. However, we are doing what we can to encourage winemakers to take a more active role in the research and observe the combination of data and the wines for themselves.

One collaborator wrote in their survey, "This was a great help, to come to this conclusion...we have wrestled for 25 years with the dilemma of excess vigor in an environment of low yields equals high quality ideology." This producer was in the project for three years and was convinced, writing further that by being part of the project, he didn't think he learned something, he *knew* he learned something.

We are still in the experimentation and evaluation stages with several years of field data collection left. However, we have proven that we can successfully engage industry into research to tackle complex issues. It is important to include them in the process upfront, listen, and work together to develop a process that is mindful of project goals and industry production schedules. Industry partners can come through with good data and contribute to a robust data set. We had strong collaborator follow-through, and there has been adoption of increased yields beyond experimental blocks at an average of 25% (~0.5 ton/acre increase). We have seen the multiplier

effect, with industry learning from their colleagues and contributing to the greater good of the industry. It is clear that quality is not driven by yield, and some vineyards can do exceptionally well with greater yields. However, our work is not yet done. We are continuing with in-house wine sensory evaluation in addition to our expert panels. We are working on ways to better integrate winemakers into the research to address the complex issue from the vineyard to winery to market.

This work would not be possible without the 25 industry collaborators...their encouragement...their

participation, and their ownership of the process. I feel we have accomplished our goal of engagement when I hear collaborators talking about the project as “ours.” I truly believe that nothing good is accomplished without teamwork, and I cannot leave today without bringing up a Green Bay Packer quote:

“People who work together will win, whether it be against complex football defenses or the problems of modern society.” –*Vince Lombardi*