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International Analysis of the Profitability of Wine Grape Production

Kathrin Strohm
Thünen-Institute of Farm Economics, Germany
(Kathrin.Strohm@ti.bund.de)

Walter Dirksmeyer
Thünen-Institute of Farm Economics, Germany
(Walter.Dirksmeyer@ti.bund.de)

Hildegard Garming
Thünen-Institute of Farm Economics, Germany
(Hildegard.Garming@ti.bund.de)

Abstract

◦*Purpose: Wine production worldwide has changed over the past decades. The production of traditional wine countries in Europe such as France and Italy as well as in Argentina has stagnated or decreased. Contrary Spain, the USA, China, Chile, Australia and New Zealand as well as South Africa increased their supply. In total overall wine production and trade increased. Therefore, international comparisons of competitiveness and profitability of wine grape production are of great interest to growers, processors, traders and also political decision makers. For this reason the objective of this paper is to identify the different systems of wine grape production in internationally important growing regions, their profitability, the driving forces behind and their perspectives.*

◦*Design/methodology/approach: Standardized methods using the typical farm approach are applied. Typical wine farms are established by partners of the agri benchmark network, drawing on the expertise of farm advisors and farmer groups and complemented with available statistics. A typical farm represents a vineyard in a specific region with its regionally typical size, structure, production and marketing systems. It includes physical-technical and economic parameters to calculate cost of production, gross margin, profitability and productivities, among others. Once established, the data are updated annually to reflect changes in input and output prices and in production technologies.*

◦*Findings: The presented results so far cover 11 different production regions in Europe, South Africa and Australia. The network aims at expanding coverage to include all interested and relevant wine growing regions of the world.*

Key words: typical farm, cost of wine grape production, profitability, competitiveness, *agri benchmark*

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1. INTRODUCTION

Wine production worldwide has changed over the past decades. Although global production has remained rather stable since the 1990ies, the statistics show major shifts in producing countries (FAOstat, 2014). Further, the wine sector has undergone a rapid globalization. This is in particular shown in the growing share of global wine production volumes being traded and the countries of the New World becoming more important players (Anderson and Nelgen, 2011).

The competitiveness of different countries in an agricultural sub-sector such as wine production depends on a number of factors, including infrastructure for processing, transport and marketing, value chain organization as well as the legal, financial and institutional framework. However, as for other agricultural crops, the production conditions due to climate, soil and farm structures differ widely between the wine producing countries. Hence, the profitability of different production systems is a particularly important factor for the international competitiveness of wine and wine grape production respectively. The benchmarking of production systems based on the costs of production is of interest for producers and other stakeholders of the value chain as well as policy makers in order to identify potential areas for improvement.

This paper presents a network approach for the international comparison of profitability in the wine grape production, based on the analysis of typical farms. In particular we are comparing the production of grapes which will be further processed into quality bulk wine that is comparable and internationally traded. First, an overview of global trends in wine grape production and trade is presented. In the following section, the methods are presented, which are applied in a standardized procedure in order to ensure comparability of results for all participating countries. In the fourth section, first results of the recently established *agri benchmark* network are presented and discussed. Finally, conclusions are drawn on the relevance of benchmarking results and benefits of expanding the network to include more countries are discussed.

2. GLOBAL TRENDS IN WINE PRODUCTION AND TRADE

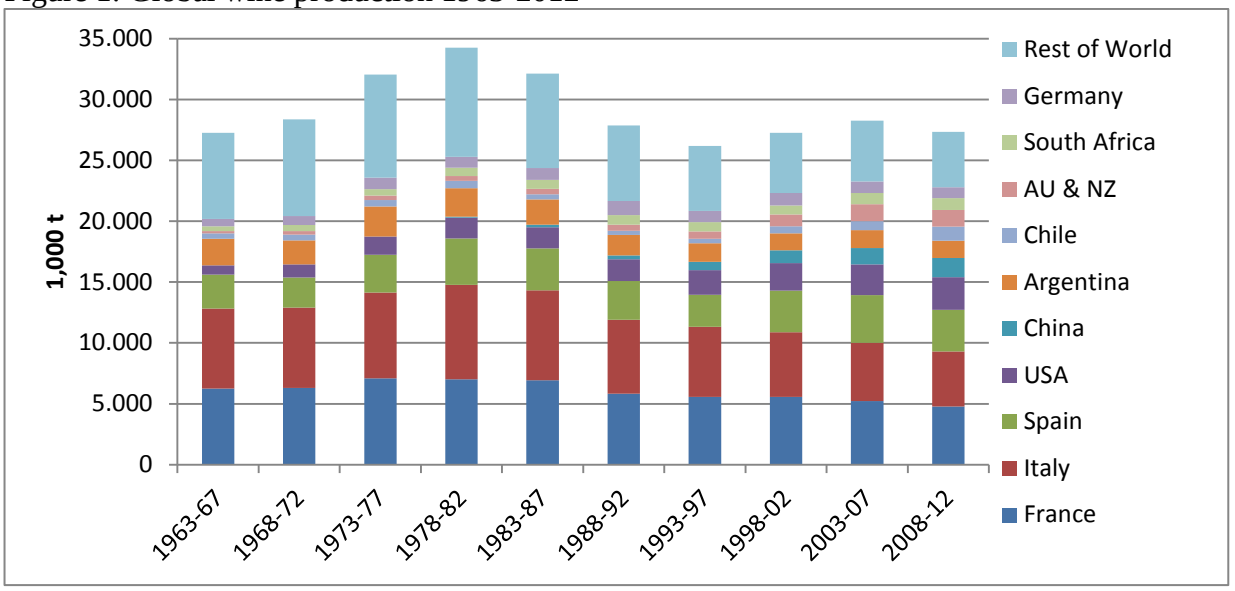
A first overview of global wine production can be found in the databases of FAOstat, where wine production data are available from 1963 onwards (FAOstat, 2014). Over the past 50 years, global wine production increased from about 27 million tonnes in the beginning of the 1960s until the early 1980s with peaks of up to 35-37 million tonnes of wine annually (see Figure 1). During the last 20 years however, global production reduced again to about the initial level and averaged between 25 and 30 million tonnes per year.

Since the 1960s the three major producers France, Italy and Spain have been dominating the global wine production, together accounting for 47-57 % of global production. However, Figure 1 and Table 1 reveal that over time the production volumes and also relative production shares in France and Italy diminished. During the mentioned period France and Italy reduced their production from 6-7 million tonnes annually (each 22-24 %) to less than 5 million tonnes (17 %). Contrary, Spain managed to increase its production to more than 3 million tonnes, now representing about 13 % of global production.

The USA more than tripled its wine production and continuously increased its market share from 3 % to 10 %. China's wine production was recorded for the first time in 1978. During the last years it reached more than 1.5 million tonnes. Thus, it now accounts for 6 % of global wine production, thus ranking 5th in total production. While Chile could augment its production to more than 1 million tonne, Argentina's production dropped by one third to less than 1.5 million. Even though the production of Australia and New Zealand grew almost eightfold, and South Africa's more than doubled, their wine production amounts to only around 1 million

tonne each and thus reach a share of 4-5 % globally. Over the last decades Germany's production has been fluctuating between 0.9 and 1 million tonnes.
The data shows that traditional wine producing countries have manifested their position although new countries outside Europe became more important. In this way the wine production of other countries in the rest of the world reduced from 26 % to 17 % and the sector became more concentrated.

Figure 1: Global wine production 1963-2012



Source: 5 year averages based on FAOstat 2014, correction made for Germany in 2012.

Table 1: Relative shares in global wine production between 1963 and 2012

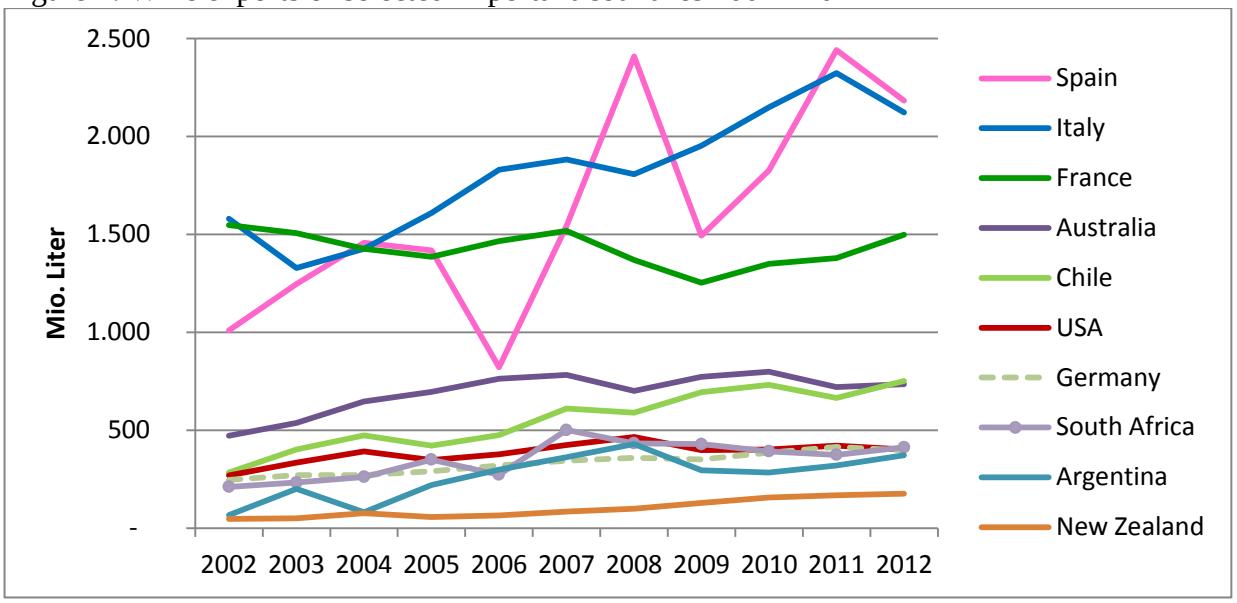
	63-67	68-72	73-77	78-82	83-87	88-92	93-97	98-02	03-07	08-12
France	**23%**	22%	22%	20%	22%	21%	21%	20%	18%	17%
Italy	**24%**	23%	22%	23%	23%	22%	22%	20%	17%	17%
Spain	10%	9%	10%	11%	11%	11%	10%	**12%**	**14%**	**12%**
USA	3%	4%	5%	5%	5%	6%	8%	8%	9%	**10%**
China	0%	0%	0%	0%	1%	1%	3%	4%	5%	**6%**
Argentina	**8%**	**7%**	**8%**	7%	6%	6%	6%	5%	5%	5%
Chile	2%	2%	2%	2%	1%	1%	1%	2%	3%	**4%**
AU & NZ	1%	1%	1%	1%	1%	2%	2%	4%	5%	**5%**
South Africa	1%	2%	2%	2%	2%	3%	3%	3%	3%	**4%**
Germany	2%	3%	3%	3%	3%	4%	3%	4%	3%	3%
Rest of World	**26%**	28%	26%	26%	24%	22%	20%	18%	18%	17%

Source: 5 year averages based on FAOstat 2014.

Corresponding to the shifts between countries in wine production, also international trade has changed in the past. Analysis of UN Comtrade data reveals that worldwide both, wine exports and imports, increased during the last decade (see Figure 2; Anderson and Nelgen, 2011).
The three major wine producers France, Italy and Spain are at the same time the largest wine exporters with volumes fluctuating between 1 and 2.5 million litres. As their imports are rather limited, all show a positive trade balance. Although the wine consumption in New World countries is partially growing, it is still at a rather low level and thus enabling countries such as Chile, Australia, New Zealand and South Africa to export 50-70 % of their national wine

production (Anderson and Nelgen, 2011).

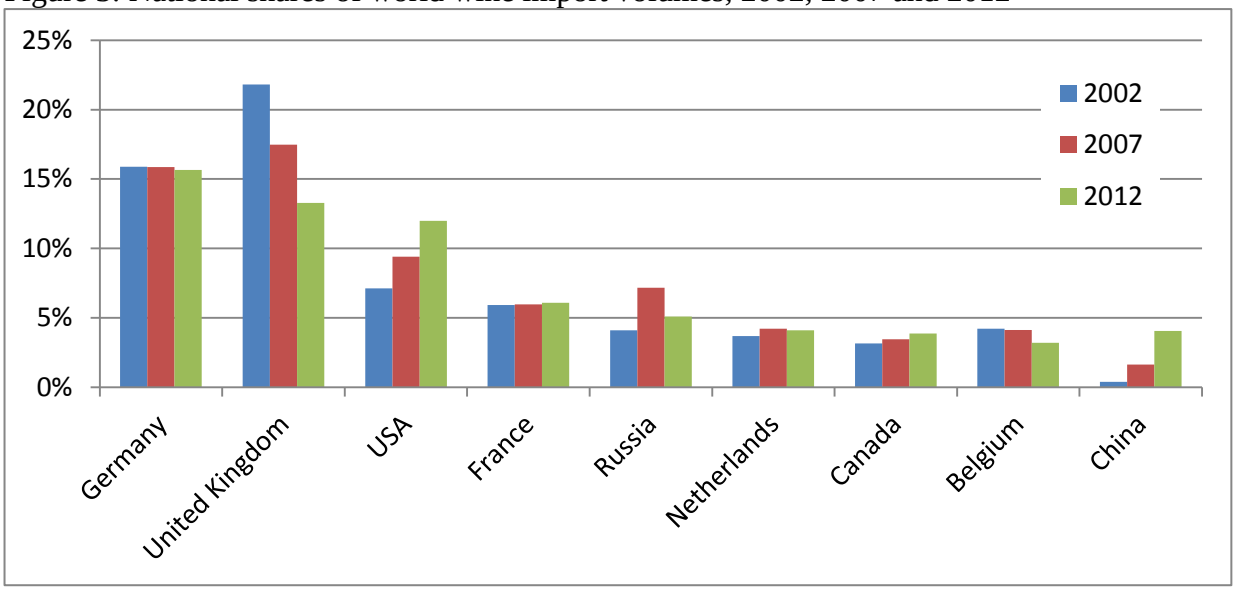
Figure 2: Wine exports of selected important countries 2002 - 2012



Source: UNComtrade 2014, wine of fresh grapes including fortified wine, exports to world.

Only nine countries together import two thirds of the globally traded wine volumes (see Figure 3). Though Germany, USA and France all produce wine in large quantities, at the same time they import relevant wine volumes in order to satisfy their large national consumptions. Russia and China are the two only non-OECD countries in that group of important wine importers. Both countries possess of a growing middle and upper class which fosters a growing wine demand. In 2012, China imported almost 400 million liters of wine, which is 13 times more than 10 years ago.

Figure 3: National shares of world wine import volumes, 2002, 2007 and 2012



Source: own analysis based on UNComtrade 2014, wine of fresh grapes including fortified wine, national imports from world.

In order to understand and explain these shifts at the level of the national wine sector, in the following sections, the profitability of wine grape production at farm level is addressed in a comprehensive approach.

3. TYPICAL FARM APPROACH

The costs of production at farm level are a basic indicator for comparing the competitiveness and profitability between production regions and countries. Though information on costs of production of wine grapes may be available in different countries (for example Shaffer and White, 2006), an international comparison is not possible, if cost estimates are based on different methodologies or even different reference years (Isermeyer, 2012). Therefore, in the *agri benchmark* network, standardized methods are applied for data collection and analysis in order to establish an internationally harmonized database. The data collection procedure is based on the typical farm approach.

A typical farm is a farm model representing the prevailing type of a farm in a certain region with regards to farm type, size, enterprise combination, resource endowment and production system (Hemme, 2000). The typical farms are established based on the analysis of a range of data sources, such as farm accountancy networks, official statistics, technical publications, regional databases and expert knowledge of advisors and researchers. Once the first blueprint of a farm model, typical for the selected region, is defined, it is discussed, adapted and validated in panel sessions (= focus group discussions) with regional farmers, advisors and scientists (Deblitz and Zimmer, 2005). Thus, typical farms are modelled farms but based on data and experiences of real existing farms. The calculation of economic performance indicators for a typical farm provides the basis to assess and compare the cost structure of different production systems and regions.

Table 2: Typical farm vs. average and individual farm data

Characteristics	**Individual Farm Data**	**Average Farm Data (surveys)**	**Typical Farm**
Representativeness	-	+	+/-
Consistency of the data set	+	-	+
Quantity structure	+	-	+
Data availability	+	+/-	+
Up-to-date data	+	-	+
Data confidentiality	-	+	+
Feasibility of data collection	+	-	+
Cost of data collection	+/-	+/-	+

+ = strength of sample method, - = weakness of sample method.
Source: Deblitz, 2010.

Following Deblitz (2010) compared to other methods of data collection, typical farms possess the advantages of an individual farm specific analysis such as consistency of the data set, quantity structure of in- and outputs and up-dated information without the drawback of confidentiality concerns when using individual farm data (see Table 2). However, although statistics are used in the setup and definition in order to capture a major part of production,

typical farms are not representative in a statistical sense, like e.g. average farms based on survey data. However, datasets from surveys often are not consistent and do not allow to construct the production system with its quantity structure. Farm surveys are very costly and hence rarely up-dated regularly, while typical farms are a cost efficient method of data collection. Regular up-dating through farm advisors and farmer panels is inexpensive.

In the *agri benchmark* network, the typical farm approach is implemented in collaboration with network partners such as research institutes and farm advisors in the respective production regions (Garming and Bravin, 2014). Wine grape production systems can be extremely heterogeneous even within a defined region, depending on target market and specialized qualities. Therefore, the benchmarking of wine grape production so far focusses on grape production for a defined and comparable bulk wine quality, which has a major share in internationally traded wines.

A typical wine grape farm is modelled as specialized farm, which should be large enough to sustain at least one full-time laborer. If diversified farms with other crops are typical for the production region, only wine grape production is modelled in detail and shared farm resources are considered corresponding to their utilization for wine grapes. The analysis is carried out variety-specific, i.e. each grape variety is considered as separate crop for cost allocation. This allows accounting for variety specific prices for vines, yields, differences in crop management as well as in output prices. Also, different age phases, particularly the establishment phase of the vineyard are taken into account by allocating a share of production area to renewal of vineyards, thus reflecting the regionally typical average age structure of the varieties and their utilization periods.
Given that data is collected at a very detailed, crop and age specific level any kind of economic indicator can be computed for the entire farm, per hectare, per tonne or for specific varieties. Common outputs of the analyses are input costs, yield levels, product prices, productivities, revenues, gross margins and profits among others. Any kind of economically relevant key figure may be extracted from this farm level analysis of typical farms.

4. RESULTS

The *agri benchmark* network so far covers 11 different wine production regions in six countries in Europe, South Africa and Australia (Table 3). In most participating countries two typical farms have been established, in Germany so far only one and in Spain even three. The size of the typical farms ranges between 5 ha in the Italian Emilia Romagna and 130 ha in the La Mancha region of Spain. The cultivated vine varieties are very divers and include both international (Cabernet Sauvignon, Shiraz, Merlot, Chardonnay) as well as local varieties such as Carignan in France, Riesling in Germany, Sangiovese and Prosecco in Italy, Tempranillo and Airen in Spain as well as Chenin Blanc in South Africa. Out of the 12 farms established so far, 10 farms produce wine grapes and sell them to cooperatives or other buyers, mainly under contract or on the spot market. The remaining 2 farms further process the wine grapes on farm into bulk wine (FR20L) and packaged wine (IT10V). However wine making is not considered in the analysis.
The presented analyses of the typical farm cost structure and profitability are calculated as farm averages across all vine varieties and also all age phases, comprising newly established vineyards without any harvest, vineyards growing up and full-bearing vineyards. The reference year, if not mentioned otherwise, is 2011 which means the grape harvest in the year 2011 both on the northern and southern hemisphere.

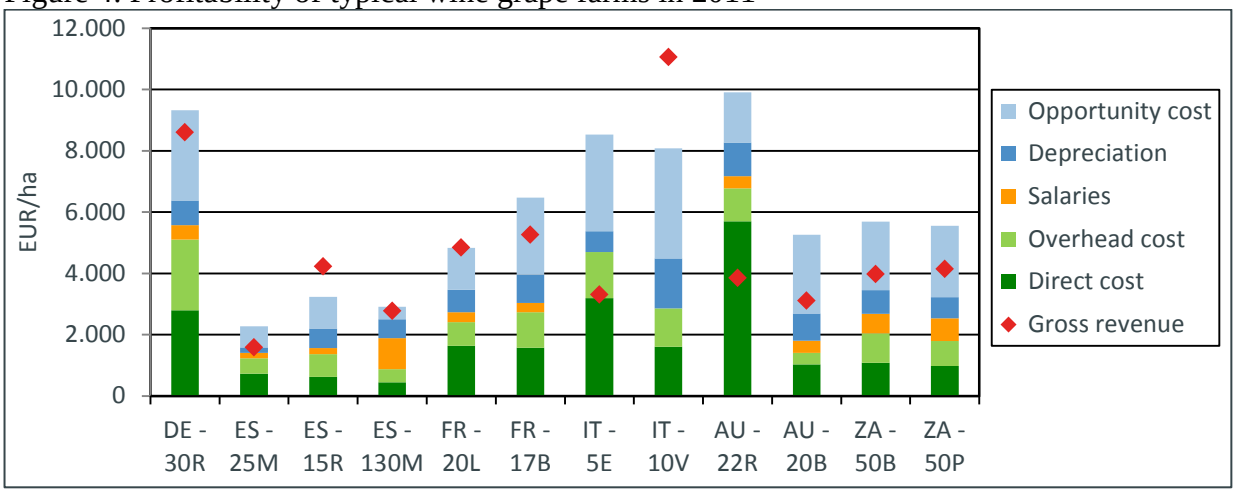
Table 3: Overview of the typical wine grape farms

	Country	Region	Farm name	ha	total yield 2011, t	3 top varieties
Europe	Germany	Rheinhessen	DE30R	30	349	Müller Thurgau, Riesling, Dornfelder
	Spain	La Mancha	ES25M	25	173	Tempranillo, Airen
		Rioja	ES15R	15	98	Tempranillo
		La Mancha	ES130M	130	1,316	Tempranillo, Shiraz, Merlot
	France	Languedoc	FRL20	20	184	Shiraz, Merlot, Carignan
		Bordeaux	FR17B	17	123	Merlot, Cabernet S. + F.
	Italy	Emilia Romagna	IT5E	5	38	Sangiovese
		Veneto	IT10V	10	151	Prosecco, Pinot Grigio, Cabernet S.
Outside EU	Australia	SA – Riverlands	AU22R	22	415	Chardonnay, Shiraz, Cabernet S.
		SA – Barossa	AU20B	20	103.5	Chardonnay, Shiraz, Cabernet S.
	South Africa	Breedekloof	AU50B	50	923	Chenin Blanc, Colombar, Shiraz
		Paarl	AU50P	50	558	Chenin Blanc, Cabernet S., Shiraz

Source: *agri benchmark* 2014.

Overall profitability of wine grape production has been rather low for the typical farms (Figure 4). The total production costs are very variable across the countries and even between the different regions within a country. While the three Spanish farms produce at lowest costs between 2,300 and 3,200 EUR/ha, the most expensive grape producers, i.e. Italy, Australia and Germany, reach costs between 8.000 and 9.900 EUR/ha.

Figure 4: Profitability of typical wine grape farms in 2011



Source: *agri benchmark* 2014.

Only one Italian (IT10V) and one Spanish (ES15R) farm cover their total cost of production, including opportunity costs, and thus generate a profit from wine grape production in 2011. However, almost all farms cover their cash costs (direct and overhead costs, salaries and depreciation) and at least a part of their opportunity costs. For the Italian farm in Emilia Romagna prices were particularly low with about 380 EUR/t for its only grape variety, Sangiovese. At the same time direct cost are high, driven by the highest pesticide costs (see Figure 7), and thus this typical farm only covers its direct costs in 2011.

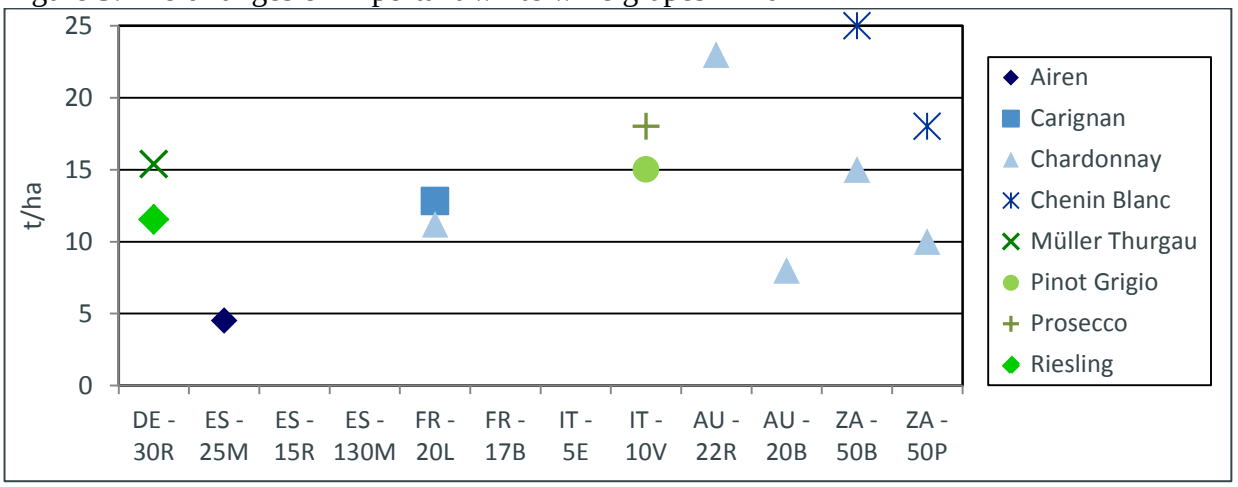
The other typical farm with very high economic losses in 2011 is the irrigated Australian farm AU22R, which is situated in the Riverlands. The second Australian farm AU20B is located in a different water catchment. Between 2006 and 2011, the Riverlands experienced an extraordinary drought. In order to secure minimum water flows in the river, the government

cut the allowance to withdraw irrigation water to only 18-67 % depending on the year. Due to unreliable offers for renting water rights, farmers generally preferred buying permanent rights. To secure their production and the survival of their vineyards farmers were forced to buy additional water rights at very high costs. Thus, in the year 2011 the total variable costs allocated to irrigation were calculated at nearly 3,900 EUR/ha, representing 68 % of the overall direct cost (Figure 4).

Both Italian farms are the only ones not paying any salaries to hired labour (Figure 4). All work on farm is done by family labour whose calculatory costs are part of the opportunity costs. However grape harvest is entirely done by machine, using contractor services whose costs are summed up under direct costs.

Wine grape yields vary largely across the typical farms and between varieties. White wine grape yields tend to be slightly higher than yields of red vine varieties (Figure 5 and 6). As the focus of the analysis is on the production of wine grapes and not on the processed wine figures are shown in t/ha.
In 2011, the yields of the white vine varieties range between 4.5 t/ha (Airen, ES25M) and 25 t/ha for Chenin Blanc in South Africa. The yields of the six red vine varieties analysed are closer together and range between 5 and 20 t/ha.

Figure 5: Yield ranges of important white wine grapes in 2011



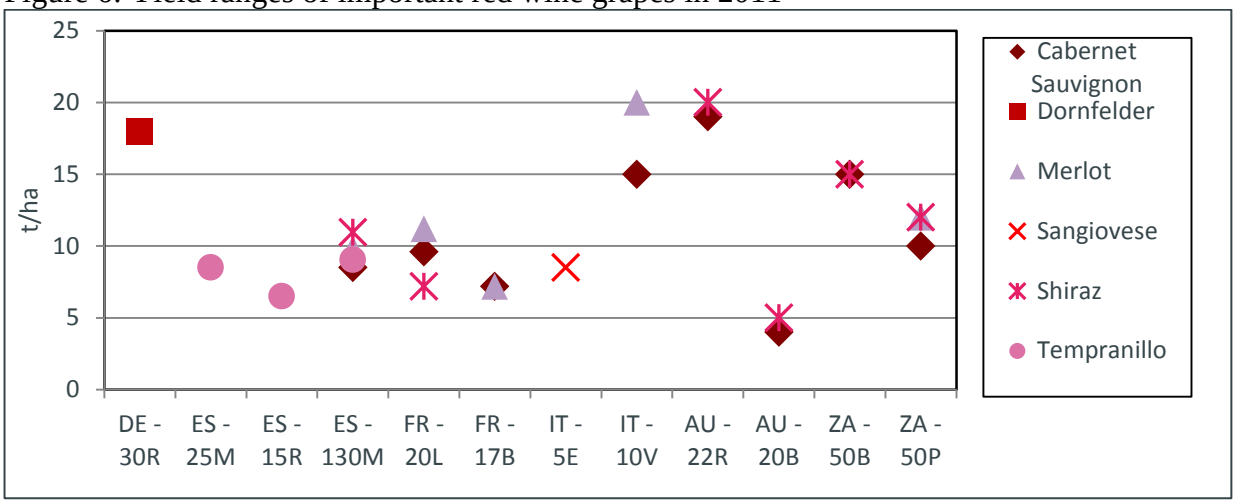
Source: *agri benchmark* 2014.

The farm ES25M in La Mancha is a farm in transformation. Airen is still cultivated in goblet without irrigation and are harvested by hand.
Though cultivating similar varieties, both Australia and South Africa show significant yield differences within their farms. While AU22R is using lots of irrigation and produces grapes for the bulk market, AU20B is situated in the famous Barossa valley, targeting the quality premium market and produces only low yields which are harvested manually. In the Western Cape of South Africa the situation is similar. The higher yielding farm is located in the Breedekloof area, a new upcoming wine growing region managing both high yields and good quality. The farm ZA50P is located in the area of Paarl where the conservative thinking predominates that only low yields can ensure high quality[1].
Overall, yields in the Spanish and French typical farms are rather low, with up to 12 t/ha for

[1] Thus, at the moment the two farms AU22R and ZA50P do actually produce premium qualities that are above the targeted quality bulk wine. As the project continues we will have to adjust the data of these two farms and make them better comparable to the remaining farms in the sample.

the white vine in Languedoc (Carignan, FR20L) and a maximum of 11 t/ha for the red vines. Among the European Farms, the typical Italian farm in Veneto reaches the highest yields.

Figure 6: Yield ranges of important red wine grapes in 2011

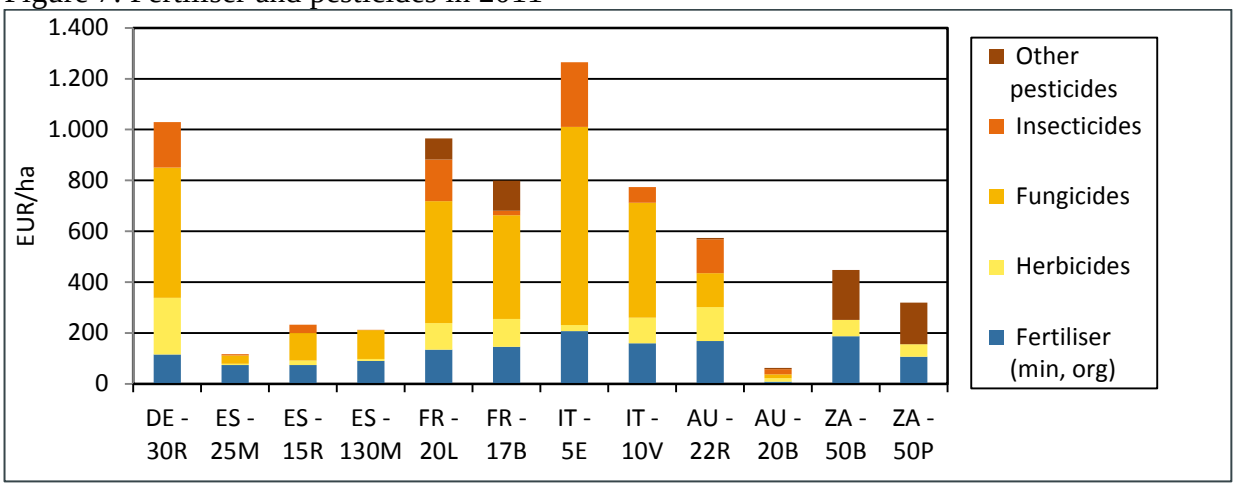


Source: *agri benchmark* 2014.

Fertiliser and pesticide costs cause a major part of the direct costs. They are depicted in Figure 7. Fertiliser costs are rather moderate, ranging from 8 to 208 EUR/ha, as vines are fertilised to only a limited degree compared to other agricultural crops. In these fertiliser costs, costs for mineral and organic fertiliser are summed up together with costs to sow cover crops on the strips.

Pesticide costs show a high variability in the sample. The Australian farm in the Barossa valley (55 EUR/ha) and the Spanish farms (43-158 EUR/ha) spend the least on pesticides which coincides with low yields. Highest pesticide costs were recorded for the Italian, French and German farms (600-1.050 EUR/ha), where fungicides make up 50-70 % of overall pesticide costs. The category “other pesticides” on the South African and French farms comprises spendings on herbicides, fungicides and insecticides together if the costs could not be indicated in a disaggregated way.

Figure 7: Fertiliser and pesticides in 2011

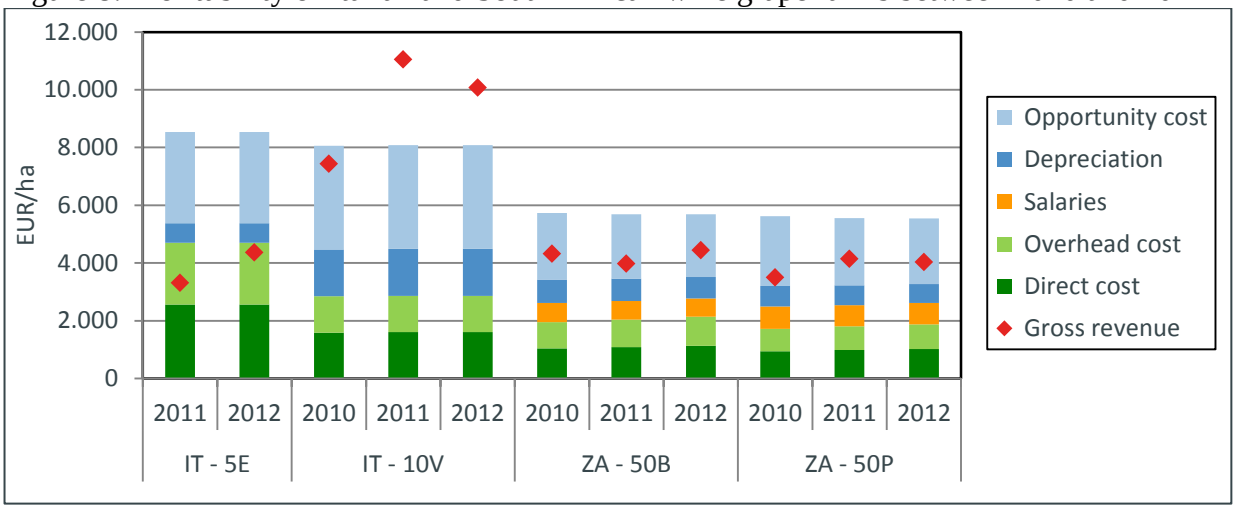


Source: *agri benchmark* 2014.

Figure 8 shows the profitability of the Italian and South African typical farms for more than one year, i.e. for the years 2011, 2012 and where available for 2010. Results in particular show great differences in gross revenue. This is due to changes in output quantity and output

price. For instance, in 2012 the gross revenue was higher than in 2011 in the Italian farm IT5E but in IT10V the opposite was true. In South Africa additionally to changes in yield and market prices important production costs were adjusted with the respective inflation rates. However, part of the effect was eliminated by changes in the exchange rate from South African Rand into Euro so that finally differences in production costs are hardly visible.

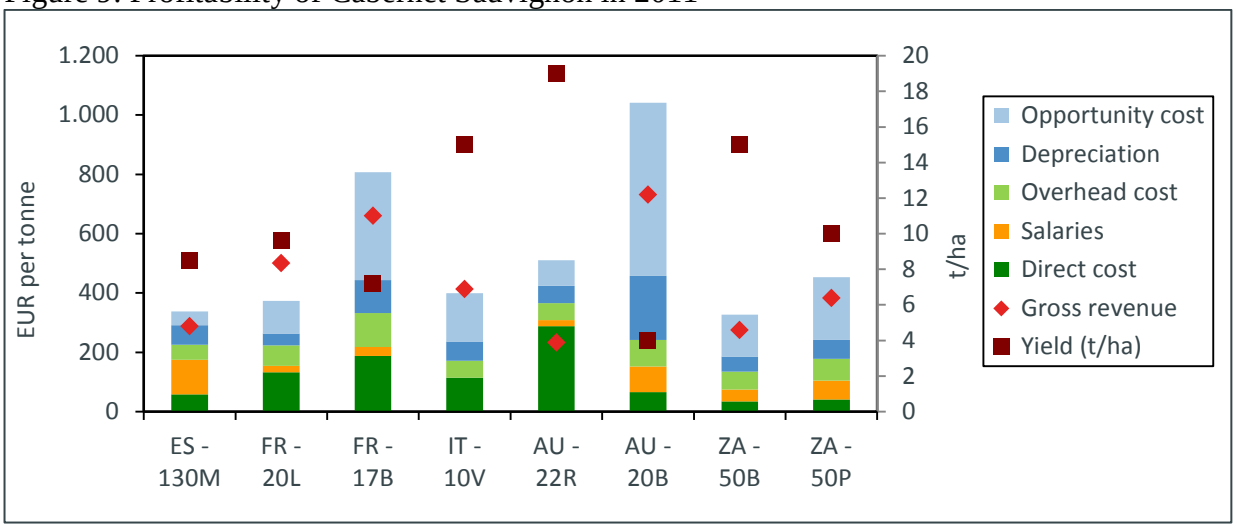
Figure 8: Profitability of Italian and South African wine grape farms between 2010 and 2012



Source: *agri benchmark* 2014.

In wine production and trade, varieties matter a lot. Therefore, comparisons of production costs of specific varieties are an interesting complement to the analysis of competitiveness. Figure 9 presents the costs and gross revenues of one single wine variety, namely Cabernet Sauvignon, grown by 8 typical farms in 5 different countries in the sample. Note that the comparison refers to the output quantity (per tonne) rather than the area related analyses as mentioned above. Hence the gross revenue directly reflects the output price. In addition, the yield level is indicated (on the right axis). For this calculation only the full-bearing vineyards were considered contrary to the analysis presented in the previous figures.

Figure 9: Profitability of Cabernet Sauvignon in 2011



Source: *agri benchmark* 2014.

The specific production costs allocated to Cabernet Sauvignon vary a lot among the farms. While four farms produce at low costs between 325 and 400 EUR/t, the production cost of the

French farm in Bordeaux (FR17B) and the Australian farm in Barossa valley (AU20B) reach 800 and 1,040 EUR/t respectively. These results correspond to the overall profitability of the farms. FR20L and IT10V are the only farms which cover their total costs and generate profits (125 and 14 EUR/t respectively). Overall, some negative correlation between prices and yields can be observed. However, even with similar yield levels of about 10 t/ha, output prices at farm gate can be different and range between 500 and 287 EUR/t for typical farms in France/Languedoc, South Africa/Paarl and Spain/Castilla La Mancha. This shows that besides quality levels also market preferences for different regions have a strong influence on profitability.

5. CONCLUSIONS

The presented results of the *agri benchmark* network on wine grape production provide detailed insights into the cost structure and revenues of international wine grape production. They can be considered as a starting point for identifying drivers of trends in wine grape production systems. A time series analysis as started in Figure 8 demonstrates the need for a longer term analysis, allowing to distinguish random events or shocks, such as the Australian drought, from longer term trends caused by changes in production conditions and structures. Also, a broader coverage of the major wine producing countries will be needed.

The analyses also indicate towards future challenges for the benchmarking of wine grape production. The market for wine grapes and wines is extremely heterogeneous in terms of varieties, qualities and preferences for geographic regions. Also legal restrictions and quality certification schemes apply in different countries and regions with respect to management, target yield levels and establishment of new vineyards. Besides using standardized methodology of data collection, the standardization of the product quality and target market needs to be enhanced for the mentioned farms in Australia and South Africa so that a meaningful comparison of the production systems can be obtained. So far, the focus in the benchmarking was on wine grapes for quality bulk wine production. With a broader coverage of wine producing countries and regions, more specific analyses for regional categories can be conducted, considering also restrictions from national wine legislation or the effects of certification and protected geographical origin.

The data collection has started only at the end of 2012 and thus the project is still in its starting phase. Major tasks for the future will be to fine-tune the data of the established typical farms and to update the farms for time series analysis as well as to establish additional typical farms in further regions and countries of the world. It is our aim to also include at least the USA, Argentina, Chile, Portugal and New Zealand into the project in order to cover the most important wine growing regions of the world.

For further and recent information and in case you are interested in participating in the project or in particular results please visit our website http://www.agribenchmark.org/horticulture.html or contact one of the authors.

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References

Anderson, K. and Nelgen, S. (2011), "Global Wine Markets, 1961 to 2009: A Statistical Compendium", Adelaide: University of Adelaide Press. Freely available e-book at www.adelaide.edu.au/press/titles/global-wine

Deblitz, C. (2010), "agri benchmark – Benchmarking Beef Farming Systems worldwide", paper presented at the 54th AARES (Australian Agricultural and Resource Economics Society) Annual Conference, 10- 12 February, Adelaide, Australia, available at: http://purl.umn.edu/59096 (accessed 04 March 2014).

Deblitz, C. and Zimmer, Y. (2005), "agri benchmark Cash Crop: a standard operating procedure to define typical farms". FAL, Braunschweig, December 2005.

FAOstat (2014), database on wine production (selected countries and years), available at: http://faostat.fao.org/site/636/DesktopDefault.aspx#ancor (accessed 03 March 2014)

Garming, H. and Bravin, E. (2014), "Netzwerk agri benchmark - Vergleich der Agrarproduktion im internationalen Kontext", Agrarforschung Schweiz, Vol. 5 No. 1, pp. 32-35, in German.

Hemme, T. (2000), Ein Konzept zur international vergleichenden Analyse von Politik- und Technikfolgen in der Landwirtschaft. FAL Landbauforschung Völkenrode Sonderheft 215, Braunschweig.

Isermeyer, F. (2012), "Methodologies and Comparisons of Production Costs – a Global Overview", in Langrell, S. et al. (Eds.), Sustainability and Production Costs in the Global Framing Sector: Comparative Analysis and Methodologies, JRC Scientific and Policy Reports, Luxembourg, pp. 25-50.

Shaffer, B. and White, G. (2006), "Lake Erie Grape Farm Cost Survey", working paper 2006-19, Department of Applied Economics and Management, Cornell University, Ithaca, New York, October.

UN Comtrade, (2014), United Nations Statistical Division: Commodity Trade Statistics Database, Commodity Code 2204, available at: http://comtrade.un.org/, (accessed February 21 & April 9 2014).