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# Factors of profitability of the grapes production

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**Abstract**: The paper analyses the relationships between the profitability of viticulture on the one hand and the sugar content and grapes yield in viticulture in the Czech Republic between 1995 and 2014 on the other hand. The paper aims to find out which of these has had a greater impact on the viticulture profitability in the Czech Republic over the last twenty years. One of the frequently debated questions is whether a higher yield of grapes may also bring a high or moderately above average sugar content, and also whether the production for sale is profitable. The answer can be achieved either via the micro-appraisal (repeatable and many times conducted experiments) or via the macro-appraisal – collecting average data for the appraised region. For this paper, the macro-appraisal was chosen, i.e. the statistical survey for the Czech Republic between 1995 and 2014. The period of 20 years comes from an annual examination conducted by the Association of Winemakers of the Czech Republic on the grapes yields in their members. In the Czech Republic, the price in the grapes market is set depending on the variety of vine and sugar content. It follows from the 20-year statistics of the Association of Winemakers CR, that the profitability of grapes production for sale is not achieved by the sugar content but by the per hectare yield. The yield per hectare should vary between 5.5 and 7 t/ha (tonne per hectare) at the average sugar content of 18.5 to 21 °NM (between 11.0 and 12.5% volume of the potential alcohol). The grapes yield of more than 6 t/ha does not increase the profitability because the price offered by the purchasing companies decreases.

**Keywords**: profitability of viticulture, selling price of grapes, sugar content of grapes, vintage, yield of grapes

One of the frequently debated questions is whether a higher yield of grapes may also bring a high or moderately above average sugar content, and also whether their production for sale is profitable outside the sphere of the selected commercial and marketing strategies impact Galizzi and Reiley (2012). The authors as Makens (1965), Nevid (1981), Bowen et al. (1992), Fevrier and Visser (2004) and Wardle and Solomons (1994) have already demonstrated in their works the influence of the intrinsic and extrinsic information in the food and beverage products. The winemakers' effort to increase the sugar content in grapes has been noticeable since a new Act of Winemaking in the Czech Republic was implemented in 1995. The answers to this question can be achieved either via the micro-appraisal (repeatable and many times conducted experiments) or via the macro-appraisal – collecting the average data for the appraised region. For this paper, the macro-appraisal was chosen, i.e. the statistical survey for the Czech Republic between 1995 and 2014. The period of 20 years under question comes from an annual examination conducted by the Association of Winemakers of the Czech Republic on the grapes yields in their members. In the Czech Republic, the price of grapes is set depending on the variety of vine and the sugar content. The issue of a systematic examination of the wine production's profitability is neglected both for the subjective and objective reasons. According to Kučerová (2014), it can be assumed that the price of the basic raw material will impact the price of the bottled wine, which will increase the possibilities of the export abroad. Despite the importance of wine making in the region of Bohemia and, particularly, in Moravia, an institutional frame of economic research and a general research into viticulture and wine making industry is missing. It is difficult to find various correlative relations towards the production of grapes and the appraisal of the probability for the managerial decision-making processes in research papers. A methodical approach towards calculations

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of costs and yields in the agricultural sector in general was developed by Poláčková (2010). The economy of production and processing of agricultural products was dealt with by Peterová (2010). An inspiration for the economic control (Foltínová and Špička 2014) impacting the competitiveness of production can be found in other agricultural businesses. Profitability should be important for every producer. As stated in Synek et al. (1996), before an entrepreneurial decision is taken, it is advisable to know the company's profitability, the profit-to-sales ratio, the yield profitability, and also the profit-to-costs ratio. The profitability of grapes production is also important for setting the price of wine, as recommended by Schätzel et al. (2004). A methodical approach to determining the costs of production of the bottled wine and barrel wine is typical of significant studies conducted by Pailler (1993, 1995, 1997) for the French wine regions of Entre – Deux-Mers, Médoc and Saint-Emilion. Strategic estimates (prediction) of the profitability of wine grapes production for the producers in the Czech Republic were dealt with by Foltýn and Zedníčková (2010), who predicted for 2014 a per hectare yield of 6.64 t/ha and the stagnation of the total costs. The price of the basic raw material influences the price of bottled wines, both white and red wine varieties. Relationships between the bids depending on the price elasticity of white wines were examined by Syrovátka and Žufan (2014). Connections between the wine price and its consumption are evaluated in a publication by Syrovátka et al. (2014). Galizzi et al. (2008), Lange et al. (2000) as well as Combris et al. (2007) published the results of their research, proving that the subjects who choose without tasting made a quicker decision and were more influenced by price than those who could taste the products. An interesting finding arising from monitoring the profitability of the grapes production is, as stated by Foltýn and Zedníčková (2010), that the commodity of grapes is considered unprofitable, even when the subsidies are included, and it is the commodity of wine that is profitable, along the supply chain starting with the production of grapes. A question arises from such a finding, when it is meaningful to invest into the viticulture and wine making industry. The Amadieau et al. (2013) offer strategic and operating categories of approach. The adopting of strategic actions as the geographic diversification, exports markets, private labelling by Pearce and Michael (2006) or a new market share trust, recommended by Chowdhury and Lang (1996), are long term initiatives, instead of the operation actions as are the immediate revenue generation, cost cutting or asset reduction preferred by Pearce and Robbins (1994). And unlike the approach of the authors Grinyer and Mckiernan (1990), Pearce and Robbins (1994) and Baker et.al. (2001) who deem it more appropriate to apply both the retrenchment and recovery. The answer to such a difficult question is sought by Koráb (2012) and the position of the industry in the supply chain is studied by Török and Tóth (2013), Lintner and Bečvářová (2014) and Syrovátka and Chládková (2014). Related to the profitability of grapes production, the impact of the economies of scale or decreasing revenues of scale might be considered, according to Samuelson and Nordhaus (1991). The research aims to ascertain a correlative impact on the grapes price and, subsequently, on the profitability of production, based on two significant factors the per hectare yield and the sugar content of wine grapes.

## MATERIAL AND METHODS

The paper deployed data obtained during the period of 1995–2014 by the Association of Winemakers of the Czech Republic. The data was gathered from 25% of the area of fertile vineyards in the Czech Republic and from the winemaking businesses which processed, in average, 33% of the total grapes production in the Czech Republic. Each year (1995–2014), more than 100 prominent winemaking businesses took part in the survey. Between 1995 and 2014, the Association of Winemakers CR conducted the survey among their members. The set of respondents was approximately the same during the whole period. The survey focused on the winemakers' average per hectare yield of grapes, the average sugar content and the average selling and purchasing price of grapes. In order to calculate profitability, the average costs in winemaking businesses were used for each year of the monitored period (varying according to the presence of diseases, and also changes in input prices, e.g. oil). The calculation did not cover subsidies. These annual results served as a basis for the analysis of 20-year relationships between the sugar content and grapes yields, between the price and grapes yield, between the profitability of production and the sugar content in grapes, and between the yield and the profitability of grapes. The data were further statistically processed; the calculations of correlations and the visualization of findings were accomplished in 2015 using the Microsoft Excel.

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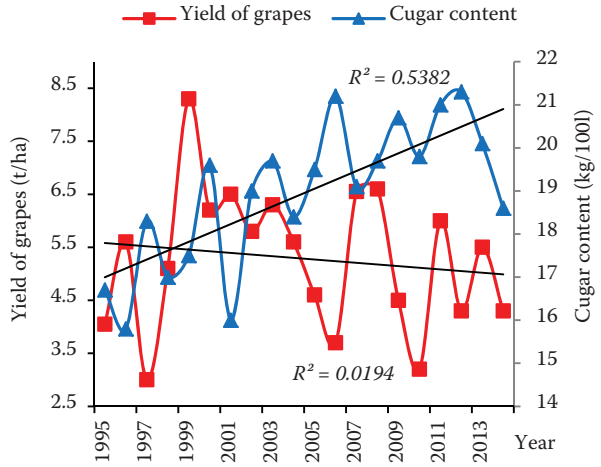


Figure 1. Average sugar content and grapes yield in years

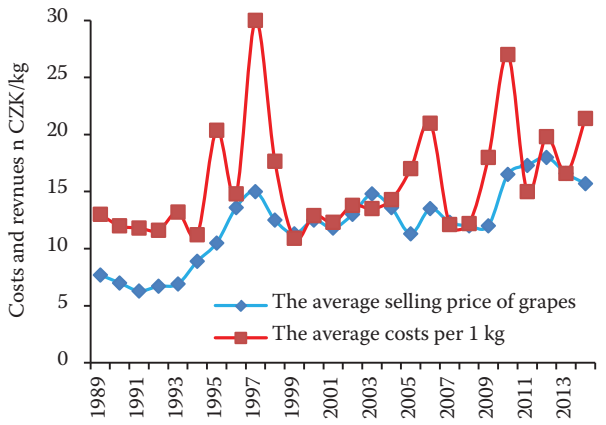


Figure 2. Average profitability of grapes cultivation in the Czech Republic (without subsidies)

## RESULTS AND DISCUSSION

### Initial conditions

In the concerned period, the total area of vineyards in the Czech Republic has varied between 10 679 ha and 17 463 ha. The expansion of the total area is related to financial subsidies before the Czech Republic joined the EU in 2004. In average, 50–60% of harvested grapes in the Czech Republic were traded. Figure 1 shows the average sugar content and the grapes yield in the Czech Republic in the individual years and a steady rise in the sugar content in the last twenty years is noticeable. Since 1995, when the Act on Wine Making was passed, winemakers have been trying to increase the sugar content in grapes, which is appropriate in our climatic conditions. A 10-year average of the sugar content is now 20 °NM, kilos of sugar/100 l of must, (11.9% volume of potential alcohol). Figure 1 shows this trend, as well as the year-on-year fluctuation in the grapes yield and its steady decrease in the long-term. A 10-year average is now 4.9 t/ha.

Figure 2 shows the average profitability of the grapes production, without subsidies in viticulture, which also vary every year.

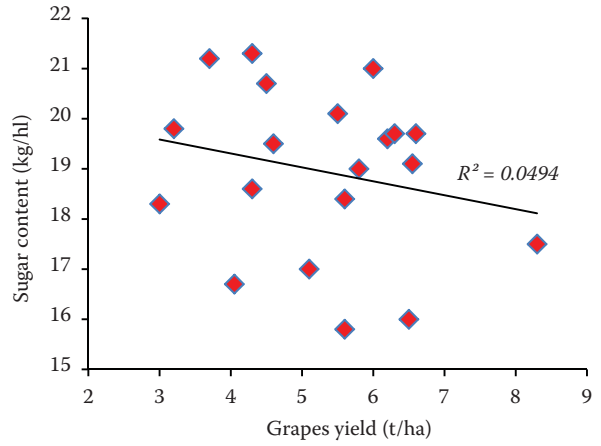


Figure 3. The dependence of the sugar content on the grapes yield in the Czech Republic between 1995 and 2014

### Relationship between the sugar content and grapes yield

Except for the extreme growing conditions and extreme weather conditions, there is *no significant correlative dependence* (Figure 3). Extremes were found in 1996, 2001 and 2014, with an average yield and very low sugar content. Further, there were years with a low yield and a higher sugar content: 1997, 2006 and 2010. In normal years, however, the average grapes yield in the Czech Republic varies from 4 to 7 t/ha and the average sugar content with this yield varies between 17–21 °NM (kilos of sugar/100l of must).

### Relationship between the price of grapes and their yield

In the last 12 years, the grapes yield has not had virtually any impact on their price. The price is determined by different factors. Winegrowers do not receive any compensation for the adverse weather conditions, it is their entrepreneurial risk (Figure 4).

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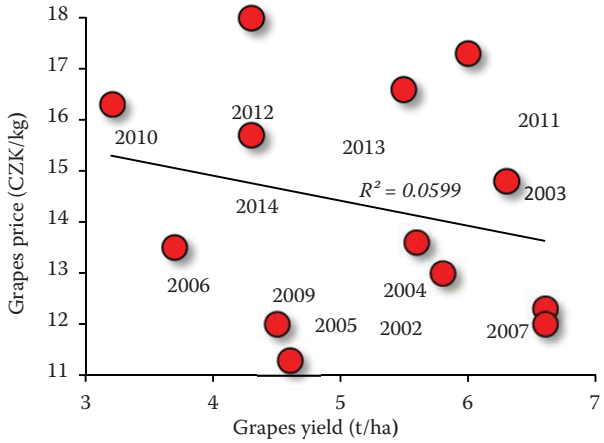


Figure 4. The dependence of grapes price and their per hectare yield

The graph also shows a noticeable slow impact of inflation.

## Relationship between the profitability of grapes production for sale and their sugar content

In case of the profitability of the grapes production, more factors play an important role when assessing the success rate of the individual years – the demand for grapes from the Czech Republic and their supply, the sales of wine and its price in the world, the reserves of wine, but also the expected grapes yield in the world or an economic recession. Usually, the price of grapes is set each year depending on the variety and the sugar content. The average price dropped from 18 CZK/kg to 15.70 CZK/kg (0.65 and 0.55 €/ kg) in the last three years (2012–2014).

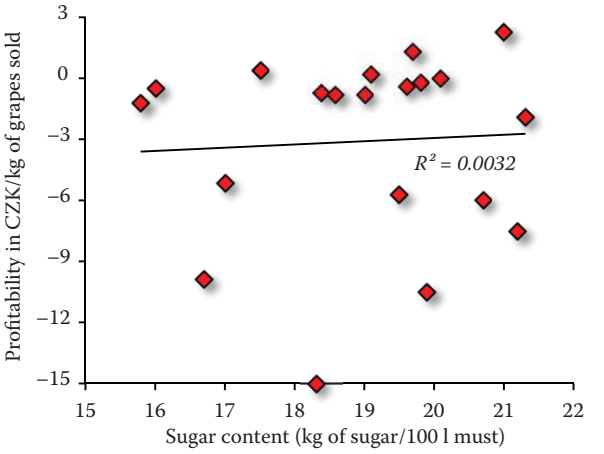


Figure 5. Correlation between the profitability of grapes production for sale and sugar content of grapes in the Czech Republic

No verifiable correlation has been found between the average sugar content of grapes grown and sold in the Czech Republic and the profitability of their production (Figure 5). For example in 1997, at the average sugar content of 18.3 °NM, the profitability was the worst in the monitored period due to the lowest grapes yield. On the contrary, at the lowest sugar content (15.8 and 16 °NM) in 1996 and 2001, the profitability was not too much below zero. In most years, the profitability of grapes production for sale is about zero, in other years, however, it is in negative numbers. In the last decade, the average loss of grapes growing was 1.80 CZK/kg (0.09 €/kg), which is reimbursed to the businesses by the subsidies within CMO with wine of the EU. Of the last twenty years, only 4 years were profitable (without subsidies), and in 2013 only the costs were covered, and the finding corresponds with the prediction made by Foltýn and Zedníčková (2010).

## Relationship between the grapes yield and profitability of their production for sale

In this case, there is an exceptionally strong relationship between the profitability and the grapes yield in the given year (Figure 6). It clearly follows from the graph that starting with the grapes yield of 5.5 t/ha, the profitability is around zero, but when the yield is below 5 t/ha, the profitability is always negative. However, an increase in the yield to above 6 t/ha does not lead to a rise in the profitability of their production; the reason is probably a drop in the grapes prices.

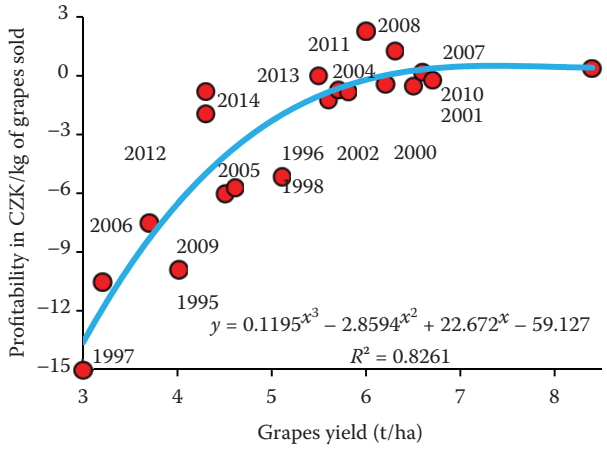


Figure 6. Profitability of grapes production and their yield between 1995 and 2014

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## CONCLUSION

The aim of this research was, based on two important factors, the per hectare yield and the sugar content of wine grapes, to ascertain a correlative influence on the grapes price and, consequently, on the profitability of their production. From 20-year statistics (1995–2014) of the Association of Winemakers of the Czech Republic, it follows that the profitability of the grapes production for sales is not determined by the sugar content but by the per hectare yield. The price is further influenced by the demand for a certain variety. The correlation was not the aim of the research. Each year, the price of grapes is usually set according to the variety and the sugar content. The observed optimal range of the per hectare yield varies from 5.5 t to 7 t/ha at the average sugar content of 18.5 to 21 °NM (11.0 to 12.5% volume of the potential alcohol). A grapes yield of more than 7 t/ha does not increase the profit to costs ratio. The accuracy of these findings can be positively compared with those of Foltýn and Zedníčková (2010). The results of the research are based on the average data covering the whole Czech Republic, not on the data provided by the individual businesses competing with one another as the data from businesses might be substantially influenced by any fluctuations in a given year. If the profitability of grapes production does not increase with the sugar content and, to a certain extent, with the expected per hectare yield of more than 7 tonnes, it is important to consider the integral production of wine across the whole viticulture and winemaking supply chain. The sale of the high-quality wine and the profit margin may cover the profit-to-costs ratio of viticulture. Vertical integration, as a modification of the economies of scale, must be used especially in the viticulture and wine-making industry. Winemaking has always been regarded as an integral unit. Moreover, the wine makers are at present able to trade also with other by-products of grapes production and via this diversification of their activities, to significantly improve the development of the wine tourism in the region.

## REFERENCES

Amadieu P., Couderc J.P., Viviani J.L. (2013): Financial Reaction to the Business Cycle in Periods Difficulties: The Case of French Wine Companies. Wine Economics. Quantitative Studies and Empirical Applications. Pelgrave Macmillan, UK: 200–228.

Baker III V.I., Patterson Jr.P.W., Mueller G.C. (2001): Organizational causes and strategic consequences of the extent of top management team replacement during turnaround attempts. Journal of Management Studies, 38: 235–270.

Bowen D.J., Tomoyasu N., Anderson M., Camey M., Kristal A. (1992): Effects of expectancies and personalized feedback on fan consumption, taste, and preference. Journal of Applied Social Psychology, 22: 1061–1079.

Combris P., Lange C., Issanchou S. (2007): Product information, hedonic evaluation and purchase decision: an experimental study of orange juice. Journal of Wine Economics, 2: 40–54.

Fevrier P., Visser M. (2004): A study of consumer behavior using laboratory data. Experimental Economics, 7: 93–114.

Foltínová A., Špička J. (2014): The use of controlling in agricultural enterprises and their competitiveness. Agricultural Economics – Czech, 60: 314–322.

Foltýn I., Zedníčková I. (2010): Rentabilita zemědělských komodit, ekonomicko-matematická predikce. (Profitability of Agricultural Commodities, Economic-Mathematical Predictions.) UZEI, Praha.

Galizzi M.M., Buonanno P., Caggiano G., Leonida L. (2008): Expert and peer pressure in food and wine tasting: evidence from a pilot experiment. Enometrica, 1: 51–68.

Galizzi M.M., Reiley D. (2012): An Identification Problem: Economists at a Wine Tasting Experiment. Discussion paper. Behavioral Research Lab., London School of Economics.

Grinyer P., McKiernan P. (1990): Generating major change in stagnating companies. Strategic Management Journal, 11: 131–145.

Chowdhury S.D., Lang J.R. (1996): Turnaround in small firms: an assessment of efficiency strategies. Journal of Business Research, 36: 169–178.

Koráb P. (2012): European Wine Policy and Perceptions of Moravian Winemakers: Theoretical Background with an Empirical Study. MENDELU Working Papers in Business and Economics, 23/2012.

Kučerová R. (2014): Factors of the attractiveness of Slovak wine market and their influence on the Czech wine export to Slovakia. Agricultural Economics – Czech, 60: 430–439

Lange C., Issanchou S., Combris P. (2000): Expected versus experienced quality: trade-off with price. Food Quality and Preference, 11: 289–297.

Lintner T., Bečvářová V. (2014): Předpoklady konkurenceschopnosti zemědělského podniku v komoditní vertikále víno. (Prerequisites of farm competitiveness in

doi: 10.17221/258/2015-AGRICECON

commodity vertical of wine.) In: Sborník příspěvků z mezinárodní vědecké konference Region v rozvoji společnosti 2014. 1st ed. Mendelova univerzita v Brně, Brno: 524–531.

Makens J.C. (1965): Effect of brand preference upon consumers perceived taste of Turkey meat. Journal of Applied Psychology, 49: 261–263.

Nevid J.S. (1981): Effects of brand labeling on rating of products quality. Percept ual and Motor Skills, 53: 407–410.

Pailler J. (1997): Contribution á l´étude des couts de revient, des prix de vente et des strategies commerciales dans la région Sait-Emilion 1996. ENITA de Bordeaux.

Pailler J. (1993): Des couts comptables aux couts economiques: L´influence des charges supplementives sur les couts de production des vins de Bordeaux en 1992. ENITA de Bordeaux.

Pailler J. (1995): Des couts de production aux couts de revient: Calcul et analyse des données de 19 exploitations viticoles du Médoc pour l´année 1994. ENITA de Bordeaux.

Pearce II. J.A., Michael S.C. (2006): Strategies to prevent economic recession from causing business failure. Business Horizons, 49: 201–209.

Pearce II. J.A., Robbins D.K. (1994): Entrepreneurial recovery strategies of small market share manufactures. Journal of Business Venturing, 9: 91–108.

Poláčková J. (2010): Nákladovost zemědělských výrobků za léta 2001–2007. (Costs of agricultural products during the years 2001–2007.) IAEI, Prague.

Peterová J. (2010): Ekonomika výroby a zpracování zemědělských produktů. (Economics of production and processing of agricultural products.) 4th ed. CULS, Prague.

Samuelson P.A., Nordhaus W D. (1991): Ekonomie. (Economy.) 1st ed. Svoboda, Praha.

Schätzel O., Doka F., Mahlendorf-Schäfer K. (2004): Jak úspěšně prodávat víno: vinařský marketing v praxi. (How successfully sell wine: wine marketing in practice.) Svaz vinařů České republiky, Velké Bílovice.

Synek M. et al. (1996): Manažerská ekonomika. 1st ed. Grada, Praha.

Syrovátka P., Chládková H., Žufan P. (2014): Wine consumption in the Czech Republic and prices of alcohol. Agricultural Economics – Czech, 60: 89–98.

Syrovátka P., Chládková H. (2014): The influence of price on supply of the Czech producers of bottled red quality wine. Procedia Economics and Finance, 12: 654–661.

Syrovátka P., Žufan P. (2014): Price Elasticity of Supply of Bottled Quality White Wine in the Czech Republic. Review of Agricultural and Applied Economics, 17: 32–37.

Török A., Tóth J. (2013): Open characters of innovation management in the Hungarian wine industry. Agricultural Economics – Czech, 59: 430–438.

Wardle J., Solomons W. (1994): Naughty but nice: a laboratory study of health information and food preferences in a community sample. Health Psychology, 13:180–183.

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