

OPERATING AND ECONOMIC TESTS OF TAKING TEST PROBES OF GRAPES FOR DETERMINATION OF QUALITY

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Abstract

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This paper will present the results from three years of trials and economic exploitation of work of the probe for testing of grapes in order to determine its quality. The tests were performed in the winery Skovin with testing probe from the program Siprem. It is a fully automated business process. Probes automatically takes test (copy) of the grape from the vehicle that performs transport and supply the grape to the ramps for unloading, and for a few minutes automatically determining the quality of grape.

This enables a continuous flow of admissions to a basket of grapes on one side and the timely and quality monitoring of the quality of grapes and timely preparation of other processing equipment for receiving and processing the resulting grape pulp based on its previously determined quality.

By means of automating this working process in the technology of processing of the grapes it will provide accurate, timely and precise assessment of the quality characteristics of the grape, but there is always question: whether the procurement of such sophisticated equipment would be justified in terms of its cost, relative to the cost of a trial, or in respect of the exploitation characteristics probe achieves during the production year.

Key words: probe for taking a test, quality of grapes, economic and operational trials

Introduction

Receipt and processing of grape represents one of the most complex technological processes and technical requirements in terms of process techniques in order to obtain a quality wine.

Receipt of grapes starts by determining the quantity of grapes, and simultaneously determining its quality or determining the level of maturity. There are two ways to determine the quality of the grapes.

One way is by manually testing and determination of glucose using equipment for determining quality of must, while the second method is fully automated and is performed using a probe for taking a test, which automatically set, in few minutes the quality of the grape.

The first sampling test is slow, depends on the expertise of the operators and depends on their expertise and training to accurately and quickly determine the quality of the grape, while using a probe speed of determining the quality of the grape

is high, there is no appearance of standstill during the process of technological processing of grapes, but these sophisticated machines are characterized by high cost.

Purpose of Testing

The objective of the three-year examination of the probe taking the test of grapes in order to determine its quality is to determine the exploitation and economic parameters, and to determine the need of equipping the wine cellars in Macedonia with this type of process equipment.

The aim of the trial was to determine cross effectiveness or duration of taking the test monthly production, the number of samples taken, effective and gross working hours, and the coefficient of effective use of time.

On the basis of exploitation investigations, one of the goals of this paper is to determine the economic parameters, i. e. the cost of a test based on annual amortization item, and the gross price, i. e. the effective working hour. On the basis of effective working hours, and based on the nominal power output of the probe for taking a test, and finalized the consumption of electrical energy per year production expressed in kWh.

Material and Method

Methodology was established and implemented over three years and for the production in 2006, 2007 and 2008.

Experiment was set in the winery Skovin, which followed the work of the probe for taking tests of grape quality.

The envisaged methodology was set up and implemented in Skovin winery with a capacity of 16 million gallons of wine annually.

Examination of the exploitation characteristics of the probe for taking a test was done on red and white grape. Examination was done during the process of work and exploitation of the equipment in terms of its deployment through the year's and during the season of receiving and processing the

grape, as well as the number of working hours during the year.

Recordings and measurements were conducted in production conditions.

The extraction tests were taken into account:

- Duration of the process of taking a test in order to establish effective working hours in season reception and processing of grape;
- Working hours of the engagement of the probe during the production year;
- Determination of the coefficient of effective use of time;

For determining the characteristics of exploitation probe as a factor, it was used the parameter of the number of vehicles (vehicles) who committed supply and transportation of wine grape to the winery. The number of samples by production year is identical to the number of samples taken in the production year. We conducted a number of repetitions for the measurement of time required for the proper and quality determination of the quality of wine grapes to the calculative calculations (statistical variation) to determine the mean or median time of taking the test in order after the during the reception and processing of grapes, based on annual aggregate data to determine the average duration of taking probe of wine grape.

Measurements were repeated it over the entire period of receipt and processing of grape, so the more repetitions are made, to the extent and accuracy as well as real image features extraction probe for taking a test to be more reliable.

Measurements for monthly determination of effective working hours and daily efficiency during the period of receiving and processing the grape, the probe for taking a test that has a seasonal character and determine the coefficient of effective use of time, were repeated it over the entire period of receipt and processing of grape .

First, determine the gross working time (gross working hours), depending on the duration of the period of reception and processing of grape, multiplied by 23 hours (Davcev, 1998).

This number of hours is the optimal period of

proper utilization of the probe taking the test during the day, if the receipt and processing of grapes is organized in three shifts, i. e. supply of grapes is continuous, which means directly depends on the intensity of harvesting of grapes. One hour is enough time to check the status of crusher grapes, and for preparation for next working day.

The calculative calculations, if the ratio between effective gross working hours and working hours gives the value of coefficient and effective use of time. The calculative calculations based on effective working hours, and on the basis of the nominal electric power the probe taking the test, we have identified and consumption of electricity production year expressed in kWh.

Results and Discussion

Winery Skovin is equipped with a probe for taking a test from the program of Spadoni. The principle of operation of the probe is as follows: samples taken from several places of the grape

which is loaded on the vehicle, which generated average estimation on the grape. The same low crusher grapes squeezed in the probe, whereas it takes the grape pulp in a quantity of about 4-6 kg, which is determined by the quality of grape (Jankov, 1992).

The time required for taking a test medium (Jankov, 1992) ranges from 1.5 minutes to 4 minutes depending on expertise of the operator and the quantity or size of vehicle that is loaded with grape. Automatic sampling test has its drawbacks, and advantages (Slavovski, 1979). The advantages relate to very quickly ascertain the quality of grapes, while negativity is costly turnaround.

Handling and management of the entire machine (probe) is done with hydraulic feedback systems, i.e. with handles that are equipped with control and manipulation board (Slavovski, 1979).

Based on the established methodology and conducted in production conditions are determined and presented in Table 1, extraction and economic parameters of the probe taking the test.

Table 1
Operational and economic parameters of the probe for taking a test of grape production in three years in the winery Skovin

Description of parameters	Production year					
	2006		2007		2008	
Type of grape	White grape	Red grape	White grape	Red grape	White grape	Red grape
Quantity of grapes received and processed, kg	6615492	6347071	6269260	6292140	7429199	7776700
Number of samples taken	800	767	775	778	865	905
Average duration of a trial	148 s		131 s		158 s	
Gross working hours	1219	1219	713	713	1265	1265
Effective working hours	32.88	31.54	28.2	28.31	37.95	39.73
Coefficient of utilization	0.0269	0.0259	0.0399	0.04	0.03	0.0314
Consumed electricity, kWh	147.95	141.95	126.92	127.38	170.79	178.78
Annual depreciation item probe, €	3787.1		3787.1		3787.1	
Cost effective working hour, €	58.79		67.02		48.75	

If we analyze the results presented in Table 1, the numbers of samples taken directly depend on the number of vehicles involved in transportation and supply of grapes. The number of vehicle turn, directly depends on the amount of received and processed grape per production year.

The number of samples taken in 2006 for determining the quality of white grape is 800, while in determining the quality of red grape 767 trials. The condition of the received and processed grape production in 2007 is similar in production year 2006. The number of samples taken of red grape is 778, while in determining the quality of white grape are taken 775 samples, i.e. three samples less than the sample of white grape.

In production in 2008 is received and processed the highest quantity of grape, performing maximum numbers of probe to collect samples.

The number of samples taken from white grape is 865 samples, while in determining the quality of red grape 905 samples (Table 1 and Figures 1 and 2).

Based on direct measurements of the work of the probe to collect samples, and determine the average time period of the sample, expressed in seconds, ranges of 131 s., in production year 2007 to 158 s., in production year 2008. In production year 2006, the average duration of taking the test is 148 s.

This situation is as a result of expertise and the training of operators, but also as a result of the frequency of vehicles (the amount of grape) per day during the reception and process of the grape.

In 2007, production has the smallest length of taking samples as a result of poor weather conditions contributed to the different varieties of grapes grow in the same period, making the daily frequency of vehicles is significantly lower compared with production in 2006 and 2008.

Because of this situation, extraction characteristics of the probe taking the test are significantly improved in production in 2007 compared with production in 2006 and 2008. Improved operational characteristics mostly seen in the coefficient of effective use of time, which in production in 2007 ranges from 0.0400 at taking tests on red grape, or 0.0399 in taking samples of white grape.

Coefficient of effective use of time defined as the ratio of effective time and gross working time, in 2006 production ratio is 0.0269 in determining the quality of white grape, or 0.0259 in determining the quality of red grape.

In 2008 production coefficient of utilization is 0.0300, in determining the quality of red grape, or 0.0314 while taking a test of white grape.

Annual amortization item is calculated based

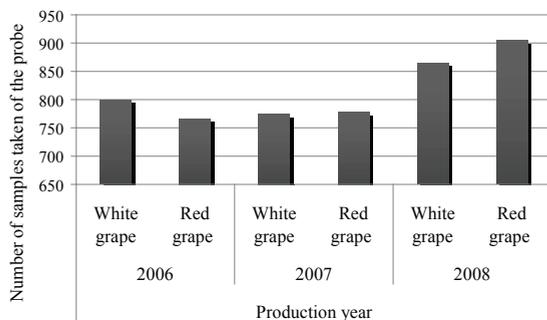


Fig. 1. Number of samples taken of the probe for white and red grape production in three years

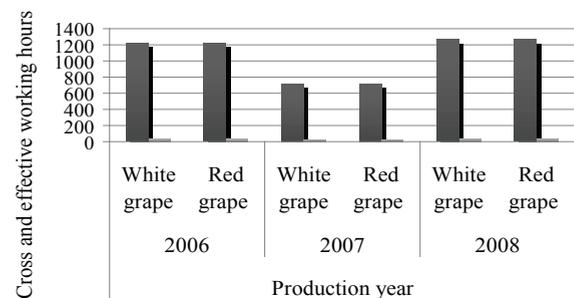


Fig. 2. Gross and effective working hours of the probe for taking a test in three production years

on the model of linear damping, with equal annual installments over a period of 20 years with an annual value in the amount of 3787.10 euro, based on the value of the effective working hour expressed exactly by the annual value of the item amortization ranges from 48.75 euro in production in 2008, to 67.02 euro in production in 2007.

Dynamics of the value of the effective working time is due as a result of the different number of effective working hours and that the value depends directly on the quantity of grapes received and processed, and the average duration of taking one test per production year.

With the results accordingly obtained, we can come to conclusion that the necessary supply of this type of machines that will address the cellar with a large workload, with a steady supply of grape to the effective working hours be as large, i. e. the value of effective working hour will be lower, making the price of this working process optimal.

Conclusions

The number of samples taken in production year 2006, the white grape is 800, while red grape 767 trials.

The number of samples taken in production year 2007, the white grape is 775, while red grape 778 trials.

The number of samples taken in production year 2008, the white grape is 865, while red grape

905 trials.

Gross number of working hours of the probe taking the test production in production year 2006 amounted to 1219, while in 2007 713 or 1265 in production year 2008.

Median time of duration of the process taking a test in grape production in 2006 amounted to 148 seconds, while in 2007 131 seconds or 158 seconds in 2008.

The cost of effective working hours in production year 2006 expressed through the annual amortizes item was 58.79 euro's, while in production year 2007 67.02 euro's, 48.75 euro's in production year 2008.

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