ANNALS of Faculty Engineering Hunedoara
International Journal of Engineering
ISSN: 1584 - 2665

WORK ORGANIZATION AND ECONOMIC ANALYSIS OF THE POST HARVEST OF AN UNIQUE REGIONAL PRODUCT

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ABSTRACT:
We have viewed a business in the South Plain Region from an economic point of view. The main activity there is pear growing and storage. Four varieties of different time of ripening and storing are grown there. We have measured all the relevant activities, worked out local normative and prepared a detailed technology. The economic evaluation was based on this data. Activities, like disinfection, pre-storage disinfection and selection, in-storing and out-storing, classification after storage, packaging, as well as loading trucks, were monitored by variety. Storage loss was determined and widely varied according to varieties, length of storage and time of out-storing. Different varieties resulted in different quality classes after storage. Price depended on the quality classes. Economic evaluation was carried out when all the relevant costs and revenues were known. Fixed and variable costs of storage were determined, break-even point was calculate and the market position of the product was evaluated.
Keywords:
post harvest, regional products, work organization, economic analysis

1. INTRODUCTION

The vineyards and the orchard plantings between the River Tisza and the river Danube abounded in different kinds of pears. The microclimate and the brown sandy soil assure good conditions for growing pears. The region of Kecskemét, Nagykőrös and Kunfehértó were traditionally considered to be famous fruit growing areas. Already in the 19th century so special pears of good quality were grown in these areas that even the vice-bailiff of the county got them as a present (Gonda, 2005). Nowadays the pear-growing centre of the Great Hungarian Plain is Kunfehértó. The pear from Kunfehértó is successful because the rainfall, the soil and the nutrient the pear needs are present in this area. Having chosen a good sort of pear, the local people started to grow pear successfully on the loess and sandy soil. The pears grown in the gynaecium of Kunfehértó were selected from one generation to the other. The especially winter pears are the most delicate, the autumn ones are less delicate however the summer pears cannot be stored but they ripe early and they are tasty and full of flavour. The pear is harvested by hand that requires a great expertise.

Storage is an important part of fruit growing. As far as pear fruit is concerned this question is even more important as certain varieties (especially those matured in autumn and winter) can only be consumed and enjoyed after a cold storage (Soltész, 2007). The further importance of storage is that the fruit can longer be kept on the market and the period of consumption can be prolonged. Especially important this matter when the buyer needs continuous shipment.

By storing fruit a higher profit can be realised. In some cases vast amounts of fruit, at the time of harvest, can be saved from selling it at a low price. A valuable, up-to-date construction is needed that preconceive necessary implementing resources. In this recent article I wish to present the main management solutions and the profitability of growing in a case study (Nótári et al., 2009).

2. MATERIAL AND METHOD

2.1. Conditions of the enterprise

In our study we processed the data of a small business in Vas County, where pear, grown on 50 hectares, is stored. The orchard is 14 years old. Four pear varieties are grown that differs in ripening and storing time. Data concerning storage of different varieties are shown in Table 1. The 1000 ton-

capacity storage was built in 1994, its atmosphere is not controlled only the temperature and humidity is adjusted. The cooling medium used is ammonium. The storage consist 6 rooms and a corridor. The area of one room is 116 m², the total net are is 696 m². In addition there is a 105 m² corridor and a 528 m² room for manipulation. The total net area is 1452 m² with the height of 5,3 m. The thickness of the wall is 0,5 m. O °C and 92-94% relative humidity can be maintained during storage. The element of cooling system is shown in Table 2.

Table 1: The characteristics of different stored pear varieties (2009-2010)

Variety	Date of harvest	Area hectare	Yield ton	End of storage
William	3 August	10	133	2 November
Bosc Kobak	2 September	15	246	2 January
Packham's Triumph	3 November	15	333	3 March
Hardenpont	1 October	10	164	1 March

Table 2: Applied equipment in pear storage

Name	Type	Piece	Nominal output
Cooling compressor	2V4/140-11	2	244 KW
Condensator	AVAKO-200	2	279 KW
Air-cooling	SM-125-16-8	30	19 KW
Ventillator	AV-63-1440-12	30	9000 m³/h
Ammonia pump	D 412 H	2	100 dm³/min

2.2. Methods of evaluation

All the relevant actions were considered and evaluated and the local normative and detailed technology was defined. These served as basics for the economic evaluation. The loss during storage was considered that varied between varieties and length of storage. Varieties sold resulted in different quality classes, their price and varied according to selling season.

By knowing costs and incomes profitability was calculated: these were counted per storing unit and stored quantity. Fix and variable costs of storage were defined, the return on storage, the level of cost and the profitability of storage.

As unique Hungarian product and market position of pear were considered too. We evaluated the strong points, the weeks and the possibilities of the pear grown in the areas of Kunfehertó.

3. RESULTS AND DISCUSSION

3.1. Characteristics of pear storage

Synchronizing harvest and storage. Success of storage largely depends on the quality of harvested fruit. This is why picking workers are qualified and well paid. Pickers are supervised whether they pick damaged fruit. Those who do too much harm to the fruit are excluded. Transport is also gently done, roads are maintained before harvest, fork-lifts are only used at loading and unloading the fruit. In this given firm the front-yard of the storage is paved, transport is done by IFA trucks. Pear is picked into small containers that can maximally loaded by 280 kg fruit. Containers are unloaded by fork-lifts and transported to FMC machine where the pear is disinfected.

Disinfecting. The FMC container's capacity is 2000 litre (STOP SCALD etoxyanin effective agent, 0,25% concentration). It is important to emphasize that after every 100 ton of pear new solution has to be mixed (for the total 876 tons of fruit altogether 18000 litre solution). The variety William's yield was 133 ton what was harvested in two days. For a daily 66,5 tons of fruit 238 crate is needed. The IFA truck can load 15 containers, so transport vehicles must return in 38 minutes. The duration of one container is 5 minutes. The transport of the disinfected containers and the loading is done by different fork-lifts. The normative of these lifts: 3,36 t/hour. The normative of the loading fork-lifts is 2,24 tons/hour. The yield of Bosc Kobak variety was harvested in four days. For the transport 220 containers are needed, the normative of one vehicle is 40 minutes. Packham's Triumph variety's 333-ton yield was harvested in five days and for the continuous processing and disinfecting the IFA trucks had to return in 38 minutes. Hardenpont variety yielded 164 tons of fruit and it took the pickers 3 days to harvest and store. Daily storing amount was 55 tons which assumes a 46 minutes return of the vehicles.

Organizing, preparing operations. It is basically necessary to check the storing rooms thoroughly, that is proper technical conditions of storing must be ensured (isolation, spare parts etc.). Rooms must be disinfected, cleaned and ventilated. All these should be terminated before the first time of storing (3 August). After storing rooms are closed and ventilated thoroughly (Ferencz et al., 2009).

Storing order. The six rooms make altogether 3688.8 m² storing capacity. There are 99 pallets in one room with 6 storey's of pear on each pallet that is altogether 1680 kg pear (6 x 280 kg). An important issue is not mix varieties. Another important matter is that no stored fruit should be manipulated until it is stored out, that is a newly loaded amount of pear should not neighbor an already stored one. William makes 79 pallets resulting 80% utilization of the place. In Hardenpont's case in the second room this index is 87,7%. Bosc Kobak makes 146 pallets altogether in two rooms (3rd and 4th) resulting 100% and 47,5% respectively. Packhams fill exactly the 5-6th rooms. The average utilisation of the room 6 is 87,7%.

Table 3: Quality classes

Variety	Storing loss rate	1st class rate	2nd class rate	3rd class rate
William	10% 13,3 t	40% 53,2 t	30% 39,9 t	20% 26,6t
Bosc Kobak	9% 22,14t	43% 105,8 t	35% 86,1 t	13% 32 t
Packham's	8% 26,64 t	46% 153,2 t	36% 120 t	10% 33,3 t
Hardenpont	11% 18,04 t	39% 64 t	32% 52,5 t	18% 29,5 t

Management of sorting. Sorting is done by an FMC type of machine. The average number of workers is 60. The capacity of the machine is 6,5 tons per hour and divides four quality categories. Its operating cost is 2950 Euro and the labor cost is 551 Euro. Workers put the sorted pear into cases and assure proper technical conditions. Woman workers put pears one by one into M30 cases. Containers contain 280 kg pear, the machine process 23,2 containers hourly, therefore 2 fork-lifts are necessary. For William 20,4 hours (2 days), for Bosc Kobak 37,8 hours (4 days), for Packham's Triumph and Hardenpont 51,2 hours (6 days) and 25,2 hours (3 days) respectively. Quality classes are shown in Table 3.

3.2. Evaluation of pear storing profitability

The main storing costs are summarised in Table 4. These calculations are not variety specific.

Table 4: Costs and cost factors of pear storage (2009-2010)

Cost factor	Cost per 1 m2 (1000 Euro)	Storing cost per 1 ton of pear (1000 Euro)
Material cost	1,4	1,1
Labour cost	120,0	6,3
Social insurance + tax	3,3	96,9
Depreciation	744,1	59,1
Cost of machinery	5087,7	3471,9
Other (FMC) cost	7,3	7,3
Direct cost	1155,9	1155,9
General cost	16,4	1984,5
Total cost	132,3	132,3

Table 5. Profitability indexes of pear growing (2009-2010)

Main natural specific costs	
total cost per 1 m² area (growing+storing)	5911,5 Euro
total cost per 1 ton of pear fruit (growing+storing)	623,9 Euro
income per 1 m² storing are	713,9 Euro
income per 1 ton of stored fruit	753,1 Euro
Profit per 1 m² storing are	122,4 Euro
Profit per ton of stored fruit	129,2 Euro
Main profitability indexes	
profitability%	21%
level of cost	83%

As it can be seen depreciation means the highest cost. It can be said that storage is very costly to firms. The profitability indexes are summarized in Table 5. The break-even point is at 264 kg/m². This firm stores 187.3 tons of pear on the average on 1 m²). It can be pointed out that the firm produces profit due to storage.

The market position of the product. This unique Hungarian product has different characteristic features. The values of this product derive from the conditions of the cultivated area and the expertise of the local people. It has got a juicy pulp, a specific smell, taste and high delicious quality. Because of the climate conditions in the region of Kunfehértó the quality of the product is higher than the average quality of the other cultivated areas. As far as the market position is concerned there has been a great

demand for this product for the last few years. Raw pears are sold from autumn to winter and can be bought in processed form throughout the year.

The strong points of the pear grown in the areas of Kunfehértó are that it can be easily transported, it is not easily damaged and can be stored and ripened for a long time. Its distillation is of excellent quality (William's pear). The food processing level of the product determines its high quality. The fresh pear even after storing can be used for making tinned fruit, fruit juice, distillation and dried fruit. Instead of the pear other winter fruits (apple) can be consumed.

The weaks of the product is that the protection of its origin is unsolved; it is not marked on the product where it is from and why it is unique. The resistance of the products grown is different to diseases and pests. That is why pesticides of different quantities must be used. This will be have an influence on how much juice the product contains.

The marketing resources to utilize the possibilities are the following: in case of winter pears the size, the shape and the stalk make it possible to have significant markings. Information labels indicating the origin can be stuck on the product or tied onto the stalk. Marking the geographic origin is good for conveying additional information as well (e.g. chemical-free, number of hours of sunshine ripening the fruit). It is suitable for making a product for enjoyment (candied).

4. CONCLUSION

- It would be ideal to store pear by size and color. That would make storing more differentiated. Storing parameters could then be altered making possible a less loss rate and a longer storing period. This extra managerial work and cost would definitely increase profit.
- In order to better utilize storing capacity and lower specific costs this firm should purchase pear. The 87,71% utilization rate should definitely be increased.
- Cost per production could be lowered if storage is leased out in "dead period".
- Generally it is practical to repeat the SWOT analysis every 2-3 years, or more frequently as needed, and to compare it to the previous examination results.
- To increase the popularity and the market revenues of this Hungaricum noted, and to simultaneously enhance the situation of the producers and the processors associated with the products.
- The processing of this product by preserving the Hungaricum nature to increase the added value that is recognized on the market.
- The application of well-selected marketing tools helps in the development of the regional and the national „image".

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