Management of commercialization of potato production through processing

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Abstract  Potato is one of the main crops in the world and in our country. Potato is a valuable food, considered by Food and Agriculture Organization (FAO) as an important pillar in enhancing food security worldwide. Need for efficient management, complex climate, technological, economic and biological changes occurred in recent times in agrosystems, require continuous and accurate knowledge of growing resources and vegetative state of crops.

Processing of agricultural products is a priority for national food industry to improve quality of life and level of performance of research by promoting new technologies in order to meet food safety requirements. Increasing quantities of processed products will lead to a secure production commercialization, profit insurance at farm level and increase of competitiveness of food industry.

Key words  potato, processing, marketing, food safety, variety

The implementation of integrated system of production-industrialization-commercialization ensures balanced development of proposed activities for increasing potato consumption processed in the EU and conveyor diversification of products processed according to customer requirements and the necessity of ensuring their health [3].

Increasing quantities of processed potato production leads to a certain production commercialization, certain profit at farm level and increase of the competitiveness of the food industry.

Currently, in Romania from the total area of 250000 ha of potato crop with an average production of 12.6 t/ha, only 1% of the total production is processed and there are a few processing units.

The first industrial transformation of potato was made in Transylvania, when the human ingenuity has found the solution of burning, namely the production of alcohol from potato thus protecting small distillery. Reports sent to Vienna generated new claim on appeal, especially after Transylvania became Grand Principality (1763), where among others ukase is issued on March 15th 1769 Guberniyal Order to extend potato crop that can be a new release form and the product obtained from burning [1].

In our country, the potato as raw material for industry was used in 70% for extraction of starch and glucose, 20 to 30 % for the production of alcohol, 5 to 10 % for other purposes [2].

Working Method

- Evaluation of the production of potatoes for processing through:
  - Determining the quantity of potatoes required for processing at national level
  - Identifying farmers who have material and technical basis for the establishment of crops
  - Determining the necessary quantities of planting material from varieties for processing and allowed farmers that produce them.
  - Determining the purchase price of planting and processing material by firm contracts between growers of seed potato for processing and factory, between processing potato growers and factory.
- Projecting medium and long term plans developed by processing plants and farmers
- Cost benefit analysis in the processing of potato in the form of chips

Results and Discussions

Currently operates two factories at national level for processing potato in the form of chips: S.C Pepsico SRL București and SC Intersnack Brașov, each with a capacity of 20,000 t/year, S.C Roclip Făgăraș for potato flakes with a capacity of 30,000 t/year, S.C Frigo Pommes Chichiș Covasna for pommes frites with a capacity of 5000 t/year, S.C Samaco SRL Targu Secuiesc for fresh potato, vacuum packaged and modified atmosphere.

Unfortunately the factory from Făgăraș processed a very small quantity of potato due to the competition in the market for potato flakes. Potato processing costs are very high because of the gas, electricity and water costs.

According to current studies, for any of the processing units in the country has not been provided the necessary raw material. All were forced to import over 50% of its potato for processing. Identified causes are low prices provided by the factory, farmers below cost, lack of possibilities of ensuring the amount of water required for potato crops, use of planting material of low biological quality not suitable for the environmental conditions.

As habitat of potato crop for processing the following areas were identified: for semi-early potatoes localities like Lunguletu and Tartasesti in Dâmbovita County, for semi-late and late potatoes farms in the counties like Brașov, Covasna and Harghita.

As contracted areas, they are far below the potential given in the mentioned areas, but with clear trends of increasing, industrial crops are a certain solution for the marketing of production, even if the price is not attractive to farmers. Through the application of crop specific technologies and ensuring demand water for crops, growing potatoes for processing becomes profitable and attractive to farmers.

Tubers for industrial processing have to be good in terms of quality. The quality of industrial potato means physical, chemical and technological quality.

Physical quality of tubers emphasizes the following aspects:
- Tuber size
- Tuber form, depending on the variety
- Eyes depth, very important aspect by cleaning
- Tuber flesh color, which determines the appearance of the finished product
- Mechanical damage of tubers produced by mechanical means during harvesting and handling or twitches products and soil pests
- Disease attack, important by potato storage

Technological quality means:
- Yield of processed product
- Color of the chips
- Oil consumption

Among the ennobled products of potato, chips are the most requested. The method of the production is: peeling of tubers and cutting into slices of 1.75 mm, after which the starch is washed under running water, the excess water is removed from the potato slices, either by hot air stream or by centrifugation, then they are fried at 160 °C in oil bath. The roasting time is 2-3 minutes. After roasting excess oil is removed by a blower fan, then they are seasoned and packaged, thus being ready for commercialization.

A good quality chips is of a uniform golden-yellow color. Oil content of chips has to be small, fewer than 30 %. A high content of oil makes fried potato slices unsavory, shortens the conservation period, increases the probability of depreciation.

To obtain a high quality finished product it is important for processing to use special potato varieties. These must correspond to the parameters required by the processing techniques, such as the tuber shape to be round or up to oval, to have shallow eyes and smooth skin, and white-yellow in color.

Chemical quality
- Tuber starch content must be > 18%. Lower starch content in potato tubers leads to accumulation of oil in fried slices of chips, which, besides having an unsavory taste, have a shorter conservation period and can be easily depreciated. High starch content of potato tuber produces an unwanted crispness, which can be annoying for consumers causing mouth irritation. Slices of too crispy chips can be sensible by transport, separate easy and destroy the commercial aspect of the product.

- Low reducing sugar content. A high content of reducing sugars in potato tubers causes blackening of chips slices during frying. This phenomenon, besides destroying the commercial aspect of the product, which darkens, produces a bitter taste as well. To obtain a high-quality raw material for the production of the chips is not enough just to choose potato varieties with parameters mentioned, but they must be cultivated on medium soils with application of specific technology, as a balanced system of fattening land and the maintenance and control of pests and diseases have to be made so that the plant to remain green until maturity. During harvest, transport and sorting of tuber mechanical injuries, that stand out during processing have to be avoided, because they destroy the commercial aspect of the product.

The main varieties that are used to produce chips are Lady Claire, Lady Roseta, Pirol, Opal, Hermes and Saturna. The latter has the best features for processing chips, with a dry matter content of between 24-25 %, and very low sugar content, preserves its characteristics.
even after a prolonged storage at a temperature of 6-7 C.

### Analyses of economic efficiency

<table>
<thead>
<tr>
<th>Specification</th>
<th>MU</th>
<th>Variety type I</th>
<th>Variety type II</th>
<th>Variety type III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw material costs</td>
<td>lei</td>
<td>3600</td>
<td>3000</td>
<td>2400</td>
</tr>
<tr>
<td>Expenditure on:</td>
<td></td>
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<tr>
<td>- Oil</td>
<td>lei</td>
<td>3800</td>
<td>3300</td>
<td>3000</td>
</tr>
<tr>
<td>- Other materials</td>
<td>lei</td>
<td>3500</td>
<td>3100</td>
<td>2800</td>
</tr>
<tr>
<td>Energy, water, gas</td>
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<td>300</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Depreciation</td>
<td>lei</td>
<td>2800</td>
<td>2500</td>
<td>2200</td>
</tr>
<tr>
<td>Personnel expenses</td>
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<td>3800</td>
<td>3300</td>
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<td>Direct costs</td>
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<td>15860</td>
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<tr>
<td>Indirect costs</td>
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<td>4700</td>
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<td>Flow losses costs</td>
<td>lei</td>
<td>1900</td>
<td>1700</td>
<td>1500</td>
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<tr>
<td>Total costs</td>
<td>lei/to</td>
<td>26300</td>
<td>23900</td>
<td>22060</td>
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<tr>
<td>Income from the commercialization of 1000 kg chips</td>
<td>lei/to</td>
<td>27000</td>
<td>27000</td>
<td>27000</td>
</tr>
<tr>
<td>Profit/to chips</td>
<td>lei/to</td>
<td>700</td>
<td>3100</td>
<td>4900</td>
</tr>
</tbody>
</table>

Variety type I- 16% starch- 1000 kg chips are obtained from 6000 kg potato
Variety type II- 19% starch-1000 kg chips are obtained from 5000 kg potato
Variety type III- 24 %- 1000 kg chips are obtained from 4000 kg potato

According to analyses of the results we can notice that the profit/ton of chips ranges from 700 lei to 4940 lei, depending on the type of the variety used.

### Conclusions and recommendations

- Processing of potato production is a priority for food industry, whereas by adding more value, the products are increasingly sought on the market. At the same time the commercialization of the production is certain.
- The quality of raw material for processing plays a major role in achieving superior yields
- Ensuring processing plants with quality raw material is an ongoing objective of local farmers
- Ensuring certified planting material of varieties suitable for processing in various forms is the basis for ensuring profit
- Recommended varieties for processing must have a high content of dry matter and values greater than 18 % of starch content in tubers

### References