STUDIES CONCERNING MASS TRANSFER AT THE MEAT PRODUCTS DEPOSIT

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Abstract: Once with continuous growing of population, in a modern world, the using of artificial cold is 
one of the most used ways to preserve and deliver food, and, in the same time to contribute to the universal food 
security.

Cold has a very little influence considering original taste of fresh foodstuff, unlike other preservation 
processes, like: salting, smoking or dehydration.

The artificial cold makes easy commercialization of meat products and transporting them between 
countries, assuring a large variety of foodstuffs to costumers.

The artificial cold may decrease the storage loosees, which are, in some countries, very important. The 
using artificial cold requires financial funs, materials, energy and skilled staff, components that often miss in 
countries that are in development course. The main causes of losses are: mechanically actions (structure damage 
because squeezing), drying processes, seasoning and degrading actions of pests (microorganisms, rodents, birds, 
etc.).

The mass transfer and weight losses are stricken by: previous processes of processing and storing of meat 
products, speeds of refrigerating and freezing processes, and time of storing at low temperature.

The present essay analyses the mass transfer and weight losses, in the case of meat products.

INTRODUCTION

Meat products, during briefing and depositing in cold spaces, suffer weight losses 
because of the mass transfer, or the partial dehydration through water evaporation or 
sublimation of the ice on their surface at the contact with the cooling agent (Tofan, I., 2005).

Strength and size of weight losses depend on air parameters from storage room 
temperature, humidity, air speed), on product caracteristics (size, species, age, weight 
process etc.) and storage period (Sâlâgean, C. D., 2003).

The increase of mass-transferring is influenced by: the product’s nature, its chemical 
composition, its physical properties, its specific surface, as well as the partial termic transfer 
coefficient at the surface of the product at the cooling agent (Țibulca, D., D. Sâlâgean, 2000).

Both mass transfer and weight losses because of meat products dewatering are stricken 
bye many factors like: product and pack type, cooling agent type, procedural used, frigorific 
equipment, exploitation and conditioning conditions (Georgescu, Gh., C. Banu, ş.a., 2000).

The more percentage of free water contained by the product, the more losses through 
dehydration; the larger specific surface F/G (surface of the carcass/ quantity of meat 
subjugated to refrigeration) the higher the losses.

The lower the relative humidity in the refrigerating spaces, the more intense the mass 
transfer and the greater weight-losses.
MATERIALS AND METHOD

For experiments, the followings have been used: pork carcass with bacon, pork carcass without bacon, beef carcass. Three carcasses out of each sortiment have been weighted.

Each of the meat carcasses have been weighted using an electronic scales. Next, they were deposited for 24 hours, 48 hours and 72 hours inside the refrigeration room. After the established time period, the carcasses were weighted using the same scale.

The beef didn’t refrigerate so quickly, to avoid cold shrinking. Because of that, the air temperature from refrigerating room was maintained between 6 – 10°C in first 10 hours after slaughter.

In pork case, the bacon batch protects meat and there is no risk of cold shrinking. The air temperature from refrigerating room was maintained between – 3.5... – 2.5°C, the air speed 0.4 m/s and relative humidity between 90 – 95%.

RESULTS AND DISCUSSIONS

In table 1 are represented estimations looking weight losses during keeping of test meat products.

<table>
<thead>
<tr>
<th>Type of product</th>
<th>Initial stage weight [kg]</th>
<th>Weight losses after 24 h [kg]</th>
<th>Weight losses after 48 h [kg]</th>
<th>Weight losses after 72 h [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pork and bacon</td>
<td>96</td>
<td>95.62</td>
<td>95.42</td>
<td>95.37</td>
</tr>
<tr>
<td></td>
<td>101</td>
<td>100.6</td>
<td>100.39</td>
<td>99.34</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>109.78</td>
<td>109.52</td>
<td>109.39</td>
</tr>
<tr>
<td>Pork without bacon</td>
<td>87</td>
<td>86.57</td>
<td>86.48</td>
<td>86.30</td>
</tr>
<tr>
<td></td>
<td>88</td>
<td>87.65</td>
<td>87.52</td>
<td>87.34</td>
</tr>
<tr>
<td></td>
<td>92</td>
<td>91.54</td>
<td>91.45</td>
<td>91.26</td>
</tr>
<tr>
<td>Beef</td>
<td>210</td>
<td>209.16</td>
<td>208.67</td>
<td>208.32</td>
</tr>
<tr>
<td></td>
<td>209</td>
<td>208.12</td>
<td>207.68</td>
<td>207.43</td>
</tr>
<tr>
<td></td>
<td>214</td>
<td>213.14</td>
<td>212.65</td>
<td>212.29</td>
</tr>
</tbody>
</table>

The greatest losses were recorded at teh beginning of the refrigerating period (pork with bacon 0.3%, pork with no bacon 0.4% and beef 0.42%). Percentage variation of weigh losses at refrigerating product storage in experiment length is represented in figure 1, 2 and 3.
Figure 1. Variations of weigh losses at refrigerating products storage in 24 hours

Figure 2. Variations of weigh losses at refrigerating products storage in 48 hours
From analysis of the acquired issues, it is noticed that in refrigerated products storage, the highest losses were distinguished at start of storage time and are keep growing as much as the storage time is longer.

Comparing the results with the ones of other authors (Banu, C., P. Alexe, Camelia Vizireanu, 2003, Tofan, I., Clemansa Tofan, 2002) from the specialty literature, it is found that the weight losses of refrigerated meat fit in the limits they established.

CONCLUSIONS

During the first 24 hours, the weight losses of the pork without beef were 25% larger than the ones of the pork with beef, which confirms the fact that beef detains a protective role in the mass transfer;

The mass losses through evaporation are not significantly influenced by the relative humidity; but during ulterior depositing and towards the end of the refrigeration cycle, the relative humidity becomes important. Usually, regulating the relative humidity is rarely economic in the refrigerating chambers;

The weight losses at refrigerated products storage has close values in the case of pork without bacon (0.4% at 24 hours, 0.55% at 48 hours and 0.75% at 72 hours) up beef (0.42% at 24 hours, 0.63% at 48 hours and 0.75% at 72 hours);

Determining the weight losses of meat products is highly important to determine the efficiency and final costs of the finished products

BIBLIOGRAPHY