

Influence of re-freezing and storage on the technological properties of meat

II. Changes of the Hydrophile Properties of Veal

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In accordance with the argumentation of the present series /report I, XV-th European Congress/, this report reveals experimental results concerning the influence of the primary and secondary freezing and storage of veal at  $-10^{\circ}$ ,  $-20^{\circ}$ ,  $-30^{\circ}$  and  $-40^{\circ}\text{C}$  on its hydrophile properties.

For the purpose, m.Longissimus dorsi obtained from carcasses of calves in warm and chilled state was used.

For the characterization of the changes of the hydrophile properties the following indices: water retentive capacity, water-absorption capacity and free water were established.

DER EINFLUSS VON WIEDERHOLTEM GEFRIEREN UND LAGERN AUF DIE TECHNOLOGISCHEN EIGENSCHAFTEN VON FLEISCH

II. Veränderungen der hydrophilen Eigenschaften von Kalbfleisch

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In Übereinstimmung mit der Motivation für diese Reihe /Veröffentlichung I, XXV Europäischer Kongress/ sind in dieser Veröffentlichung die experimentellen Resultate des Einflusses von erstmaligen und wiederholtem Gefrieren und Lagern von Kalbfleisch bei  $-10^{\circ}$ ,  $-20^{\circ}$ ,  $-30^{\circ}$  und  $-40^{\circ}\text{C}$  auf seine hydrophilen Eigenschaften dargestellt.

Zu diesem Zweck wurde m.Longissimus dorsi verwendet, erhalten von noch warmen und gekühlten Kälberschlachtkörpern. Zum Charakterisieren der Veränderungen der hydrophilen Eigenschaften wurden folgende Kenngrößen bestimmt: Wasserhaltevermögen, Wasseraufnahmevermögen und das frei wasser nach Grau.

# INFLUENCE DE LA DEUXIÈME CONGÉLATION ET STOCKAGE SUR LES PROPRIÉTÉS TECHNOLOGIQUES DE LA VIANDE

## II. Changements des propriétés hydrophiles de la viande de veau

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En accord l'argumentation de la présente série /rapport I, XIV<sup>e</sup> Congrès européen/ ce rapport montre les résultats expérimentaux concernant l'influence de la première et de la deuxième congélation et du stockage du veau à une température de -10°, -20°, -30° et -40°C sur ses propriétés hydrophiles.

L'étude a porté sur m.Longissimus dorsi des jeunes taureaux au moment de l'abattage, à l'état frais et réfrigéré.

Pour caractériser les changements des propriétés hydrophiles on a déterminé les indices suivants: pouvoir de rétention d'eau, pouvoir absorbant d'eau et de l'eau libre d'après Grau.

# Влияние повторного замораживания и сохранения на технологические свойства мяса.

## II. Изменения гидрофильных свойств телятины

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В соответствии с обосновкой настоящего цикла / см. сообщение I-ое. XXV-ый Европейский Конгресс/ в этом сообщении представлены экспериментальные результаты о влиянии первичного и повторного замораживания и сохранения телятины при -10, -20, -30 и -40°C на её гидрофильные свойства.

Для этой цели использованы пробы от мускула Longissimus dorsi, полученные от парных и охлажденных телячьих туш. Для характеристики изменений гидрофильных свойств определяли стойкостиследующих показателей: водозадерживающая способность, водопоглощающая способность и свободная вода по Грау.

## Influence of Refreezing and Storage on the Technological Properties of Meat

### II. Changes of the Hydrophile Properties of Veal

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#### Introduction

In order to obtain an overall picture of the changes of the technological properties of meat during its cold treatment and storage, it is advisable to study the changes which occur in its structural and mechanical properties and in its hydrophile properties as well.

#### Material and Methods

In order to establish the influence of refreezing and storage in frozen state on the hydrophile properties of muscle tissue, *m. Longissimus dorsi* obtained from calves in warm and chilled state was used. The studies were carried out according to the scheme and methods described at length in our previous paper (1). The experimental results obtained and processed by the methods of the mathematical statistics are given in the graphs attached with the following symbols adopted:

- A. Changes during primary freezing and storage of  
 ..... warm veal  
 - - - - - chilled veal  
 B. Changes during secondary freezing and storage, for 150 days, of veal primarily frozen in warm and chilled state after  
 x-----x 75 days of primary storage,  
 o-----o 120 days of primary storage and  
 Δ-----Δ 210 days of primary storage, respectively.

#### Experimental Results

The experimental results of the changes in the hydrophile properties of meat during its freezing and storage in frozen state depending on its thermal state, freezing temperature and storage durability are shown in Fig. 1-4. As is seen from Fig. 1, at all the temperatures used the freezing process itself affected more considerably the values of the index of water retentive capacity in case of warm meat which manifested in lowering of the latter. The freezing process at the same temperatures exerted no authentic influence on the water retentive capacity of chilled meat. The storage of so frozen meat, regardless of its initial state, was accompanied by no essential changes of the water retentive capacity. The existence of a trend although slightly expressed toward worsening of the water retentive capacity of meat frozen in chilled state could be pointed out.

The experimental results obtained for the rest of the indices characteristic of the hydrophile properties of meat during its freezing and storage in frozen state at the temperatures adopted, i.e. salt absorptive capacity (Fig. 2), water absorptive capacity (Fig. 3) and free water after Grau (Fig. 4) showed that the changes occurred had the same feature and dynamics as the aforesaid. However, it could be pointed out that in case of veal frozen in warm state, about the period of 3-4 months some improvement of water absorptive capacity and lowering of separated free water after Grau occurred apparently in connection with post mortem processes.

At the examination of the results obtained for the influence of the secondary freezing on the hydrophile properties of veal frozen in warm state, it was established that irrespective of the temperature of cold treatment and storage the secondary freezing achieved at a later stage after the primary storage exerted a more markedly expressed influence on the values of the indices determined than that shown in the initial period of storage. A similar dependence was also established under the influence of the durability of secondary storage. It is necessary to point out that the deviations of the values of the indices characteristic of the hydrophile properties although slight, revealed a trend showing an improvement of the hydrophile properties during the secondary freezing and storage while this trend was more clearly expressed in case of extension of the period of primary storage. At the examination of the experimental results about the influence of the secondary freezing and storage of veal frozen in chilled state on the indices characteristic of the hydrophile properties, it could be seen that these changes were basically identical with the changes already established for warm veal frozen and preserved in frozen state. In this case there was a trend toward some improvement of the hydrophile properties during



secondary freezing and storage of meat, however this trend was equivalent for the various moments of secondary freezing and storage depending on the durability of the preliminary primary storage.

During the secondary freezing of veal primarily frozen in chilled state the differences already established for the degree of the influence of secondary freezing and storage on the quantity of the values of the indices determined depending on the durability of the primary storage were missing.

#### Literature

- (1) Dantchev, St., Lalov, M., European Congress of Meat Research Workers, Moscow, 1977.

