

Einfluss der Betriebsparameter auf die Veränderungen beim Gefriertrocknen von Fleisch

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Die Gefriertrocknung erweist sich von Jahr zu Jahr mehr und mehr als die geeignetste Methode zur Konservierung und langfristiger Lagerung von Lebensmitteln. Bei Anwendung dieser Methode erhalten die Lebensmittel ihren Nährwert.

In vorliegender Arbeit werden die Fragen des Einflusses von Betriebsparametern auf die Veränderung der Vitamine B₁ und B₂ beim Gefriertrocknen des Fleisches zur Erörterung gebracht.

Effect of regime parameters on vitamin changes upon the freeze-drying of meat

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With each year, freeze-drying proves the most suitable method for the preservation and long storage of foods which preserves their nutritive value.

This work discusses problems related to the effect of regime parameters on the changes in vitamin B₁ and B₂ upon the freeze-drying of meat.

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Influence des paramètres du régime sur la modification des vitamines pendant la lyophilisation de la viande

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La lyophilisation prouve de plus en plus ses avantages en tant que méthode s'avérant la plus convenable à la conservation prolongée des aliments et permettant à ces-derniers de retenir leur valeur alimentaire.

Dans le présent travail sont discutés les problèmes concernant l'influence des paramètres du régime sur les modifications dans les vitamines B₁ et B₂ pendant la lyophilisation de la viande.

Влияние параметров режима на изменение витаминов при сублимационной сушке мяса

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С каждым прошедшим годом сублимационная сушка утверждается как наиболее подходящий метод консервирования и долгого хранения пищевых продуктов, при котором сохраняется их питательная ценность.

Настоящая работа рассматривает вопросы о влиянии параметров режима на изменение витамина B₁ и B₂ при сублимационной сушке мяса.

Effect of regime parameters on vitamin changes upon the freeze-drying of meat

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The freeze-drying which consists of the separation of the water substance from the hard matrix of the biological material under pressures lower than the pressure in the triple point for the specific substance, at present finds an increasing application in the meat industry. Literature data show that freeze-dried meat (1,2,3) takes place as a component in the production of sausages and other meat products. This fact creates possibilities that in the near future there might be created new technologies in the meat industry, in which parallel with the classical methods and means, the method of freeze-drying shall find its place. The quality of the freeze-dried meat depends from a number of factors related to the preliminary treatment, freezing and freeze-drying, and also packing and storage. An important role in keeping the biological and nutritive value of the meat when freeze-dried plays the conservation of its vitamin content. Especially important vitamin in meat is vitamin B₁ (thiamine). Its content in pork, where it is the biggest, varies between 0,9 to 1,20 mg%, while in beef it is 0,1 to 0,3 mg%. It is well known that in the process of meat production the destruction of the vitamins is mostly influenced by such factors as temperature impact, water content, pH values, enzymes, free amino acids and others. The scope of the present work was to follow the changes in the vitamin B₁ content during the successive phases of the technological process of freeze-drying.

Object of the study were muscles longissimus dorsi, from animals after 120 hours following slaughter. The samples were cut in the form of plates. Untreated meat and meat submitted to culinary processes (roasting) were studied. Preliminary freezing of the samples was made by natural and impaired convection of the air media to temperatures of -30 and -50°C. To follow the influence of the regime parameters during the sublimation drying cycle were tried two methods of energy generation in the drying samples: conductive heating and combined conductive-radiational. The content of vitamin B₁ was determined after the Thiocrom method (4).

It is well known that the length of the drying cycle plays an important role on the biological value of meat; the means of energy generation in the object and the temperatures in the sublimation zone and during the period of the decreasing speed of drying (secondary drying) are of most importance for the keeping of the meat. For determining the total length of the drying cycle was constructed the following equation:

$$\tau = \left[\frac{W_H - W_{Kp}}{S} \cdot \frac{2,3}{\alpha} \lg \frac{1}{\alpha(W_{Kp} - W_p)} \right] \frac{G}{F}$$

where: W_H - is the initial moisture of the samples of beef.
 W_{Kp} - the critical mean humidity
 W_{kp} - the final residual humidity in the meat samples
 W_p - Balanced humidity
 α - coefficient of drying
 G - weight of the sample
 F - Surface of the sample

The speed of the freeze-drying S , taking part in the above equation is determined by the following formula (5,6):

$$S = \frac{D_{12}^0 K_n \Delta P}{(K_n P + D_{12}^0) RT \xi}$$

where: $D_{12}^0 = D_{12} \cdot P_c$

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- D_{12} - coefficient of mutual diffusion at atmospheric pressure
 P_c - pressure in the sublimation zone
 K_n - coefficient of steam permeability
 ΔP - difference in the pressures of sublimation and desublimation
 P - total pressure in the sublimation chamber
 R - universal gas constant
 T - temperature in the sublimation zone
 ξ - intensification of the sublimation zone

With the accepted means for energy generation during the process of freeze-drying was observed that better preservation of vitamine B₁ is achieved with the combined electric heating (conductive-radiational). Immediately after freeze-drying of raw meat by conductive-radiational heating and vacuum in the chamber from 10⁻¹ to 1,5 mm q.s.coloumm was not observed any change in the vitamine B₁ content in comparison to the content in the raw untreated meat. After 20 months of storage of the freeze-dried meat at room temperature, packed in multilayer elastic packing, the loss in the vitamine B₁ in comparison to the initial content was 5,03%. The preliminary culinary treated meat, after 20 months of storage in freeze-dried condition, loses 18,91% from the initial content of vitamine B₁.

The conducted studies demonstrate that the conductive-radiational heating by electricity in freeze-drying, permits maximal preservation of the vitamine (7).

Literature

- 1.K.Rothast, Gefriergetrocknetes Fleisch für Brüh-und Rohwürste, Die Fleischerei, 5, 1977
- 2.H.Rauber, Der Einsatz von gefriergetrocknetem Fleisch bei der Industriellen Brühwurstherstellung, Die Fleischerei, 5, 1977; Gefriergetrocknetes Fleisch für die Wurst von morgen, Die Fleischwirtschaft, 6, 1977
- 3.Strohecker R., und Kenning H.M., Vitamin-Bestimmung, Verlag Chemie GmbH - 1963
- 4.Tsvetkov Ts.D., Sublimatsionno sushene v chranitelno-vkusovata promishlenost, Zemizdat, 1973, Sofia
- 5.Gouido E., Tsvetkov Ts.D., Mechanisme de passage des gas rarefiés dans les matériaux au cours de la lyophilisation., IFF Symposium, Bressanone, Italy, 1974
- 6.Tsvetkov Ts.D., Novi tehnologii v chranitelno bkusovata promishlenost, Sofia, 1977
- 7.Tsvetkov Ts.D., Vacuumno sublimazionni installazii, Sfia, Tehnika, 1977