STUDIES ON THE CONTENTS OF RETINOL IN CALF LIVERS STORED UNDER DIFFERENT TEMPERATURES AND PERIODS OF TIME

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Summary,

Analysed is the liver from 15 calves of 12 to 18 months of age. The mean quantity retinol, found in liver in time of slaughter, amounts to 21069 I.U.to 100 g fresh mass. Losses of the vitamine during storage of the liver under temperatures of +4°, 0°, and -15°C of 2 to 40 days after slaughter, are biggest under plus temperature, while under minus temperatures in relation to the length of storage. In 40 days of storage of liver under temperature even of -15°C, the retinol loss amounts to 60%.

ИССЛЕДОВАНИЕ СОДЕРЖАНИЯ РЕТИНОЛА В ПЕЧЕНИ ТЕЛЯТ, СОХРАНЯЕМОЙ РАЗЛИЧНОЕ ВРЕМЯ ПРИ РАЗЛИЧНЫХ ТЕМПЕРАТУРАХ

Резюме

Исследована печень 15 телят возрастом от 12 до 18 месяцев. Среднее количество ретинола, обнаруженное в печени во время заготовки мяса, достигает 21069 м.е./100 г свежей массы. Потери витамина при хранении печени при температурах +4°, 0°, -4°, и -15°С в течении 2-40 дней после убоя наиболее высоки при плюсовой температуре, тогда как при минусовых температурах потери ретинола, отнесенные к 100 г свежей массы, уменьшаются в зависимости от продолжительности хранения. При 40-дневном хранении печени даже при температуре -15°С потеря ретинола достигает 60 %.

UNTERSUCHYNGEN ÜBER DEN RETINOLGEHALT IN KALBSLIEBER BEI UNTERSHIEDLICHEN LAGERUNGSPERIODEN UND TEMPERATUREN

Zusamenfassung,

Es wurde die Leber bei 15 Kälbern im Alter von 12 bis 18 Monaten auf Retinolgehalt wärend der Lagerung untersucht. Die Durchschnittsmenge an Retinol in der Leber beträgt bei Fleischgewinung 21069 I.E./100 g frische Masse.Der Verlust an Vitamingehalt der Leber während der Aufbevahrung bei Temperaturen von 4°C,0°C, -4°C, und -15°C innerhalb 2 bis 40 Tagennach der Schlachtung ist am grössten bei den Plus-Temperaturen,während der Verlust an Retinol bezogen auf 100 g frische Masse bei den Minus-Temperaturen sich inAbhangigkeit von der Lagerungsperiode verrindert. Innerhalb 40 Tage der Aufbewahrung von Leber selbst bei Temperature von -15°C ist der Velust 60%.

Prolongated storage of animal tissues and of meat is related to bigger or smaller losses of the retinol content and other vitamines.

In the present work are investigated the quantitative changes whichoccur in the retinol contents of calf liver, stored under different temperatures and periods of time.

A peculiarity of the retinol is its stability in the liver, blood plasma and animal tissues during storage periods. Under condition of being stored moist, the liver can keep most of its retinol contents even during oxydation. On the other hand, the vitamine is entirely lost in sublimation drying of liver. For its preservation have their role the natural fats containing antioxidants like hydroquinone and tokopherols (1).

Material and Methods.

Studied is liver of 15 calves of 12 to 18 months of age. The samples are taken from and same anatomotopographic part of liver, immediately (to 3 hours) after slaughter, and after determined periods of its storage under different temperatures;

1. at +4°C - 2 days after slaughter;
2. at 0°C - 2 days and 4 days after slaughter;
3. at -4°C - 2, 20, and 40 days after slaughter; and
4. at -15°C - 2, 20, and 40 days after slaughter.

For ensuring the above temperature conditions, were used regular laboratory refrigerators, in which were placed glass vessels freely covered and containing the liver samples.

Envolved is the autumn and winter period of the year.

The retinol was determined after the method of Carr-Price(2,3).

Data is worked up for reliability after the method of Student (4).

Results and Discussion.

It was found that retinol in liver of calves of 12 to 18 months of age fluctuates between the limits of 9960 to 27337 I.U. to 100 g fresh mass, or that gives a mean of 21069 I.U. to 100 g fresh liver mass.

In similar investigations, different authors have received differences, which is seen on table 1.

Table 1

Scource	Retinol I.U. to 100 g
Moore and Payne (1942)[5]	6300
Harms (1942)[6]	12100
Watt and Merrill (1950)[7]	22500
Schweigert and Payne (1959)[8]	44000
Tashev et al.(1966)[9]	22500

Most probably the differences, received by these authors are due to age differences and breed of the animals, food, season, geographic conditions and other factors, which can influence on

the different meat components.

For the quantitative changes of retinol during storage of liver was found, that this vitamine is best kept, in storing of the liver on the zero and minus temperatures.

After 2 days storage of liver under +4°C, the retinol amounts to 77,25% in comparison to the quantity found immediately after the slaughter of the animals. After a 2 days storage of the liver at 0° less than 10% of the retinol is lost, and after 4 days the loss is doubled (amounts to 9,77%, and 18,10% respectively, in comparison to the quantity found during the first day after slaughter).

The storing of the liver under minus temperatures show the following losses of retinol : at -4°C, the vitamine decreases with 5,12% after two days, with 29,35% after 20 days, and with 62,65% after 40 days storage, or amounts to 19989, 14886, and 7870 I.U. to 100 g fresh liver mass.

Comparatively smaller is the retinol loss in liver, during storage at -15°C. After 2 days storage it amounts to only 1,83%, after 20 days to 23,67%, and after 40 days to 61,80%.

Quantity of retinol in calf liver under different temperatures and periods of storage(in I.U.to 100 g fresh mass).+

Table 2

Immed. after slaughter	T°of storage	After 2 days	Loss %	After 4 days	Loss %	After 20 days	Loss %	After 40 days	Loss %
21069	+4°C	16276	22.75	-	-	-	-	-	-
	0°C	19010	9.77	17306	18.14	-	-	-	-
	-4°C	19989	5.12	-	-	14886	29.35	7870	62.65
	-15°C	20683	1,83	-	-	16081	23.67	8056	61.76

+/For all groups P >0.001; r - in limits - +0.4 to + 1.23

From the results shown in table 2 is evident, that the changes in retinol contents, which have occured after 2 days of storage of the liver are very near under temperatures -4°C and -15°C, that is the difference is about 3%. The difference in the data from storage of liver for 40 days under the same temperatures is smaller than 1%. A bigger quantity of retinol has been kept after 20 days of storage under -15°C in comparison to the quantity for the same period under -4°C (difference in the loss amounts to 5.68%).

In storing of liver under refrigeration especially fit for

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the purpose, for periods of 20 and 40 days, is observed a slow water evaporation, the liver is dried slowly, and the air inflow is not restricted. Under these conditions retinol content is lowered with more than 60%, which in turn is in accordance with literature data, that in drying and access of atmospheric oxygen, retinol in liver delapidates to a greater degree, in spite of the fact, that during the storage the liver has not been treated for removing natural fats, which during the period have been submitted to changes.

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