

UNTERSUCHUNGEN ÜBER DEN THIAMINGEHALT IN BEI VERSCHIEDENEN  
TEMPERATURBEDINGUNGEN GELAGERTER KALBSLEBER

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Zusammenfassung

Es wurde die Leber von 10 Kälbern im Alter von 12 bis 18 Monaten untersucht. Die bei der Fleischgewinnung in der Leber gefundene durchschnittliche Thiaminmenge betrug 0,36 mg in 100 g frisches Gewebe. Die grössten Verluste an Thiamin wurden während der Lagerung bei Plus temperaturen festgestellt, während bei Minustemperaturen die Vitaminverluste, bezogen auf 100 g frische Masse, in Abhängigkeit von der Lagerungsdauer abnahmen.

ETUDE SUR LA TENEUR EN THIAMINE DU FOIE DE VEAU, CONSERVÉ A  
DIFFÉRENTES CONDITIONS DE TEMPERATURE

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Résumé

On étudie le foie de 10 veaux âgés de 12 à 18 mois. La quantité moyenne de thiamine, trouvée dans le foie pendant la production de la viande, atteint 0,36 mg/100 g de tissu frais. Les plus grandes pertes en thiamine pendant la conservation du foie sont marquées à la température positive alors qu'aux températures négatives les pertes en cette vitamine se rapportant à 100 g de masse fraîche diminuent en fonction de la durée de conservation.

INVESTIGATIONS ON THIAMINE CONTENT IN CALVES LIVER STORED UNDER  
DIFFERENT TEMPERATURE REGIMES

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Summary

Livers from 10 calves of 12-18 months of age was investigated. The mean thiamine quantity formed in the liver just after the kill amounts to 0,36 mg to 100 g fresh tissue. Biggest losses of thiamine under storage of liver, are encountered with plus temperature, while with minus temperatures the losses in vitamine related to 100 g fresh tissue are lower, depending on the storage length.

ИССЛЕДОВАНИЕ СОДЕРЖАНИЯ ТИАМИНА В ПЕЧЕНИ ТЕЛЯТ, СОХРАНЯЕМОЙ ПРИ  
РАЗЛИЧНЫХ ТЕМПЕРАТУРНЫХ УСЛОВИЯХ

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Аннотация

Исследована печень 10 телят от 12 по 18 месячного возраста. Среднее количество тиаминa, установленного в печени при мясopроизводстве, составляет 0,36 на 100 г свежей ткани. Самые большие потери тиаминa при сохранении печени отмечены при плюсовой температуре, тогда как при минусовых температурах потери этого витаминa на 100 г свежей ткани уменьшаются в зависимости от длительности хранения.

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The pH of fresh liver is 7,1 - 7,3 while after 24 hours of storage it changes to 6,1 - 6,4 (1). The Thiamine contained in the liver tissue is stable at pH 7,0 and each change from this value leads to its denaturation. Under lower temperatures it is more stable (2).

The scope of the present work was to investigate the quantitative changes in the Thiamine content of calf's liver, stored under different temperatures for 40 days. Similar investigations are not encountered in the current literature.

Material and Methodics of the investigation

Liver of 10 calves - Bulgarian brown breed - of 12 to 18 mouths of age, and a liveweight between 239 and 462 kg were investigated. The weight of the liver immediately after the slaughter was within the limits of 3,360 to 4920 g.

Samples were taken from median parts of the liver up to 3 hours after slaughter, as well as after defined terms of storage under different temperatures:

1. +4°C - 2 days after the slaughter of the animal
2. 0°C - 2 and 4 days " " " "
3. -5°C - 2, 20 and 40 " " " "
4. -15°C - 2, 20 and 40 " " " "

The spring season of the year has been investigated.

The Thiamine content was determined fluorometrically (as thiochrom). Elution was made on columns with Permutite T-warm. Extraction was made isoboutilalcohol. Measurement was made on Spekol with fluorimetric attachments, and a wavelength of 365,5 nm (3).

Results and Discussion

After the investigations there were data that the Thiamine from livers of calves aged 12 - 18 months having a liver weight of 239 to 462 kg, immediately after the slaughter is within the limits of 0,35 to 0,37 mg of 100 g fresh tissue.

For similar investigations other authors have obtained mean values for the thiamine in livers of calves, given in table 1.

| Source                    | thiamine mg % |
|---------------------------|---------------|
| /1953/A/                  | 0.22          |
| /1963/A/                  | 0.25          |
| /1962/A/                  | 0.30          |
| Psychev-Zvetkova /1963/A/ | 0.29          |
| /1967/A/                  | 0.29          |
| Krilova et al. /1968/A/   | 0.35          |

Similar to our findings for thiamine in livers of calves are those of Krilova et al., which are within the limits of 0,35%.

The differences of the content of thiamine in calves livers given by the different authors are possibly due to age, breed, liveweight, feed, season and other factors, which act on the thiamine content in the organs of the animals.

For the quantitative changes of thiamine under storage of livers it is proved, that this vitamin is well kept in the livers under minus temperatures (2).

While stored for 2 days, on +4°C, the liver amounts to 0,32 mg %, which is 89,03% from its quantity formal immediately after the slaughter. (table 2).

After a 2 days storage of the liver at 0°C less than 10% of the vitamin is lost, while after a storage of 4 days under the same temperature this loss is one and one half times more (9.44% and 14,3% resp.). (Table 2).

Samples of liver stored at -5°C exhibit a loss in the thiamine of 3,2% after the second day, 5,59% after the twentieth day, and 5,40% after the fortieth day. Similar are the losses in storage at -15°C. (Table 2).

During the first two days of storage at 0°C and 4°C the liver loses big quantities of liquid. Further the samples were stored only covered with glass tops in laboratory refrigerators, in which humidity and temperature have certain fluctuations. Probably the bigger losses of the vitamin are due on one side from the lost juice, due on the other side, from pH changes in the liver, which

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Table 2

| thiamine<br>immed. af-<br>ter slaugh-<br>ter<br>mg % | t°C | 2 days |                       | 4 days |                       | 20 days |                       | 40 days |                       |
|--|-----|--------|-----------------------|--------|-----------------------|---------|-----------------------|---------|-----------------------|
|  |     | %      | thia-<br>mine<br>mg % | %      | thia-<br>mine<br>mg % | %       | thia-<br>mine<br>mg % | %       | thia-<br>mine<br>mg % |
| 0,36   | +4  | 10.92  | 3.93                  | -      | -                     | -       | -                     | -       | -                     |
|  | 0   | 9.44   | 3.40                  | 14.87  | 5.37                  | -       | -                     | -       | -                     |
|  | -5  | 3.20   | 1.15                  | -      | -                     | 5.59    | 2.01                  | 5.40    | 1.94                  |
|  | -15 | 2.73   | 1.00                  | -      | -                     | 4.06    | 1.46                  | 4.00    | 1.44                  |

\*/ For all groups  $P < 0.01$  to  $0.1$ ;  $g$  = within the limits from 0.9 - 1.23

values under lower temperatures are more stable.

Negligible are the losses during the period 20th to 40th day of storage under -15°C (only 0.06 %), while on the 40th day of storage at -5°C the observed increase in the vitamin content (0.19 %) could be accounted for, vitamin producing microflora penetration. This might also be true for the results we received for liver stored at -15°C, where losses were very small - 0.04 %.

LITERATURE

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