A STUDY OF THE CONTENT OF RETINOL AND THIAMIN IN LIVERS OF UP TO FIVE MONTHS OLD LAMBS

N.Nestorov, N.Kozhuharova, N.Kirdzhieva

In the last decade, the percent of meat in the daily ration of man, has been increasing. Agriculture has been intensified more and more, the rate of its chemicalization augmenting in an accelerated rate. The situation demands that the biological qualities of meat be examined in each country and at each definite stage of the development of its agriculture.

In the present work the authors' aim was to examine the content of Retinol,Thiamin, as well as of some trace elements, in fresh liver of lambs not older than five months.

Studies in this respect have been carried out in the United States of America, Norway, Germany, etc., but those studies to a great extend include only individual parts of the carcass, processed meats, or refer to breeds of animals reared in those countries.(1-10). This explaines the differences in the data of the individual authors. It is evaluated from Table 1, that the examined contents of Retinol and Thiamin in liver of small cattle, marked quantitative differences have been obtained.

Table 1.

S O U R C E	RETINOL I.U./100 gr	THIAMIN mg/%
Schweigert and Payn, 1956 (11)	50.000	0,29
Wate and Merill, 1959 (12)	50.500	0,40
Tashev et al.,1966 (13)	1,600	0,29

Material and Methods

The liver of 60 lambs, slaughtered in the Sofia Meat Packing Plant, was examined. Sampling was done not later than 4 hours after slaughter. The studies include the spring season, during the growth of the lambs. The animals were devided into 8 groups according to their slaughter weight. Table 2.

Table 2.

Group	Average slaughter weight/kg	Number of animals
1	6,500	4
2	7,500	4
3	8,370	10
4	9,580	10
5	10,227	11
6	11,491	12
7	12,400	6
8	13,366	4

One and same part of liver, according to its anatomo-topographical location, in quantity of 5 gr of fresh tissue, was studied.

Retinol was determined after the method of Carr-Price (14). Saponification was performed with 30 ml of 50% KOH in a water bath at 65°C for 60 min. Measurement was performed with a spectrophotometer "Specol" at 620 nm. Because of the small cells, the quanitites measured and the colouring agent were respectively reduced 3 times.

Thiamin was determined fluorimetrically (thiochrom method) (15, 16). Hydrolyses of liver was performed with 60 ml of 0,1 N HCl at a boiling water bath for 40 min., the enzymatic treatment Diastase was carried out at 37°C for 4 hrs, and the purification and eluation by warm Permutit T. Thiochrom was extracted with Isoamyl alcohol. The measurement was carried out with "Specol" equiped for fluorimetric measurements at 437 nm, with comparative standart solutions.

Calcium was determined titrimetrically by the method described by Ermakov (17, 18) ; Phosphorus - colorimetrically after the method of Peat et al.(19), Iron - complexometrically after the method described by Tomicek (20), and Protein, by Kjeldal (17).

The obtained results were processed for reliability after the method of Student (21).

Results

Data obtained from these studies, differ from those available in literature, and are shown in the annexed tables and graphs.

An inverse correlation was noted between slaughter weight of the lambs and the content of Thiamin, Calcium, Phosphorus and Iron.

It is evident from Fig.2, that the increase of the slaughter weight nearly twice, the content of Thiamin has decreased by approximately 42,20%. This reduction is fairly marked among the first four groups ; the second groupshows a content of the vitamine 5,13% lower than in the first ; the third group, shows it by 26,[illegible] lower than in the third group. Further, difference becomes smaller however, and Thiamin level in the last three groups is nearly the same.

Such a correlation connot be noted with the Retinol content (Fig.1).

The results obtained for the Calcium content of lamb liver, are shown in Fig.3. In this case, too, a considerable reduction is noted among the first four groups. The Calcium content in the last group constitutes only 28,47% of the quantity, determined for the group with the lowest slaughter wight.

From the values obtained for Phosphorus and Iron content, one can conclude, that they, too, show an inverse correlation as regards to slaughter weight. The Phosphorus content in the group with the highest slaughter weight amounts to 74,1% of the content in the first group, and the Iron content - to 71,45%.

The values obtained for Retinol, Thiamin, Calcium, Phosphorus and Iron, refer to the age of lambs when they are the object of traditional lamb meat production in this country.

Table 3. Content of Phosphorus, Iron and Protein in lamb liver, in relation to slaughter weight.

Group	Slaughter weight kg	Phosphorus+/ mg%	Iron++/ mg%	Protein+++/ %
1.	6.500	442	15.80	19.88
2.	7.500	413	14.70	21.52
3.	8.370	405	13.40	20.59
4.	9.580	360	12.31	20.86
5.	10.270	370	12.44	20.56
6.	11.491	350	12.02	21.26
7.	12.400	337	11.05	21.62
8.	13.366	328	11.30	21.84

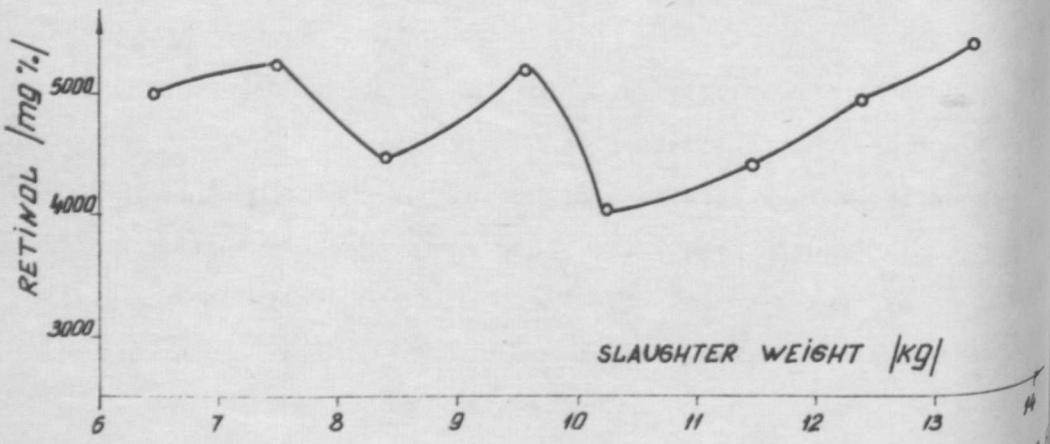
+For all groups P 0.001 ; g within the limits - + 0.08 to + 3.31
- 0.13 to - 1.14

++For all groups P 0.001 ; g within the limits- + 0.19 to + 0.34

- 0.09 to - 0.

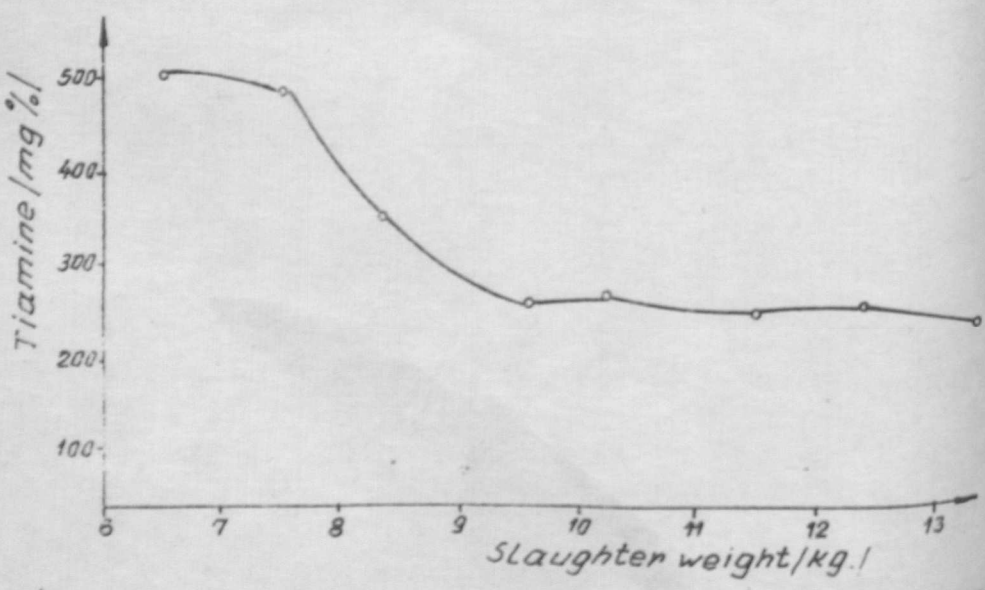
‡/For all groups P>0.001 ; g within the limits - + 0.19 to + 0.
N x 6.25 - 0.11 to - 0.

Fig.1.Retinol content in lamb liver in relation to slaughter wei



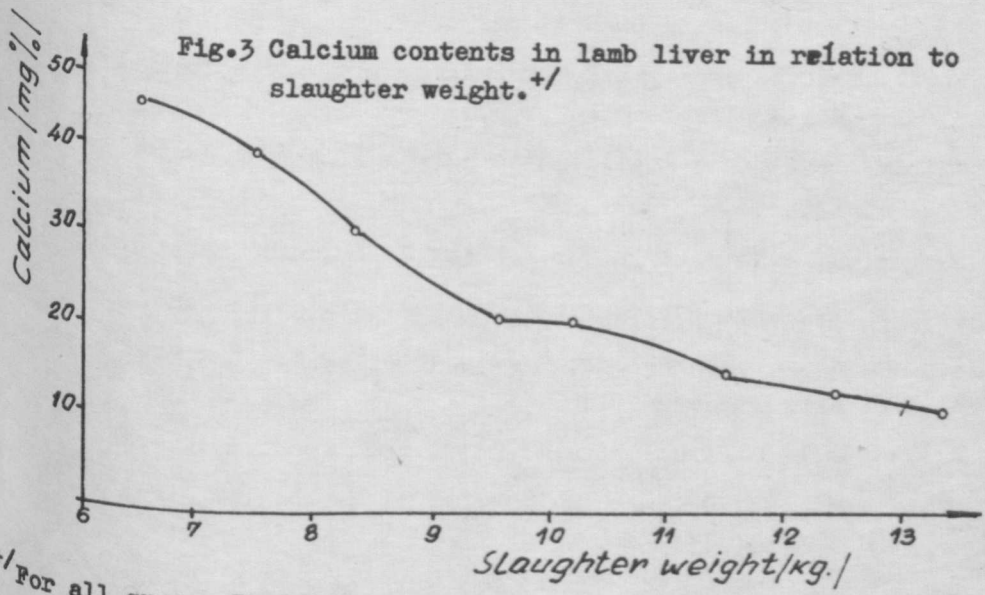
+/For all groups P>0.001 ; g within the limits - + 0.04 to + 1.
- 0.03 to - 0.

Fig.2 Thiamin contents in lamb liver in relation to slaughter weight.+/



+/For all groups P>0.001 ; g - within the limits - 0,9 to 0,79
For group 8 - P>0.0

Fig.3 Calcium contents in lamb liver in relation to slaughter weight.+/



+/ For all groups P > 0.001 ; g - within the limits - 0,63 to 1,28 g for group 8 + 0,4

Literature.

1.Antila,P.,E.Varesmaa, F.P.Niinivaara, 13th Eur.Meeting Meat Res. Workers, Rotterdam, 1967.

2.Niinivaara,F.P., P.Antila, 13th Eur.Meeting Meat Res.Workers, Rotterdam, 1967.

3.Blegen, E.,E.Damm, 12th Eur.Meeting Meat Res.Workers,Norway 1966

4.Blegen, E., 15th Eur.Meeting Meat Res.Workers,Finland, 1969.

5.Buchter,L.,L.Bogh-Spemser, M.Jul, 12th Eur.Meeting Meat Res. Workers,Norway,1966.

6.Kizlaitis,L.,C.Deibel, A.J.Siedler, Food Techn.1,1964,s.103

7.Meyer,J.A., E.A.Briskey, W.G.Hoekstra, K.G.Weckel, Food Techn. 4,1963,p.119

8.Wilkie,W.J.,E.A.Irwing, Austr.J.Exp.Agric.andAn.Husbandry,12, 1964,p.63

9.Schilinger,A., G.Zimmermann, Zchrft für Lebensmittel Untersuchung und Forschung Bd 128, 4, 1945

10.Agricultural Statistics,USDA,1967,p.604

11.Schwigert,B.S.,B.J.Bayn,- A summary of Nutrient Content of Meat, Amer.Meat Institute Foundnt,Bull.30,1956

12.Wate,B.K.,A.L.Merill,-Composition of Food - Raw,Processed,Prepared,No 8,1950

13.Tashev,T.A. et al. - Tablitzi za Sastava na bulgarskite chranitelni producti, 1966

14.Carr,B.C., Receiul Trav.Chim.de Pays Bas,55,1046,1936

15.Jansen,B.C.,Biocjem.J.2o,497,1926

16.Stroecker,R.,H.M.Henning, - Vitamin Bestimmungen Erprobte Methoden, Verlagchemie E.Merck - A.G. Darmstadt,1952

17.Ermakov,A.I.-Metodi Biochimicheskogo Isledovanie mastenii, Msokva-Leningrad,1952

18.Stanchev,L.at al.-Rukovodstvo za chimicheski analiz na rastenia, pochvi i torove, Plovdiv, 1968

19.Peat,F., G.J.Thomas, W.J.Whelan, J.Chemie Soc.,722, 1952
20.Tomicek,O. - Kvantitativni analysa, Praha, 1958
21.Merkureva,E.K. - Biometria v zivotnovodstve,Moskva,1964