

7 Summary

Examination of different diagnostic methods and significance of fatty liver at clinically diseased dairy cows and its relation to hypophosphatemia

Liver biopsy and blood samples were taken from four-hundred-eighty dairy cows from the clinic of cattle, faculty of veterinary medicine, Free University, Berlin. The cows were classified according to clinical manifestations into left abomasal displacement (71.9%), right abomasal displacement (19.8%) and other diseases, like pneumonia, mastitis, claws affection and metabolic disorders (8.3%).

The fat content of livers was estimated either by the copper sulphate test or by gravimetric methods. According to the fat content, the cows were classified into normal liver (0-15.5%), mild (>15.5-26%), moderate (>26-33%) and severe fatty liver (>33%) groups. Statistical comparison between the results of the two methods revealed a highly significant correlation ($p < 0.01$) between them ($r = 0.98$).

Tissue lysine buffer (ATL) was used in the gravimetric method to achieve a high percentage of liver cell destruction and subsequent accurate measurement of total lipid contents of livers.

Triglyceride was measured in the liver and livers were classified according to their triglyceride contents into normal, mild, moderate and severe fatty livers with triglyceride contents 0-10%, >10%-15%, 15%-20%, 20%, respectively. In addition a good correlation between total triglyceride and total fat content could be demonstrated ($r = 0.94$). While the correlation between triglyceride content of total lipid and total lipid was weaker ($r = 0.76$).

The clinical signs of severe fatty liver can be summarized as being yellow mucus membranes, anorexia, ketosis and nervous manifestation like stargazing, holding of the head, recumbancy and coma. Moreover, the mortality rate in cows increased when the fat content of livers was higher than 33% or the total triglyceride content above 20%.

The relationship between fatty liver and different disease conditions revealed that the prevalence of fatty liver increased with LDA more than with RDA and other diseases. In addition, an increase in the prevalence of endometritis did occur with an increase in the fat content of livers.

For serum chemistry a significant decrease of phosphorus was associated with an increase in total lipid contents of liver, triglyceride content of livers and triglyceride contents of total lipid ($r=-0.35$, -0.37 , -0.34 respectively) due to a decrease in food intake resulting from fatty liver.

A significant decrease of potassium ($r=-0.34$, -0.37 , -0.29) and of urea ($r=-0.12$, -0.10 , -0.10) was observed with an increase in total fat content, triglyceride content and triglyceride content of total fat content, respectively. On the other hand, significantly increased in ASAT ($r=0.31$, 0.34 , 0.30) and bilirubin ($r=0.44$, 0.49 , 0.45) with increase total fat content, triglyceride content and triglyceride content of total fat content, respectively.

Blood pictures showed a significant reduction of total leucocytes with increasing fat contents of livers. Blood indices revealed a macrocytic normochromic anaemia which resulted from disturbance in the cobalt metabolism due to liver dysfunction.

Ultrasonography of the liver was performed in hundred-forty dairy cows using a 3.5 MHZ transducer with a linear array. The hepatic ultrasonogram was evaluated according to the presence of bright and dark patterns and vascular blurring. In severe fatty livers, a higher percentage of bright pattern, deep attenuation, vascular blurring and blurring of edges was visible when compared with normal liver.

The portal vein diameter was reduced with an increase in the fat content of liver, while the size of the gall bladder increased when the fat content of livers increased.