

8. Summary

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Investigation in blood serum concentration of B vitamins of dairy cows.

The concentration of vitamins B₁, B₁₂ and folic acid in serum, which is released from protein, were analysed by high pressure liquid chromatography.

The analysis were done with a chromatograph, made by Dr. Ing. H. Knauer GmbH, Berlin.

Instrumentation	Dr. Ing. H. Knauer GmbH, scientific instruments, 14163 Berlin
Detektion	UV, K-2501
Column	Sperimage-80, ODS2, QE 125
Eluent A	Methanol
Eluent B	Ion exchange solution: Dodecan-1-sulfonacid-sodium
Software	ChromGate, chromatography data systems

The method of analysing vitamins B₁, B₁₂ and folic acid in standard solution is successfully established. HPLC provided the potential for the simultaneous quantitation of vitamin B₁, B₁₂ and folic acid. The analysis of bovine serum failed by limit of detection. The sensitivity of the UV-detection was 100 mg/l for folic acid, 20 mg/l for vitamin B₁ and 20 mg/l for vitamin B₁₂.

With these detection conditions folic acid must be concentrated to 10⁴, vitamin B₁ to 10³ and vitamin B₁₂ to 10⁵. This is not possible with the instrumentation used in this study.

In the here presented field study the blood serum concentration of the vitamins B₁, B₁₂ and folic acid in dairy cows were investigated.

The size of the herds varied from 150 to 3500 cows. Blood and milk samples were taken one or three times. During every visit information about keeping, feeding and health of the livestock has been evaluated and documented in a form sheet.

For the study only animals were used, who showed no clinical signs of disease. They represented the average.

Depending on the state of lactation the selected cows were divided in five groups:

group 1	cows from 8 to 3 week a.p.
group 2	cows from 3 to 1 week a.p.
group 3	cows from 0 to 1 week p.p.
group 4	cows from 3 to 5 week p.p.
group 5	cows from 15 to 18 week p.p.

In every group a pool value consisting of ten single samples has been made. The information content of the pool samples correspond the mean, which is calculated from ten single values. Therefore the bloodserum was analysed by established methods. Folic acid and vitamin B₁₂ were analysed simultaneous by radioimmunoassay. After derivatisation vitamin B₁ is measured by HPLC/fluorimetric detection.

Neither in blood nor in serum vitamin B₁ shows a significant difference according to the stage of lactation. From 3 weeks after calving the concentration of vitamin B₁₂ went down significantly below the reference values. This might be resulting from an inadequate provision with cobalt or a secondary lack of cobalt, caused by too high provision with potassium, or it could be a clue to a rumen malfunction. The information content of the vitamin B₁₂ concentration in milk corresponds to the mean from the vitamin B₁₂ concentration in serum. Biotin shows a significant difference according to the stage of lactation. Specially cows in an early state of lactation have a concentration of biotin which is below the literature reference value discussed in the standard literature.

The concentration of folic acid significantly goes down when cows are in early lactation or 8 to 3 weeks before calving. The dynamic of folic acid concentration reflect microbial rumen function within lactation.

B-vitamins show great differences between and within the different states of lactation. The results may show that folic acid and vitamin B₁₂ have a relation to ruminant digestive function.