Elektrolyte concentration (Ca, ionized Ca, P) and alkaline phosphatase activity in periparturient sows

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Introduction

Calcium has an influence on inflammation mechanisms and therefore possibly plays a role in the development of mastitis and metritis. Subclinical deficiencies may be important. Aim of the study was to determine mineral and electrolyte levels in the blood of periparturient sows in relation to the contents of the minerals in the food. Furthermore, we wanted to investigate, if additional calcium per os shortly before parturition has an increasing effect on the ionized calcium concentrations. Especially the biological available ionized calcium is an important parameter of mineral metabolism (Zepperitz and Gürtler 1992).

Material and Methods

We examined 60 hybrid sows of a piglet production farm with 700 producing sows. The sows got additional calcium via food at the day of parturition. Blood samples were taken one day ante partum, one, 8 and 15 days postpartum. We measured the concentrations of total calcium, ionized calcium, inorganic phosphate, potassium and sodium concentrations as well as the alkaline phosphatase (AP) activity in blood serum. Simultaneously, food samples were taken and the calcium, phosphate and sodium levels in the food were examined.

Results

The serum calcium concentration increased significantly ($p<0,001$) from one day ante partum (dap) to 8 days postpartum (dpp) (figure 1). At the same time increased the ionized calcium concentration from one day ante partum to 15 days postpartum (figure 1). The calcium concentrations were in all sows at every examinations time within the physiological limit. Calcium levels in the food were with 0,62% during high pregnancy and 0,75% during lactation within the recommended range.

Phosphate concentrations increased significantly ($p<0,05$) from one day ante partum to one day postpartum and decreased afterward significantly ($p<0,001$) (figure 2). All phosphate concentrations were within the physiological limits. Phosphate concentrations in the food were with 0,57% in high pregnancy above the recommended level of 0,5% and in lactation with 0,51% slightly beneath the recommended level of 0,55%. The calcium-phosphate ratio was with 1,1:1 in high pregnancy to low and with 1,5:1 during lactation relatively high.

The AP activity decreased from one day ante partum significantly ($p<0,001$) to one and 8 days postpartum and increased significantly ($p<0,01$) 15 days postpartum (figure 2). Sodium and potassium concentrations did not change during lactation and were within the physiological limits.

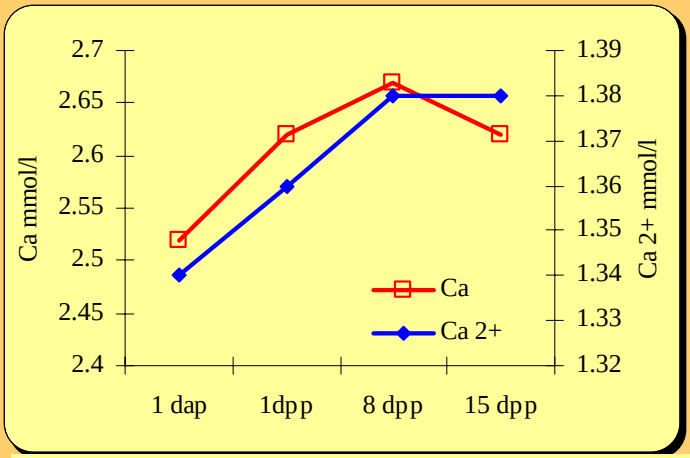

Figure 1 Total calcium and ionized calcium concentrations in the blood of periparturient sows (median) (n=60)

Discussion

The increasing calcium and ionized calcium concentrations during lactation are probably caused by the additional oral substitution of calcium. Because of the sufficiently high calcium concentrations in the food this calcium substitution would not have been necessary in this farm. It shows, however, that an additional calcium feeding is able to increase ionized calcium levels in the blood.

The increased phosphate concentrations, on the other hand, might be explained by the strain of parturition. That explains the short increase and the decrease in later lactation. The marginal supply with food had no direct influence on serum phosphate concentrations in this study.

The low AP activity indicates a balanced bone metabolism, as is shown with the physiological ranges of calcium and phosphate. Temporary metabolic acidosis, as is often the case in parturition, or decreased food intake around parturition also decreases the AP activity.

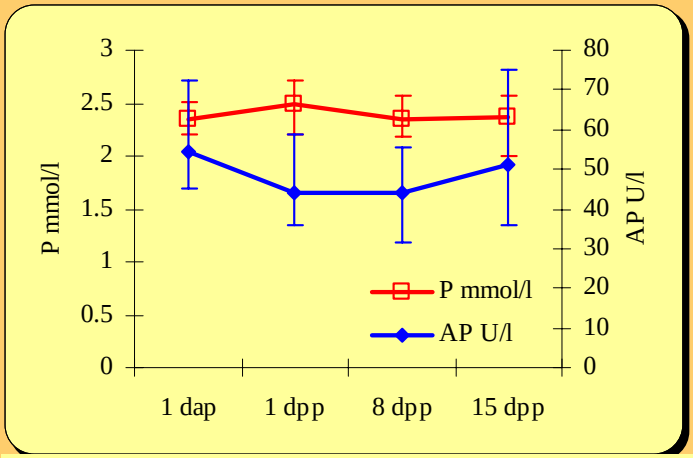

Figure 2 Phosphate concentrations and AP activities in the serum of periparturient sows (median, 1st; 3rd quartile) (n=60)

References

1. Zepperitz, H. et al. (1992). BMTW. 105, 328-332
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