

## 8. Summary

### **The effect of a varied duration of the close up period of primiparous cows on the incidence of dystocia and perinatal calf mortality**

In the recent years the incidence of perinatal mortality of calves in calvings of primiparous cows has increased. Dystocia is the main cause for the death of the perinatal calf. The most important factor influencing calving performance is the birth weight of the calf. This study was designed to examine the influence of the duration of the close up period on the growth of the primiparous heifer, its hormonal birth preparation and calving performance. Additionally, this study was to show the influence of the varied duration of the close up period on the calf birth weight, its body measurements, its perinatal viability, clinical parameters and blood serum metabolites.

This study was conducted between November 2003 and October 2003 on a Brandenburg dairy in Germany. 433 primiparous, artificially inseminated Holstein heifers were randomly allotted to three groups. A close up ration was fed to group 1 for one week (0-11 days), to group 2 for two weeks (12-16 days) and to group 3 for three weeks (> 17 days). The ration included 6.1-6.6 MJ NEL/kg, 12.1-15.0 % crude protein, 18.6-23.0% crude fibre and 16.5-22.7 starch and other carbohydrates on a dry matter basis.

The examination included the measurement of back-fat thickness by ultrasound and collection of a blood sample. The peripartum blood samples were analyzed for estradiol-17 $\beta$  and progesterone concentrations. A final blood sample was taken immediately after the calving and additionally examined for its concentration of various serum metabolites.

Calving difficulty was classified by three numerical scores: 0= no difficulty; 1= light calving assistance and 2= extreme difficulty requiring the use of a mechanical calf puller.

Prior to the first feeding of colostrum, the calf was weighed; its sex determined; the crown-rump-length, heart-girth, head width, body temperature, heart-rate and breathing frequency were measured and a blood sample was obtained. The concentration of lactate was measured in the whole blood and the concentration of various metabolites was measured in the blood serum. Within the first 24 hours the blood lactate was measured for a second time. At the ages of seven and fourteen days, the calf was weighed and its body measurements were re-taken. Disease and death cases until the fourteenth day were noted.

The duration of the close up period did not influence the body measurements, the viability, the serological or clinical parameters nor the incidence of the perinatal mortality of the calf in this study. The blood lactate concentration of the neonatal calf was higher than the reference values of the adult cattle and was independent of the duration of the close up period. The growth, the back-fat thickness and the height at the withers of the heifers were identical in all three groups after calving.

Higher birth weights of the calves lead to more calving difficulties. Although the calf birth weight did not differ between the groups, the longer the close up period, the more birth difficulties were observed.

Calving difficulty score 2 was primarily caused by abnormal presentation and reduced relaxation of the maternal soft birth canal and not due to an exceptionally high birth weight. Its incidence was equal in all three groups of the study and therefore it was not influenced by the duration of the close up feeding.

Higher calving difficulty scores led to more stillbirths in calves. Although the calving difficulty score 2 accounted for only 7% of the calvings, it led to almost one third of the stillbirths. The other perinatal calf deaths were found in equal parts at the calving scores 0 and 1. The estradiol-17 $\beta$  concentration in heifers with stillborn calves was significantly lower in the pre and peripartal period. This and the incidence of stillborn calves after a physiological delivery lead to the assumption that there is a prenatal lethal abnormality of the calf or a dysfunction of the placenta. Further investigations and studies of the placenta and the stillborn calf are necessary to evaluate this relationship.

The supervision of the parturitions and the calves took place hourly. Based on this there was a very low incidence of stillbirth and postnatal morbidity and mortality of the calves. The duration of the prepartum transition feeding did not lead to any consequences regarding the postnatal development of the calves.

In summary, perinatal mortality in calves is caused by a diversity of factors. In this study there were two major causes. On the one hand, heifers with stillborn calves showed a significantly lower prepartal estradiol-17 $\beta$  concentration and the perinatal calf mortality also existed under easy deliveries. This indicates the existence of a calf which was already prenatal lethally damaged or lethal dysfunction of the placenta. On the other hand, difficult births lead to a large proportion of the perinatal mortalities. It is not possible to completely eradicate the possibility of stillbirths, though it can be significantly reduced by a shorter close up period. In combination with early identification and correction of dystocia, a large number of perinatal calf deaths could be avoided.