

Summary

Investigations on the ultrasonographic measurements of back fat thickness and the variation in back fat thickness of dairy cows during dry period and lactation

The aim of this study was to describe the back fat thickness and the variation in back fat thickness as an indication of the energy balance in dairy cows. For this reason 11,055 cows of ten herds were investigated at regular intervals from 18 to 42 days by ultrasound scan. From this data collection results 85,049 measures. These values were subsequently related to production variables to set limits usable in dairy herd management.

The difference between net energy intake and net energy output is determining the energy balance. Therefore the energy balance is influenced by parity, dairy mass intake, time in lactation and milk yield. To avoid postpartal depression in performance the back fat thickness at dry off should be between 22 and 24 mm in herd average. With starting the lactation, the cows are in negative energy balance. This affects a decrease of back fat thickness down to 5 mm in some cows. The mean value of the herd should not be lower than 14 mm in early lactation. With the increase of the DMI and the decrease in milk yield in later lactation the fat reserve will be restored. This could be a reason for adiposis in herds with low production. Optimal conditions should be prepared until the beginning of dry period. Therefore the adequate feeding should be focused in the later lactation.

The variation in back fat thickness is estimated from two ultrasonographic measures and the days in between. An interval of 26 to 30 days is the best period between two measures. Shorter periods lead to unacceptable findings in work. Longer intervals result in an inaccurate estimation of the mean value.

During the dry period the daily variation in back fat thickness should be between 0.0 and 0.05 mm. Higher rates of anabolism in fat are connected with an increase of milk yield in early lactation but should be critically treated together with the backfat thickness. This should not be about 35 mm. Because of the reduced DMI and the increase of energy demand heifers start to lose condition 40 to 30 days before calving.

The postpartal nadir affects a daily change in back fat thickness of about 0.16 mm in herd average. A higher rise in lipolyses causes a decrease of reproductiveness. The nadir of the negative energy balance is between day 30 and 40 after parturition. After 110 days in milk the restore of fat depots should be started to prepare for the next lactation period.

There are strong correlations between milk yield and change in back fat thickness. A high milk yield in early lactation causes a high energy deficit. High producing cows catabolism can use up 0.2 mm of back fat per day. A higher rise in lipolyses leads to a significantly reduced reproductiveness. The increase of the daily change in back fat thickness from - 0.15 to - 0.2 mm doubles the interval to first insemination. Likewise the intercalving periods degrades as well as the number of inseminations till the pregnancy. Despite of high milk yield an efficient herd management can offset depression in fertility.

Milk solids secretion is strongly related to energy balance. Especially the milk protein content in early lactation has a significant correlation to the variation in back fat thickness. An average of milk protein below 3,1 % is an indicator of an extreme energy deficit. These cows can lose up to 0.2 mm of their back fat thickness a day. The milk fat content is not strongly related to energy balance.

The ultrasound scan of the back fat thickness can be an useful method to observe the condition in dairy cows. To solve problems in dairy herd management the variation in back fat thickness is more suitable. For this purpose standard curves throughout lactation of this experiment can be used.