

## **Summary**

*Examinations to detect the influence of methodical factors and factors depending on the animal on the results of the intravenous glucose tolerance test with breeding bulls*

480 intravenous glucose tolerance tests (ivGTT) have been carried out on 293 Holstein Friesian bulls aged from 9–20 month in two different artificial insemination centres. Following parameters were determined, while all bulls had a 12 – 21 hours diet by free choose of water intake: the basal glucose and insulin concentration ( $G_0$  and  $I_0$ ), the maximum concentration of glucose and insulin above the basal level ( $G_{MAX}$  and  $I_{MAX}$ ), the glucose and insulin area equivalent ( $G_A$  and  $I_A$ ), half life of glucose ( $G_{HWZ}$ ) as well as the quotient of insulin and glucose area equivalent ( $I_A/G_A$ ). The aim of the study was to assess the individual different regulation of testet parameters, the effect of factors like age, weight, condition and location and repeatability of the results. Furthermore, in literature described different methods to calculate half time of glucose should have been compared. Following Burkert (1998), who showed an interrelation between parameters of insulin reaction, this study should investigate, whether only one insulin parameter is enough to assess the insulin reaction. BURKERT (1998) showed in his study bulls with very different reaction of ivGTT. These special animals were picked out and the results were examined by repetition of the test.

The results are largely common with literature references, well recapitulate and fundamental influenced by age and different times without feeding.

Significant correlations exist between all parameters, the differences based on variable ages. 2 to 3 months after the first examination all results were repeatable. A significant correlation between all parameters existed. Thereby the difference between the values of the first and the second study in matched the majority of parameters due to the age. A significant relation between  $G_A$ ,  $G_{HWZ}$  and parameters of insulin reaction is in the first and second study for a short period. Reason for the negative correlation between the values of short-dated repetition is the number of probes ( $n=20$ ) and the strong influence of the single values.

The age has great influence of the results. Based on the higher fat substance of young bulls the parameters of insulin reaction grew up, corresponding to concentration of glucose and half-value time of glucose decreases.

This phenomenon stopped in age-group 3 (over 15 month), even more the back fat thickness declined. This crease could lead back on the test application of the bulls for the sperm production which takes place from the age of approximately one year and represents a sudden load for the breeding bulls.

Based on these results the best examination point would be an age with 12 month, before the bulls start with the sperm production.

Weight and back fat thickness influence the test results only due to old age. There is no significant correlation between these factors and test parameters within a close period of age. The influence of station is mostly caused by different feeding and husbandry. Therefore it is very important to create standards for examination.

The method from KANEKO (1997) to measure the half-value time of glucose shows the best agreements with literature, so this is the best propose for the standard method.

It was also examined (also see BURKERT 1998) that there are bulls with very low or very high insulin response corresponding to changed half-value time of glucose.

In some cases it was possible to repeat these results a second time, which means that there are bulls with a very divergent metabolism, but mostly the deviation, was inspired by unknown factors.

The study showed a high correlation between parameters of insulin response. To reduce the work to describe the insulin reaction with only one measurement; we assessed the relationship between insulin concentration and moment of taking the probe as well as parameters of insulin response. All insulin concentrations had correlation over 0.9 to  $I_A$ . Because most of the Insulin peaks fall on the 14<sup>th</sup> minute p. inj., the insulin concentration at this moment would be recommended as a parameter for the description of the insulin reaction.