Postprandial glucose and insulin concentrations in Belgian Blue veal calves on a commercial milk powder diet

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Introduction
White veal calves (formula fed calves) are predominantly male offspring of dairy cattle, which receive a low iron milk powder diet to obtain white meat. Veal calves remain physiologically monogastric.¹ Insulin resistance, hyperglycemia and glucosuria have been described in Holstein Friesian (HF) dairy veal calves on different milk powder diets.² In Belgium, besides HF dairy calves, also Belgian Blue (BB) beef calves are raised in this production system.

Objective
To determine the postprandial evolution of glucose and insulin concentration in 5 months old BB veal calves in order to investigate whether insulin resistance and hyperglycemia are also present in this beef cattle breed.

Materials and methods
• Six healthy 6 months old Belgian Blue veal calves (mean body weight= 260±31 kg) on a commercial veal farm (483 calves), housed on a grid floor.
• Milk ingestion (at T0):
  • Normal diet at that production stage; no concentrates or roughage
  • 8 litres milk (156 g milk powder/L; 19.6% crude protein; 20.3% crude fat)
• Blood sampling through permanent jugular catheter (Cavafix Certo 338, Braun) with 150 cm elongation tube and sampling outside the pen (Figure 1) at:
  • 30 minutes before milk uptake (T-30)
  • Immediately after milk uptake (T0)
  • At T30,T60,T90, T120, T180, T240, T300, T360, T420 and T480
• Analyses:
  • Glucose (mmol/L): dry chemistry (Spotchem™ II Glucose, Menarini Diagnostics) on sodiumfluoride tubes.
  • Insulin (µU/mL): human electrochemiluminescence immunoassay method (Cobas Insulin kit, Roche Diagnostics)² Cross-reactivity between bovine and human insulin was 25 % and constant within the physiological concentration range.³

Results
Mean basal values, peak values and area under the curve of glucose and insulin are given in table 1. Mean glucose and insulin levels in relation to feeding time are given in figures 2 and 3.

Conclusion
In contrast to HF veal calves (insulin/glucose ratio= 3.26)⁴, no signs of insulin resistance could be demonstrated in BB veal calves on a typical milk powder diet, fed twice a day.

High energetic nutrition can induce insulin resistance, but our results are also indicative for an additional breed specific difference in insulin responsiveness as has been demonstrated previously in neonatal BB and HF calves with an intravenous glucose tolerance test.³

References