

Beef versus dairy cattle: a comparison of metabolically relevant hormones, enzymes, and metabolites

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Abstract

In Charolais (CH) as beef and German Holstein (H) as dairy cattle, differences in concentrations of hormones regulating partitioning of nutrients, are expected. Charolais ($n=13$) and Holstein ($n=12$) bulls 9 months of age were fed every 4 h. Blood samples were taken every 20 min over 6 h. The average plasma concentration of growth hormone (GH) did not differ, but differences in pulse frequency (CH 4.7 pulses/6 h, S.D. 0.9; H 3.5 pulses/6 h, S.D. 1.2, $P=0.011$) and amplitude were observed (CH 6.3 ng/ml, S.D. 2.8; H 10.1 ng/ml, S.D. 4.7, $P=0.026$). Plasma concentrations of insulin, glucagon, and leptin also differed (insulin: CH 18.7 $\mu\text{U/ml}$, S.E. 1.7; H 28.1 $\mu\text{U/ml}$, S.E. 1.7, $P<0.001$; glucagon: CH 82.3 pg/ml, S.E. 7.5; H 120.8 pg/ml, S.E. 7.8, $P=0.002$; leptin: CH 2.4 ng/ml, S.E. 0.2; H 3.0 ng/ml, S.E. 0.2, $P=0.008$). Insulin and glucagon data were fitted to sinusoidal curves to analyse ultradian rhythm. Differences in amplitude, but not in period, were found. The results suggest that different utilization of nutrients leads to pronounced protein synthesis in CH and elevated fat synthesis in H to meet the episodic energetic demands during lactation in this breed. The results are confirmed by the analysis of selected metabolites.

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