

Changes of hindquarter metabolite uptake when turning from maintenance to fattening in Belgian Blue bulls double muscled type

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Introduction Measurement of muscle metabolite uptake may be approached by the technique of arterio-venous differences across the hindquarter, which contains large proportion of muscle, especially in double-muscled cattle. Muscle is an important site of amino acid catabolism (Goldberg and Chang, 1978). The extent of amino acid degradation may vary according to the time after feeding (Weijs, 1993). The aim of this experiment was to assess the changes in the kinetics of metabolite uptake across the hindquarter in Belgian Blue bulls fattened after a period of maintenance.

Material and methods Four double muscled Belgian Blue bulls, 288 kg and 12 months old, were fitted with catheters in abdominal aorta and vena cava and with a probe for aortic blood flow measurement. Animals were maintained at steady state during 15 d with restricted amounts of a low energy low protein diet (MP). They were then offered 6 kg/d of a high energy high protein fattening diet for another period of 15 d (FP). Hindquarter blood flow was measured and blood samples were taken every 2 hours from 08.00 to 20.00 h the last three days of each period. Diets were offered at 08.00 and 14.00 h. Arterio-venous difference and uptake of glucose and alpha-amino nitrogen were calculated for each sampling time. Data relative to each sampling time were averaged over 3 d by treatment and by bulls. Daily consecutive data were compared by the paired Student t-test with corresponding data at the previous meal. Effects of the treatment were also analysed by the paired Student t-test.

Results Weight gain averaged -0.1 ± 0.139 and 1.05 ± 0.39 kg/d during MP and FP respectively. During MP, glucose uptake showed no significant changes in the course of the day. During FP, it was numerically higher at 02.00 and 14.00 h and then decreased. Alpha amino nitrogen uptake decreased significantly 2 h after the first meal and increased thereafter. A numerical decrease was also observed after the second meal but to a lesser extent. Large differences were observed between the two periods.

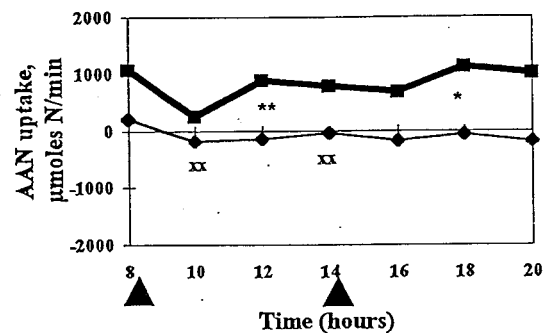
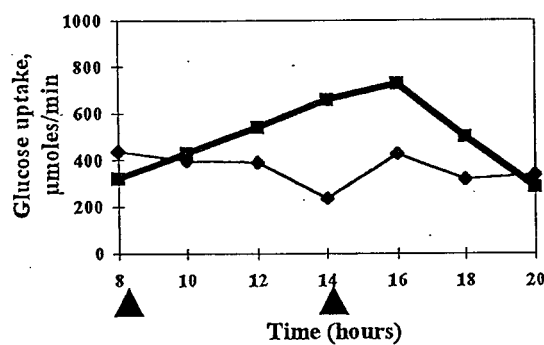


Figure 1 and 2. Changes in glucose and alpha amino nitrogen (AAN) uptake between fattening bulls at maintenance (—) or during fattening (—). Arrows indicate the feeding time. *, **: differences between periods ($P < 0.05$, $P < 0.01$); xx: differences with values at previous meal ($P < .05$).

Conclusions Higher glucose and alpha amino nitrogen uptakes during the fattening period are related to energy and amino-acids requirements for muscle protein deposition. The significant decrease of alpha amino nitrogen uptake immediately after the first meal, associated with a lower glucose uptake suggest a lower muscle protein deposition immediately after the first meal than after the second one.

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References

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