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Voluntary intake and feeding behaviour in relation to digestive function and body composition in normal and double-muscled Belgian-Blue young bulls

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Double-muscled Belgian-Blue bulls are known to have lower voluntary intake (VI) and better feed conversion ratio than normal bulls (Hanset *et al*, 1987, Génét Sél Evol, 19, 2, 225-248). The low VI of double-muscled animals was analysed through feeding behaviour, digestive function and body composition.

Six normal (N) and 6 double-muscled (D) young bulls were compared at 9 months of age (270 kg). Bulls received 40 g DM/kg BW^{0.75} of pelleted concentrate (57.5 % maize) and grass hay (58.6 % NDF) *ad libitum* (10 % refusals). Hay and concentrate were fed in two equal portions at 9 am and 15 pm for hay, and at 10 am and 16 pm for concentrate. After 2 weeks of adaptation, VI, kinetics of intake and jaw movements were recorded over 5 days (Baumont *et al*, 1990, J Agric Sci, 115, 277-284). Afterwards, the bulls were fed at 95 % of the determined VI with 50/50 % hay/concentrate ratio. Digestibility, nitrogen retention and retention times of Eu-labelled hay and Yb-labelled concentrate particles were measured over 10 days during which feeding behaviour was recorded over 5 days. Then, energy expenditure was measured by indirect calorimetry (7 days, Vermorel *et al*, 1994, Proc XIIIth Symp on Energy Metabolism, EAAP publ 76). Bulls were slaughtered 4 or 6 days later on.

VI in D bulls was 10 % lower than in N bulls and was associated with a lower rate of intake (RI) and a higher number of meals. RI in D bulls was significantly lower during both hay meals following distributions (14.3 vs 17.0 g DM/min, P = 0.013) and during concentrate meal at 10 am (77.1 vs 95.7 g DM/min, P = 0.041). Differences in feeding behaviour were similar during digestibility period. Dry-matter digestibility was similar in N and D bulls (69.6 %), as also total retention time of hay (48.7 h) and concentrate (32.0 h). Empty weight of digestive tract (47.3 vs 56.8 g/kg empty BW, P = 0.001) and rumen (15.6 vs 18.3 g/kg empty BW, P = 0.003) were lower in D bulls.

These preliminary results show that lower VI in D bulls is related to a lower motivation to eat (lower RI) which might be explained by lower energy gains (24.8 vs 49.3 kcal/d/kg BW^{0.75}, P = 0.0004) due to slightly higher protein accretion (81.2 vs 72.8 % muscles in the carcass, P = 0.003) but much lower lipid gains (4.4 vs 9.9 % adipose tissues, P = 0.007). In addition, physical limitation of hay intake should be more effective in D bulls which have a reduced rumen size and therefore tend to increase daily number of meals.

	N	D	P value*
Voluntary Intake (g DM/kg BW ^{0.75} /d)	88.6	79.6	0.005
Hay intake (g DM/kg BW ^{0.75} /d)	47.4	40.5	< 0.001
Rate of intake (g DM/min/d)	22.7	19.6	0.025
Number of meals (/d)	11.0	12.7	0.080

* : "genotype" effect in the analysis of variance.