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***Comparison of milking characteristics and feed conversion
efficiency of two lines of Holstein-Friesian cows which differ
genetically in live weight***

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of the requirements for the degree of

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ABSTRACT

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Milking characteristics during peak yield in two consecutive lactations (seasons 2000 and 2001, experiment one); daily milk production and composition, somatic cell count, live weight and body condition score during a complete lactation (2000 season, experiment two); and metabolisable energy intake and feed conversion efficiency during peak lactation (1999 season, experiment three) were studied in three experiments with grazing Holstein-Friesian cows from two selection lines, which differed genetically for live weight. *Experiment one (a & b)*: the heavy line yielded more milk at each milking than the light line but this difference was not significant for any season. Average flow rates were similar for both lines in both lactations (~2.0 litres/min for both lines). Maximum flow rates did not differ between lines either (~3.2 litres/min for both lines). Consequently, total milking times were similar for both lines in both lactations (7.5 vs. 7.3 min and 7.6 vs. 7.8 min for the heavy and the light line for seasons 2000 and 2001 respectively). *Experiment two*: Cows from the heavy and the light line yielded 22.2 and 20.6 litres/day respectively ($p < 0.01$). Fat yield was similar for both lines because the milk from the light cows had a higher fat concentration than milk from the heavy (4.8 vs. 5.0%; $p < 0.05$). The heavy line yielded more milk protein than the light line (0.8 vs. 0.7 kg/day; $p < 0.05$), however, there were no significant differences between lines for protein concentration. Log transformed milk somatic cell counts were slightly lower for the heavy line both in peak lactation and during the whole lactation, however, this difference was significant only during peak lactation in 2001 (10.8 vs. 11.4×10^3 cells/ml of milk, $p < 0.001$; and 10.3 vs. 10.8×10^3 cells/ml of milk, $p < 0.05$ for the heavy and light line for period one and two respectively). Differences in live weight between the heavy and the light line were significant (517 vs. 474 kg for the heavy and the light line respectively; $p < 0.001$). Body condition score during the whole lactation was similar for both lines (4.2). *Experiment three*: metabolisable energy intake and feed conversion efficiency in peak lactation were similar for both lines (158 vs. 161 MJ ME/cow/day and 108 vs. 106 g MS/kg DM intake for the heavy and the light line respectively). The regression coefficient of metabolisable energy intake on metabolic live weight was $0.65 \text{ MJME/kg LW}^{0.75}$ for both lines. In summary, selection for cow live weight affected the live weight of the cows, had no effect on milk production, and in contrast with other experiments, had no effect on individual pasture intake either per cow or per kg of metabolic live weight nor on energy requirements for maintenance. Finally, selection for cow live weight did not have a consistent effect on milking characteristics or milk somatic cell counts.

Key words: dairy cows; live weight; milk production; milking characteristics; somatic cell counts; feed efficiency.

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In memory of Jorge H. Tolosa Brown

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