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Resort Map

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Hepatic mitochondrial function of two Holstein strains in a grazing system

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To assess mitochondrial function during late lactation of North American (NAH) and New Zealand Holstein (NZH) cows under grazing conditions, eighteen Holstein cows (n = 9; 571 ± 79 kg of body weight (BW) and 3.0 ± 0.34 units of body condition score (BCS) for NAH and n = 9, 526 ± 64 kgBW and 3.1 ± 0.37 units of BCS for NZH) were assigned to a randomized block design (3 replicates/strain; 3 cows/replicate). Cows grazed on perennial tetraploid ryegrass (3673 ± 194 kg of dry matter (DM)/ha and 31 ± 4 kg of DM/cow per day; 1.49 Mcal/kg of DM. 13% crude protein and 52% of neutral detergent fiber) in daily strips. Liver biopsies were collected and cryopreserved at 214±37 days in milk and mitochondrial function was assessed measuring oxygen consumption rates using complex I (glutamate/malate) and complex II (succinate) substrates. Data were analyzed using a mixed model that included the strain as fixed effect and replicate as a random effect. Milk yield did not differ between Holstein strains (17.0 ± 1.2 kg/d) but fat and protein content were greater ($P < 0.01$) for NZH than NAH cows, thus, milk solid production was 20% greater for NZH cows. Pasture dry matter intake did not differ between Holstein strains (16.5 ± 0.8 kg DM/d) but when expressed as unit of $BW^{0.75}$, it tended ($P = 0.08$) greater for NZH than NAH cows (152 *vs*. 139 ± 5 g/kg $BW^{0.75}$). However, no differences were observed between Holstein strains in mitochondrial function parameters ($P > 0.20$). Oligomycin-sensitive respiration, which is respiration destined to ATP synthesis, was 6.7 *vs.* 5.8 ± 0.9 and 7.6 *vs.* 9.8 ± 1.5 pmolO_2/min/mg for NZH and NAH for complex I and complex II, respectively. Oligomycin resistant respiration, which is related to proton leak, was 5.3 *vs.* 5.3 ± 0.4 and 23.7 *vs.* 25.5 ± 3.4 pmolO_2/min/mg for NZH and NAH for complex I and complex II, respectively. Maximum respiratory capacity, which is related to a reserve potential, was 14.4 *vs.* 12.7 ± 1.5 and 38 *vs.* 35.9 ± 5 pmolO_2/min/mg for NZH and NAH for complex I and complex II, respectively. Finally, complex I non-mitochondrial respiration was 8.1 *vs*. 7.4 ± 0.6 pmolO_2/min/mg and for complex II was 8.1 *vs*. 7.7 ± 0.9 pmolO_2/min/mg for NZH and NAH, respectively. Overall, our results indicated that despite differences in milk solid production and pasture DM intake relative to $BW^{0.75}$, during late lactation, hepatic

mitochondrial function did not differ between NZH and NAH when grazing pasture was the only source of nutrients