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Abstract

Adaptive and Productive Sheep Breed for Changing Climate [†]

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Abstract: Sheep in semi-arid environments are likely to be affected by warming environment due to climate change. To identify genotypes best suited to warmer climates we assessed thermotolerance and meat quality of 5 female sheep of each of 4 breeds (Merino, Wiltshire, Dorper, and Southdown) under simulated summer conditions. The sheep were housed in metabolic crates within climate-controlled rooms and were exposed to thermo-neutral (TN; 18–21 °C and 40–50% relative humidity) or cyclic heat stress (HS; 28–40 °C and 30–40% RH) conditions for two weeks. Physiological responses were recorded 3 times daily, and brown fat tissue temperature was measured by data loggers inserted into the brisket. Sheep were slaughtered at an abattoir as per standard commercial procedure and samples obtained for carcass and meat quality attributes. When exposed to HS, Dorsers and Merinos exhibited lower respiration rate (151, 142 breaths/min, respectively) and rectal temperature (39.39, 39.32 °C, respectively) ($P < 0.05$) than Southdowns (192 breaths/min, 40.05 °C) and Wiltshires (200 breaths/min, 39.91 °C). Dorper and Wiltshire ($n = 3$) showed lowest sternal fat temperatures during HS indicating inherent differences in thermogenesis. HS had significant effect ($P < 0.05$) on post mortem muscle pH decline which was slower than TN sheep, except in Dorper again indicating better thermotolerance. There were significant ($P = 0.03$) breed effects on meat cooking loss % such that Southdown showed minimum cooking loss (17%) while Merino showed the greatest loss (24%). These results suggest that there are genetic (breed) differences in thermotolerance and meat quality of sheep, providing an opportunity to select best sheep suited to a warming climate.

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