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J.D. Pagan

METABOLIC EFFECTS OF WARM-UP ON EXERCISING HORSES

S. ROKURODA, L. LAWRENCE, S. PRATT, L. WARREN, D. POWELL AND A. CRUM
University of Kentucky, Lexington, KY

Athletes commonly warm-up prior to strenuous exercise. Warm-up may provide several benefits including enhanced blood flow to working muscles which could increase oxygen and substrate availability during the subsequent exercise. Little research has been conducted in the area of equine warm-up protocols, particularly in regard to identification of ideal warm-up procedures for various activities. In a previous study, warm-up intensity (walking vs. a combination of walking and trotting) did not affect heart rate or plasma lactate accumulation during a step-wise exercise test. However, it was concluded that the step-wise exercise test may not have been a suitable model as the initial steps were conducted at a very low intensity and may have acted as additional warm-up, thereby equalizing the warm-up treatments. Two additional studies were subsequently conducted to evaluate the effects of two warm-up intensities on response to shorter term, more intense exercise tests.

Five Thoroughbred geldings were used. All exercise tests were conducted in the morning, after a 12-16 h fast. In each experiment, the effects of two warm-up procedures were compared. The low intensity warm-up consisted of 15 min of walking and the high intensity warm-up consisted of a sequence of walk, trot, gallop and walk, but also lasted 15 min. Treatments were assigned to horses using a two period cross-over design in both experiments, so that all horses completed both warm-up treatments.

In experiment A, horses performed a 70 s exercise test following the warm-up period. The speed of the treadmill was increased during the last 30 s of the warm-up. The 70 s test consisted of 50 s of gallop at 8 m/s on a 10% grade, followed by 20 s at 8.5 m/s on a 10% grade. Heart rate and hematocrit were higher during warm-up ($P < .05$) when horses completed the high intensity warm-up but there were no treatment differences for these variables during the exercise test. Heart rate at the end of the exercise test averaged 196.8 b/min when horses completed the low intensity warm-up and 196.6 b/min when they completed the high intensity warm-up prior to the exercise test. Warm-up intensity affected plasma glucose and free fatty acid responses during the warm-up period, and glucose concentrations were higher ($P <.05$) during the exercise test when horses performed the high intensity warm-up. Higher glucose concentrations may suggest enhanced glucose availability as a result of catecholamine activation of hepatic glycogenolysis in response to high intensity warm-up. Plasma lactate concentrations at the end of the exercise test were lower ($P < .05$) when horses performed the high intensity warm-up. Lower lactate accumulation during the exercise test may suggest that high intensity warm-up promoted oxygen availability or aerobic energy production during short term high intensity exercise (70 s).

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In experiment B, horses performed a 3.5 min exercise test consisting of 30 s at 6.5 m/s, 60 s at 7.0 m/s, 90 s at 7.5 m/s and 30 s at 8.0 m/s, all on a 10% grade. Warm-up effects were similar to experiment A except that plasma lactate responses were not significantly different. In addition, rectal temperature at the end of a 5 min recovery period was higher ($P < .05$) when horses completed the high intensity warm-up before the exercise test than when they completed the low intensity exercise test.

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