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Performance diagnostics in Icelandic sport horses

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The aim of the study was to analyze the endurance capacity of Icelandic sport horses. For this purpose 17 Icelandic horses of different age and gender completed a field exercise test. The test was implemented on oval tracks and included, besides of a warm-up and recovery phase, three five-minute phases with increasing speed. Velocity (v), heart rate (HR) and blood lactate concentration of the horses was measured.
The average velocity in the phases was 200 ± 18 m/min, 246 ± 16 m/min and in phase three 339 ± 27 m/min. The average HR of the Icelandic horses in the three phases was 139 ± 14 bpm, 152 ± 16 bpm and 184 ± 10 bpm. A linear regression analysis proved the expected linear dependence of the HR from the velocity (regression test: n= 39, r^2= 0,674, $p < 0,05$). Lactate concentration of the horses reached 1,5 ± 0,2 mmol/l, 1,7 ± 0,4 mmol/l and 4,6 ± 1,5 mmol/l on average in phase one to three. The lactate concentrations are rising exponentially with increasing velocity (exponential regression test: r^2 = 0,706, n= 46).
In order to analyze from which velocity or HR range lactate is formed aerobically or increasingly anaerobically, the values V_2, HR_2, V_4 and HR_4 were calculated by linear interpolation or extrapolation for each horse. The velocity at 2 mmol/l lactate (V_2) was 255 ± 24 m/min (n= 16) on average. The speed corresponds to working trot in Icelandic horses. The horses can tolerate this physical exercise for a longer duration without fatigue. The average of HR at 2 mmol/l lactate (HR_2) was calculated at 153 ± 11 bpm (n= 13). The velocity at 4 mmol/l lactate (V_4) was 330 ± 45 m/min (n= 14) on average. The speed is equivalent, for example, with medium canter in Icelandic horses. At this speed the horses start to produce more anaerobic energy. The average of HR at 4 mmol/l lactate (HR_4) was 178 ± 12 bpm.
In the recovery phase, the HR values were reduced to an average of 102 ± 9 bpm and a lactate elimination of 1,7 mmol/l could be detected within 5 minutes. The test was a submaximal exercise for the horses, from which the horses recovered quickly on average. The results provide indications that the tested Icelandic horses had well-developed endurance capacities. The results may be a first step for the development and design of specific training programs for Icelandic horses.