

PERFORMANCE DETERMINING FACTORS IN BIATHLON SHOOTING

Sattlecker Gerold¹, Müller Erich, Lindinger Stefan
(University of Salzburg¹, Austria)

Keywords: Biathlon, Shooting

In biathlon many factors can have influence on the shooting result. The main variables are considered as: Shooting position, targeting, breathing technique and triggering (Nitzsche 1998). In comparison to rifle shooting the high physical pre-intensity, the short shooting time and the stance on the skies decrease the shooting results in biathlon (Grebot et al. 2003, Larue et al. 1989). According to Nitzsche (1998) at least 70-80 percent of the total trigger-force within the last second should be achieved.

The aim of this study was to analyze the performance determining factors in biathlon shooting with and without physical load. Therefore 10 elite biathletes of the Austrian National (29 61617; 4 yr) and Junior-National-Team (18 61617; 2 yr) were tested outdoors (roller ski track) several times on a biomechanical shooting measure station, consisting of: 1) Force plate (FITRO Sway Check, SVK) for stance stability, 2) Strain gauge force transducer at the trigger (Spe-zialmesstechnik Ilmenau, GER), 3) Computer controlled display for the shooting results (SA 921 – Sius Ascor, GER). The data were processed by iSportmanager-Biathlon (Ike-Software, AUT). As variables the mean pre-shot trigger force (TF) over one second before the shot [in % of the maximum force], the deviation of the standing position [mm] in x-(cross shooting) direction (Xdev) and y-direction (in shooting course) (Ydev), the path length [mm²] (PL) on the force plate and the shooting results (1-10) (Score) were measured in different situations (all 4 series of 5 shots): 1) without physical load (WL), 2) base speed (BS) [1.5-2 mmol La/l], 3) sub lactate threshold speed (SL) [3-4 mmol La/l], 4) 15 km race speed (RS) [5-6 mmol La/l]. Although the values of two variables (PL, Ydev) changed in dependence to the intensity, only Xdev-WL ($r = -0.773$, $p < 0.01$) and Ydev-WL ($r = -0.637$, $p < 0.05$) showed low correlations for the situations without physical load. For the 3 situations with physical load no relationships between shooting results and analyzed parameters could be found. Only the PLBS ($r = -0.621$, $p = 0.055$) and PLSL ($r = -0.555$, $p = 0.096$) showed at least a tendency to have influence on the shooting performance. The comparison of the five best and worst biathletes (factor: shooting results) illustrated no significant differences within the analyzed variables.

One reason for the in-existent or low influence of the analyzed variables on the shooting performance could be the high level of all tested athletes. As Sattlecker (2006) stated, professional biathletes seem to have their own optimum shooting pattern, in which the shooting results are stable. Although the values of two parameters in our survey changed significantly due to different intensities, the shooting results did not change significantly. Higher intensities and longer distances could break the patterns named above and show other results. Another possibility is the analysis of other determining factors like breathing technique or upper body work while targeting.