Analysis of the relationships between type traits and functional longevity in Croatian Holstein cattle using a Weibull proportional hazards model

Nikola Raguž, Sonja Jovanovac

Faculty of Agriculture, University of J.J. Strossamyer in Osijek, Kralja Petra Svačića 1d, Osijek, Croatia (nraguz@pfos.hr)

Summary

Survival analysis using a Weibull proportional hazards model was applied to evaluate the effect of linear type traits on functional longevity in Croatian Holstein cows. The data set consisted of 2,066 registered Holstein cows that first calved from 2001 to 2011. Longevity was defined as the number of days between first calving to culling or censoring. Cows alive at the end of the study (52.4%) were treated as right censored. Type information consisted of 18 linear type traits scored during the first lactation. The Weibull model included the time-dependent effects of the relative milk production within herd, year*season of calving and parity, as well as the time-independent effects of the herd size, region, age at first calving and type traits. Udder traits of highest impact on longevity were udder depth, fore udder attachment, rear udder width and suspensory ligament where lower scores were associated with higher culling risks. Very angular animals had approximately 1.7 times lower risk to be culled then non-angular animals. Animals with shallow body were exposed to 3.8 times higher risks of culling in compare to animals with deep body. An intermediate optimum was found for the rump angle where animals with high and slope pinbones had about 1.5 times higher risks to be culled than animals with average rump angle. Animals with biological extremes for the rear legs side view had almost 3.0 times higher risks of culling than average scored animals. It could be concluded that some of the type traits, especially udder traits could serve as early predictors of functional longevity in Croatian Holstein cows.

Key words: Holstein cows, longevity, type traits, survival analysis.