Degenerative joint disease (DJD) is one of the most prevalent musculoskeletal disorders seen in horses, resulting in loss of performance ability, early retirement and significant cost to horse owners. Biomarkers of tissue turnover may offer a sensitive diagnostic for the early detection of joint pathology. The objectives of this thesis were to establish inter- and intra-individual variance of joint tissue biomarkers (CTX-II, PIIANP and NO) in an equine population, determine whether there was a correlation between biomarker concentrations and lameness, and evaluate the efficacy of Steadfast® Equine for use in horses with naturally acquired lameness. CTX-II concentration decreased with increasing lameness score (P<0.0001), however there was no effect of lameness score on PIIANP concentration (P>0.21) or NO concentration. There was no effect (P > 0.5) of supplementation with Steadfast® Equine on lameness score, CTX-II concentration, or PIIANP concentration compared to the placebo group. The culmination of the data of these two trials demonstrates the potential utility of serum CTX-II concentration in order to non-invasively evaluate DJD and also several confounding variables and limitations, such as season, gender and a precise standard against which to measure joint damage.