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239-780 Speed of sound measurements in the evaluation of bone properties in Holstein Friesian cows: a preliminary study

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To investigate the influence of e.g. growing, pregnancy, lactation or nutrition on bone metabolism and properties, different methods have been established for the use in bovine, namely histomorphometry, measurement of breaking strength, photon absorptiometry and radiographic photometry. Recently, biochemical markers of bone formation and resorption have also been proven to be a useful tool in the investigation of bone metabolism in cows. Over the last decade, quantitative ultrasound (QUS) has been introduced as a method of analysing bone tissue in human medicine. The measurement of speed of sound (SOS) at various sites using the axial transmission mode along the cortex gives information about stiffness, architecture, porosity and bone mass. We recently described the application of this technique in cows and demonstrated the repeatability of the results. The objective of our study is to compare different measurement sites and to evaluate the inter-user variability. Eighteen healthy 3- to 8-years-old (mean 5.2 ± 1.03 SD) Holstein-Friesian cows, with an average weight of 502 ± 50 kg (SD), were used in this study. Bone SOS measurements were performed with the "CM" probe of the Sunlight Omnisense device (Sunlight Ultrasound Technologies, Tel Aviv, Israel) on the dorsal and lateral aspects of the left and right metacarpal bones. Six cows were measured consecutively by two different users and six cows were also measured on the lateral aspect of the metatarsal bone. Differences of measuring sites and inter-user variability were analysed by ANOVA 2. SOS ranged from 3762 m/sec to 4672 m/sec with a mean of 4298 ± 136.41 (SD) m/sec for the left dorsal metacarpal approach, 4226 ± 159 (SD) m/sec for the right dorsal metacarpal approach, 4320 ± 142 (SD) m/sec for the left lateral metacarpal approach, 4336 ± 150 (SD) m/sec for the right lateral metacarpal approach, 4290 ± 139 (SD) for the right lateral metatarsal approach and 4287 ± 188 (SD) for the left lateral metatarsal approach. There was no significant difference between measurement sites and cows. However, a significant inter-user variability was shown up. QUS is easy to use, radiation-free, non-invasive, very well tolerated by the cows and allows serial assessment of bone properties. Further studies should be performed to investigate if growing, pregnancy, lactation and nutrition has an influence on bone properties and whether those changes can be detected by this method.