Test accuracy at different cut-offs when plasma concentrations of metabolic indicators are used to detect decreased fertility in dairy cows

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Negative energy balance is a known risk factor for decreased fertility in dairy cows. This study evaluates the accuracy of measuring plasma concentrations of two indicators of negative energy balance, non esterified fatty acids (NEFA) and β-hydroxy buturate (BHBA), when they are used to predict decreased fertility. For 496 cows in 12 Swedish dairy herds plasma samples were taken 0-21 days in milk and data on breed, parity, calving date, gynecological examinations, and inseminations were collected. The diagnostic sensitivity (Se) and specificity (Sp) at different cut-offs in concentrations of NEFA and BHBA were calculated and compared to each cow’s fertility status, measured as anestrous (ANEST) and delayed first AI (DFAI). Positive and negative predictive values (PV+; PV-) were calculated considering different levels of decreased fertility. Strata-specific Se and Sp and associations between test results and fertility parameters were investigated using logistic regression. For this analysis, cut-offs with Sp ~80% was used because a high Sp was considered of interest. This corresponded to a NEFA-cutoff at 400 µeqv./ml (Se≤0.44) and a BHBA-cut-off at 1.8 mM (Se≤0.32). Sp was generally higher when the test was used in heifers compared to older cows. With a prevalence of ANEST of 28% PV+ were 0.25 and PV- nearly 0.90. With a DFAI prevalence of 35%, PV+ were <0.38 and PV- nearly 0.90. The results indicate that overall test performance is low when metabolic indicators measured 0-21 days in milk are used to predict decreased fertility in dairy cows. However, the accuracy and the usefulness of the tests could be influenced by cow-level factors as well as the prevalence of decreased fertility.