



THE GLOBAL STANDARD FOR LIVESTOCK DATA

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Subject	Abstract presented manuscript as presentation	A tool to predict likelihood of conception to first insemination with milk mid-infrared spectroscopy

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Title of the Presentation:

A tool to predict likelihood of conception to first insemination with milk mid-infrared spectroscopy

ABSTRACT

Identifying cows that are most or least likely to conceive in early stages of lactation would be useful for breeding decisions. We examined the ability of including milk mid-infrared (MIR) spectroscopy, MIR-derived traits (milk composition, milk fatty acids, blood metabolic profiles) and on-farm data obtained before first insemination to predict the likelihood of conception to first insemination (pregnant versus open) of dairy cows in Australia. A total of 30,355 spectral and milk production records of 15,456 cows from 50 commercial dairy herds were used. Different models were developed and tested on the extreme data including cows that conceived to first insemination (“good”) and cows with no conception event recorded and with only one insemination (“poor”). The accuracy of these models was evaluated through herd-year external validation (validation A) and measured by sensitivity and specificity (proportion of “good” and “poor” cows being correctly classified, respectively), and area under the receiver operating curve. Then, the most predictive model was tested in a fresh dataset (validation B) for its ability to identify cows that conceived and did not conceive to first insemination. To do this, we ranked the predicted probability of all cows in a herd-year and selected the top and bottom 10% of records (i.e. where the model predicted the highest versus lowest likelihood of conception to first insemination, respectively) and compared to actual values. The accuracy was measured as the proportion of selected records being correct. When validated on cows classed as “good” and “poor” fertility (validation A), the most predictive model, including milk yield, MIR, days in milk, calving age, days in milk at insemination and somatic cell count had an accuracy of 0.74 with sensitivity of 0.74 and specificity of 0.64. Using

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data from all cows in a herd-year (validation B), we could identify the 10% of cows that were most and least likely to conceive with an accuracy of 0.51 and 0.76, respectively. This study shows that MIR and on-farm data can identify poor fertility cows with promising accuracy. DataGene is developing a tool that allows farmers to combine the probability of conception predicted with MIR data, and a range of other metrics to identify poor conception animals for culling or mating to beef. These metrics are, days since calving, insemination history (ratio of inseminations to pregnancies across the cows lifetime), age and antibiotic treatment during the current lactation :



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