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Ketosis detection based on milk spectral info

This letter that I wrote to Prof Kowalski describes plans for collaboration. My PhD-student, Tesfaye Belay, could go to Poland alone to prepare this in January, but for a continuing collaboration and for more knowledge on technical and other detail, I should join him.

Possibilities for collaboration between Poland and Norway

As a follow up of our DairyCare Cost meeting in Copenhagen in August, and further contact by email and Skype later, I write this letter. I understand that you will be meeting people in charge of Dairy Control in Poland soon and will discuss the possibilities for using Polish cow data in our collaboration with them.

We have proposed a method that we think will give better predictions for traits based on milk FTIR spectra. This is described in Binyam Dagnachew's PhD (Dagnachew, 2012) and in a published paper in Journal of Dairy Science (Dagnachew et al., 2013). We show that direct prediction from the predicted breeding values for the FTIR spectra should give a better breeding value prediction for fat%, protein% and lactose% for Norwegian goats. However, we did not have chemical analyses available for that evaluation, but used %-values available from Dairy Control that had been predicted from the same spectra.

The same principle we will now try for fatty acids in milk of Norwegian cows. In addition to breeding values, we will add predictions for permanent animal, and farm x test day based on FTIR spectra. This we think can improve the usefulness of the predictions for judging the feeding etc. of the animals. A PhD student, Tesfaye Kebede Belay, started this year doing that under Binyam Dagnachew's and my supervision.

It is not yet clear how many cows we will have with fatty acid analyses, and possibly the number may be less than we would like for a good evaluation of our method.

We would like to evaluate our method on your ketosis data too. We understand that you have a large and well-designed dataset.



To do this we propose for the Polish Holstein data:

- 1) To use the ketosis diagnoses based on blood values as the link (regression) to FTIR spectra for the same animals.
(?60% of the 1000 cows?)
- 2) To estimate the heritable, permanent animal, farm x test day, and residual (variance/covariance) parts of the FTIR spectra based on a sample of a large dataset of Polish cows where the pedigree is known and well structured.
(FTIR spectra and pedigree for ?1-300 000? cows with many sires that have more than ?20? daughters. To be discussed further.)
- 3) To use these estimates to predict individual cows' heritable and permanent animal effects, and predict farm x test day values for components representing the FTIR spectra.
(For our evaluation we primarily need to do this to the remaining test part of the ?40% of the 1000 cows in 1). You may want to do it for more of your cows now and in the future.)
- 4) To link the predictions in 3) to ketosis diagnoses using results from 1) and evaluate whether this gives better predictions of ketosis than at present.
(For the same cows as in 3).)

Our interest would be in applying our method to your good and new dataset and publish a paper on this. The PhD student would use this in his PhD dissertation. For you it could mean that you get a better method for using your FTIR spectra for ketosis detection.

We can discuss other collaboration.

Tormod Ådnøy

Associate professor in Animal Breeding, PhD Mathematical Statistics.

References cited

Dagnachew, B.S., 2012. Multivariate genome and milk specter information: opportunities to improve milk quality. PhD, IHA, UMB 2012.

Dagnachew, B., Meuwissen, T.H.E., Ådnøy, T., 2013. Genetic components of milk Fourier-transform infrared spectra used to predict breeding values for milk composition and quality traits in dairy goats. *Journal of Dairy Science* 96, 5933-6068