



DairyCare COST Action

Scientific Report for Short-term Scientific Mission (STSM)

March 4, 2015

COST STSM Reference Number: COST-STSM-FA1308-21718

Planned period: 2015-01-11 00:00:00 to 2015-01-17 00:00:00 (7 days), **but the STSM executed on:** 2015-01-18 00:00:00 to 2015-01-24 00:00:00 (7 days)

COST Action: FA1308

STSM type: Regular (from Norway to Poland)

STSM Applicant: Mr Tesfaye Kebede Belay, Norwegian University of Life Sciences, Ås (Norway); tesfaye.kebede.belay@nmbu.no

STSM Topic: Ketosis detection based on milk spectral info

Host: Prof Zygmunt Maciej Kowalski, University of Agriculture in Krakow, Krakow 30-059, Poland; rzkowals@cyf-kr.edu.pl

Purpose of the STSM:

The main purposes of my STSM to Poland were:

- To describe our method of analyzing spectral data for use in breeding and feeding and to see possibility in applying this method in detection of subclinical ketosis (SCK) using Polish dataset.
- To work on the details of the polish dataset such as pedigree structure, spectral data, ketone bodies from blood and spectra, and on other herd information.
- To understand the Polish way of monitoring SCK and Fourier transform infrared (FTIR) spectra utilization in SCK detection.

Description of the work carried out during the STSM:

My STSM started by discussion with Polish partners. A brief description of the method that we think will give better prediction for traits based on milk FTIR spectra was given. In this method, the raw spectra is splitted into heritable (genetic), permanent environment, herd*test day and residual components and linked to traits of interest. The heritable part of the spectra used for better prediction of breeding values while other components could be used for detection of abnormalities (e.g. ketosis, negative energy balance etc) in

individual cows based on residual spectra. The possibility in verifying this method by applying it on Polish dataset for detection of SCK was discussed. Our Polish partners also briefly described their unique way of monitoring SCK, utilizing FTIR in SCK detection and available datasets. Thorough discussion was made on the type and amount of data that we need for evaluation of the method. Pedigree info, spectral and other phenotypic data (predicted or measured) and factors (fixed or random) were available for the datasets. Spectral part of the datasets were stored per farm and it needs to be compiled together and merged to other phenotypes and factors. Much time was spent on such data management (cleaning, combing and descriptive analysis). Names (codes) of variables in the datasets were also changed into English.

Description of the main results obtained:

The main aims of my STSM to Poland were fully achieved and it was fruitful. Two types of datasets (dataset1 and dataset2) that are needed for our collaboration were identified. The datasets have three parts: 1) pedigree 2) predicted and/or measured phenotypes and other herd information, and 3) spectra. Ketone bodies such as beta-hydroxybutyrate acid (BHBA) is the only data available both as measured (from blood) and predicted (from milk spectra of the same cows) phenotype. Other available phenotypes such as milk compositions, acetone, etc. are prediction from milk spectra. Dataset1 that include BHBA measured from blood is cleaned and ready for analysis. This dataset consist of data on 877 cows and it will be used to develop calibration equation (regression) that serve as link to FTIR spectra from the same animals. The large dataset (dataset2) which currently consist of data on 191,467 cows that are in 6 to 60 days in milk is also made ready for analysis. Unlike dataset1, dataset2 does not contain any phenotype measured from blood. Spectra in dataset2 is available from September to December 2014. Since we need at least one-year data, spectra to be collected from January to August 2015 will be sent to us by our polish partners. Dataset2 will consist of data on 600,000-800,000 cows at the end of August 2015. This dataset2 would be used to estimate the heritable, permanent animal, farm*test day, and residual (variance/covariance) parts of the FTIR spectra. Pedigree data that contain up to seven generations was constructed for both datasets.

Future collaboration with the host institution (if applicable):

Our collaboration with Poland will be continuing. For example, Professor Tormod Ådnøy will go to Poland in September for sabbatical to work on multivariate analysis and related issue.

Foreseen publications/articles resulting from the STSM (if applicable):

I would use results from this data in my PhD dissertation and there is planned paper, which is the result of our cooperation including the STSM. The paper (s) will be published in internationally recognised scientific journal (e.g. Journal of Dairy Science).

Confirmation by the host institution of the successful execution of the STSM:

Confirmation letter from the host institution is enclosed in this report.