STSM – Short scientific report

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Subject: Short Term Scientific Mission – Short scientific report

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Host institution: University of Ljubljana, Biotechnical Faculty, Department of Animal Science

Host: Assist. Prof. Klemen Potočnik

Period: 17/11/2014 to 05/12/2014

Project name:

Prevalence and effect of subclinical ketosis in Holstein cows in environment of Croatia and Slovenia

Purpose of the STSM:

The purpose of this Short Term scientific missions was to determine the prevalence of subclinical ketosis as well as the effect of subclinical ketosis on subsequent daily milk yields in Croatian and Slovenian Holstein cows using monthly test day records and accounting the environmental effects.

Description of the work carried out during the STSM:

Database containing Individual test-day records of Croatian Holstein cows collected in regular milk recording performed by alternative milk recording method (AT4/BT4) from January 2003 to December 2013 was provided by the Croatian Agricultural Agency. In Croatia, during the official milk recording, ambient temperature and relative humidity are recorded in the barns.

Database containing Individual test-day records of Slovenian Holstein cows Data was provided by the Agricultural institute of Slovenia and consisted of test-day yields of milk, fat, and protein. Ambient temperature and relative humidity is not recorded during the official milk recordings. Therefore, these parameters was obtained from farm's nearest weather station (based on farm's and weather station's coordinates).

Logical control of test-day records in both database was performed according to ICAR standards (2003). Daily temperature-humidity index (THI) values will be calculated using temperature and relative humidity relative humidity recorded in the barn by the Kibler (1964) equation:

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$$THI = 1.8 \times Ta - (1 - RH) \times (Ta - 14.3) + 32$$

Ta – measured ambient temperature in °C, RH – relative humidity as a fraction of the unit. After the statistical analysis (basic statistics, distribution frequency) necessary new variables were created. Records with missing or nonsense region, calving and control date, age at calving, parity value, with lactation stage in (< 0 days and > 500 days), Ta values in (< 5oC and > 40oC), RH values in (< 30% and > 95%) were deleted from dataset.

Numerate statistical models for evaluation of the effect of subclinical ketosis on daily milk yield in terms of heat stress in the barns were developed and tested. Heat stress conditions in the barns were defined according to the daily THI value as follows: HS when THI ≥ 72 meaning stressful environment, and HN when THI < 72 meaning normal environmental conditions. The risk of metabolic disorders prevalence was indicated by the F/P ratio as follows: K when F/P ≥ 1.5 meaning ketosis risk, N when F/P 1.0 – 1.5 meaning normal conditions, and A when F/P < 1.0 meaning acidosis risk. The significance of the differences between the tested effects was tested by Scheffe's method of multiple comparisons using the MIXED procedure of SAS (SAS Institute Inc., 2000).

The prevalence of subclinical ketosis was defined as incidence risk and was calculated as frequency of cows indicated with risk of subclinical ketosis in total number of cows in regard to heat stress and lactation stage classes separately for each parity.

Description of the main results obtained

1. Paper (The environmental conditions in the barns and risk of metabolic disorders prevalence)

Heat stress condition in the barns caused the decline in daily milk yield and daily protein content, while daily fat content and consequently F / P ratio significantly increase in terms of heat stress.

The highest ketosis risk was determined in early lactation (till 60th day), while the lowest frequency was after the 180th day.

Lower ketosis risks were determined in stressed than normal conditions during the early lactation. In the mid lactation ketosis risk was higher in stressed animals, while in prevalence of ketosis risk was low and similar regardless environmental the condition.

2. Paper (Effect of heat stress on ketosis prevalence risk and milk production in early and mid-lactation of Holstein heifers in Croatia)

Heat stress conditions were determined during the summer period with average THI ≥ 72 observed from mid-June till the end of August.

The highest ketosis prevalence risk was observed in early lactation (first 60 days) with similar prevalence both in heat stressed and cows in normal conditions. Prevalence risk lower than 10% characterise the period from 120th lactation day. Higher prevalence risk in stressed animals was determined from 80th till 120th lactation day after what prevalence risk was similar regardless the environmental conditions in the barns.

Future collaboration with the host institution (if applicable)

The research results points out that test-day records collected in regular milk recording could be useful tool for monitoring of cows metabolic disorder. By early detection and treatment of the subclinical disorders farmer's economic losses could be decreased or completely avoided. Since environmental conditions significantly affects daily milk yield, fat and protein content, and consequently F/P ratio further research with purpose of detailed formulation of metabolic disorder risk and environmental conditions relation is needed. Also evaluation of the genetic parameters for heat stress resistance as well as for prevalence risk of metabolic disorders in necessary. Further scientific cooperation by above mentioned issues is planned during the next year.

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

1. Paper

Title: The environmental conditions in the barns and risk of metabolic disorders prevalence

Authors: Vesna Gantner, Krešimir Kuterovac, Klemen Potočnik

Submitted to: Croatian journal *Mljekarstvo*.

Form: Full paper

2. Paper

Title: Effect of heat stress on ketosis prevalence risk and milk production in early and mid-lactation of Holstein heifers in Croatia

Authors: Vesna Gantner, Krešimir Kuterovac, Marcela Šperanda, Klemen Potočnik

Submitted to: The Second DairyCare Conference, Cordoba, Spain, March 3rd and 4th 2015

Form: Abstract

3. Paper

In preparation – Slovenian test-day records

Submitted to: The Second DairyCare Conference, Cordoba, Spain, March 3rd and 4th 2015

Form: Abstract

Applicant

Assoc. Prof. Vesna Gantner

05 Dec 2014