In recent years profitability of dairy cattle production in terms of Croatia as well as Slovenia becomes more and more questionable. Increasingly unfavourable environmental conditions that is periods of high temperatures combined with high relative humidity cause a decline in production in quantitative and qualitative terms that persist even after the termination of the effects of adverse external influences. Previous studies showed statistically significant decline of daily milk yield and composition during summer period in Croatia (Gantner, 2011.). With the aforementioned decline in production, the prevalence of metabolic, health, and reproductive disorders was also recorded.

Ketosis is a metabolic disorder that can occur both in clinical and subclinical forms (Shaw, 1956). Clinical ketosis most frequently occurs in susceptible high-yielding dairy cows in the first days of lactation between the 2nd and 7th week after calving as a consequence of inadequate nutrition and management (Baird, 1982; Gillund et al., 2001). Prevalence of ketosis could be influenced by breed, parity, season and herd-related factors. Gustafsson and Emanuelson (1996), Rajala-Schultz and Gröhn (1999), as well as Østergaard and Gröhn (1999) quoted that clinical ketosis induces economic losses to the dairy farmer through treatment costs, decreased milk production, impaired reproduction efficiency and increased involuntary culling.

The farmer’s economic losses and the cow’s malaise could be decreased or avoided by detection of the disorder before the cow develops strong clinical symptoms in its subclinical stage. Early determination of possible disorders could be performed from blood samples. But, this methodology are expensive and invasive. Alternative to blood sampling could be usage of the records collected during official milk recording – test day records (TDR). These records include daily milk, fat and protein production, and the fat to protein ratio (F/P ratio).

Since milk fat and milk protein percentages are altered in subclinical ketosis, these parameters have been investigated for their utility in defining subclinical ketosis. Beening (1993) and Gravert (1991) indicated that the ideal range for F/P ratio is 1 - 1.25, while Duffield et al. (1997) sets 1.33 as the upper margin. Haas and Hofirek (2004) reported that an F/P ratio higher than 1.4 indicates energy deficit and, if ketone bodies are present, subclinical ketosis. Duffield (2004) and Richardt (2004) defined a 1.5 value of F/P ratio as risk level for subclinical ketosis, while Eicher (2004) beside F/P ratio also took into account daily milk production.

Having in mind that the environmental conditions in the barn significantly influence variability of daily milk yield and quality these effects should be taken into account in determination of ketosis prevalence.

The purpose of this Short-term scientific missions is 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.

Data will be provided by the Croatian Agricultural Agency and Agricultural institute of Slovenia and will consist of test-day yields of milk, fat, and protein from Croatian and Slovenian Holstein cows as well as of data on environmental conditions in the barn on test day.

Subclinical ketosis will be indicated by the F/P ratio higher than 1.5 in cows that yielded between 33 to 50 kg milk per day (Eicher, 2004). Only the first occurrence of the above defined criteria will be considered in proposed STSM. Subclinical ketosis prevalence will be defined as the lactation incidence risk. It will be calculated as the frequency of cows indicated with subclinical ketosis in the total number of cows. For evaluation of subclinical ketosis monthly test day records will be used.

Only cows with detected subclinical ketosis will be included in the analyses. Milk yield measured on the test day when subclinical ketosis occurred will be used as the reference level. The ketosis index will be defined as follows:

K–0 = test-day milk yields collected when subclinical ketosis is detected,

AK–1 = test-day milk yields collected within 35 days after the diagnosis,

AK–2 = test-day milk yields collected between 35 and 70 days after the diagnosis,

AK–3 = test-day milk yields collected between 70 and 105 days after the diagnosis.

The effect of subclinical ketosis on test day milk yields will be studied by accounting the significant effect on daily milk yield and components variability.

Daily temperature-humidity index (THI) values will be calculated using temperature and relative humidity recorded in the barn by the Kibler (1964) equation:

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

Ta – measured ambient temperature in °C, RH – relative humidity as a fraction of the unit.

The significance of the differences between the levels of ketosis index will be tested by Scheffe's method of multiple comparisons using the MIXED procedure of SAS (SAS Institute Inc., 2000).

Realization of the proposed STSM involves the following steps:

1. Merging of Croatian and Slovenian database
2. Logical control of data
3. Statistical analysis – basic statistics, distribution frequency
4. Creating the necessary new variables based on analysis results
5. Statistical models development
6. Determination of the prevalence of subclinical ketosis and the effect of subclinical ketosis on subsequent daily milk yields accounting the environmental effects
7. Publishing of research results (journal and/or symposium – possibly Cordoba DairyCare Meeting).