Introduction to a metabonomic study of peri-parturient dairy goats

Ana Elena Cismileanu[1], Celine Domange [2,3]

[1]*National Research Institute for Animal Biology and Nutrition (IBNA), Balotesti, Romania. [2]INRA, UMR 791, Modélisation Systémique Appliquée aux Ruminants,16, rue Claude Bernard, F-75005 Paris, France. [3]AgroParisTech, UMR 791, Modélisation Systémique Appliquée aux Ruminants, 16, rue Claude Bernard, F-75005 Paris, France*
ana_cismileanu@yahoo.com

Peri-parturition is a critical period for dairy ruminants because of increased energy needs and not enough intakes. In some serious cases, it can lead to pathological state (ketosis/pregnancy toxemia). Up to now, some chemical additives were used to treat this period of metabolic imbalance (for example, propylene glycol). So, we wanted to test saponin-based feed additive during 2 periods (middle of lactating and peripartum periods) on dairy goats. Different parameters have been collected (classical biochemical data, metabolomic data using 1H-NMR spectroscopy, zootechnical parameters) in order to study the effect of this additive on these 2 periods, the individual responses of animals and to find some putative and earlier biomarkers of risk of ketosis (other than the classical but delayed beta-hydroxybutyrate or BHB).

The first experiment was provided on 20 lactating goats and the second one on 24 peri-parturient goats with 4 weeks of plant additive distribution. Weekly sampling of blood, rumen liquors and milk have been done. No significant differences on plasmatic glucose, urea, BHB and non-esterified fatty acids concentrations were found between additive/control groups or between sampling times. For rumen liquors, the pH normally decreased, the ammonia also normally decreased and the protozoa number had no variation. There was no statistical difference of the molar proportion concentrations of the most important volatile fatty acids between the experimental/control groups or between times at each sampling moment.

The metabonomic approach enable us, (by using 1H-NMR spectroscopy and the BATMAN R software package) to list main metabolites found in the different biofluids and to differentiate metabolic fingerprints of lactating and peri-parturient goats. Profiling analysis will led to the identification of the most abundant metabolites. The multidimensional statistical analyse will be performed on data in order to reveal the main metabolites and metabolic pathways involved in the peri-partum period of dairy goats and in their individual response to saponin-based additive.