Introduction of new mid-FTIR Herd Management Tools for early warnings of nutritional and health issues in high producing dairy cows

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Abstract

Delta Instruments[1], St. Albans Cooperative Creamery[2], Cornell University[3] and Miner Institute[4] research collaboration on milk production efficiency has enabled the development of the first generation mid-FTIR herd management tools. Following the findings of D. M. Dave Barbano[3] and his team, a set of predictive fatty acids (FA) models has been developed to provide farmers with early warnings on nutritional and health problems of dairy cows before these become severe.

The first tool consists of a set of milk FA models grouped according to their chain length and relation to biosynthetic origin within the cow. FA from C4 (i.e., 4 carbon) to C:14, known as de novo FA, are synthesized in the udder from volatile FA produced in the rumen. C:18 and higher are preformed FA mobilized from the adipose tissue or transferred directly from the diet. The C:16:0 and C16:1 are mixed origin FA that can be synthesized de novo or may be pre-formed FA.

Farmers will be enabled with information they can use to effectively monitor and improve milk composition (i.e., fat and protein percent) and production volume of the herd, as well as with early warnings on gastrointestinal diseases (displaced abomasum) of early transition cows.

The second tool concerns a milk based blood non-esterified fatty acids (NEFA) prediction. Negative energy balance stimulates the mobilization of energy from fat stores and causes blood NEFA levels to rise. High NEFA levels in the blood signal that the body is in a severe negative energy status.

The milk based blood NEFA prediction tool will provide farmers with information about the severity of the negative energy balance status of a transition cow and metabolic (clinical and subclinical ketosis) diseases. These early warnings on the health issues of a transition cow may allow preventive measures to avoid these conditions from becoming severe, while improving the transition process from pregnancy to lactation.

Keywords: Herd management tools, de novo fatty acids, milk based predicted blood NEFA, displaced abomasum, clinical and subclinical ketosis,