

The relevance of adipokines as biomarkers for metabolic health in dairy cows

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Adipokines are messenger molecules secreted from adipose tissue and exerting their effects in both endocrine and autocrine or paracrine manners. Adipokines are involved in lipid metabolism, insulin sensitivity, angiogenesis, and in the regulation of energy balance; moreover, several adipokines are related to inflammation and to the acute-phase response. The role of adipokines in metabolism and in inflammation is of particular interest for dairy cows during the transition from pregnancy to lactation: energy intake during the first weeks of lactation usually lags behind the energy output with milk; in consequence body reserves, mainly fat, are mobilized. The prioritization of milk secretion at the costs of body reserves is achieved by reduced insulin sensitivity in peripheral organs except the mammary gland. Impaired insulin regulation of energy metabolism is considered as etiologic key component for metabolic diseases typically occurring during this time whereby inflammation has been proposed as a missing link in the pathology of metabolic disorders in transition cows. Among those adipokines that are particularly related to insulin sensitivity and/or inflammation are "classical" cytokines, specific hormones such as leptin, as well as acute phase proteins. For their consideration as biomarkers of metabolic health, assessment at the level of the protein in easily accessible body fluids is a prerequisite. Suitable assays that allow for valid quantification of the adipokines in the species of interest are prerequisite and might need to be specifically developed. To be considered as biomarker, adipokines should also have tonic rather than episodic secretion patterns, with long biological half lives, and should remain largely unaffected by short term effects such as feed intake or (psychological) stress. The present contribution provides a focused review about the circulating concentrations of selected adipokines, i.e. adiponectin, leptin, chemerin, and resistin, during the transition period and their relation with energy balance, insulin sensitivity, lipolysis and health status. The importance of adipose tissue as a source for the major bovine acute phase proteins i.e. serum amyloid A and haptoglobin, will be surveyed and the potential of using non-invasively obtainable body fluids for, in particular milk, for these biomarker candidates will also be addressed.

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