

A-1. Nutritional control of inflammatory responses in broiler chicken (Abstracts of the International Symposium on Recent Advances in Animal Science (IS-RAAS), Joint meeting of 2nd IS-AS and 3rd IS-IFS)

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Lecture Sessions

A-1. Nutritional control of inflammatory responses in broiler chicken

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In general, immunological stress(es) or stimulation results in decrease of nutrient intake, increase in catabolic process of nutrients and change in the nutrient partitioning. Chickens under raising conventional condition are exposed to many kinds of stressors, such as pathogenic or non-pathogenic microorganisms, transportation to the growing site, overcrowding, vaccination, chilling and/or overheating, and etc. To maintain the self-defense functions, immunocompetent cells must proliferate, express receptors for the recognition of foreign molecules, produce cytokines to regulate the responses and produce antibodies and other effector molecules. Production of effector molecules, such as reactive intermediates of oxygen and nitrogen may increase energy and nutrient requirements. Thus nutrient requirements for achieving appropriate immunological status are not always identical with those for obtaining the maximum production under these circumstances. Since it has been reported that nutrient requirement for innate immune response is probably greater than for acquired immune response, it appears likely that control of innate immune response following production of pro-inflammatory cytokines would be crucial to improvement of chicken production during immune stimulation. We have shown that certain nutrients, e.g. conjugated linoleic acid, xylitol and etc can modulate both innate and acquired immune responses with improving growth performance during immunological stimulations in chicks. TNF- α , a pro-inflammatory cytokine, is not cloned so far even if this cytokine is not only important in immune regulation, but also in metabolic changes. I would like to introduce how addition of certain nutrients to broiler diet affects immune and metabolic responses during immunological stimulation and some function of chick TL1A as avian TNF- α .

A-2. Swine intestinal immunity via Toll-like receptors and its advanced application to food immunology

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Recent interest has focused on the importance of intestinal immunity for the host defense, but to date, not much has been known about the underlying mechanisms. Toll-like receptor (TLR) family plays an important role in the defense through recognizing pathogen associated molecular patterns (PAMPs). Our research on the bioregulatory function of food products has investigated the immunoregulatory effects of lactic acid bacteria (LAB) via TLRs. Studies in swine, which is expected as a human model, have been examined intestinal immunoregulation by the LAB. Our research has now demonstrated modulation of intestinal immunity mediated by TLRs in Peyer's patches and the mesenteric lymph nodes. On the basis of our study, efforts have also been made to develop an immunoassay system for immunobiotic LAB DNA and cell wall components to evaluate immunoregulation by the LAB via TLRs. The findings in our research activities may provide important clues at the molecular level on TLR signal transduction pathways and recognition mechanisms. They also provide impetus to further delineate the activation mechanism of the innate immune response. In addition, identification of LAB DNA with immunoactivity, and better understanding of cytokine induction and intestinal immunoregulation hold promise in basic research and development of "immunobiotic foods" to prevent specific diseases.