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Genomic advances and applications in aquaculture

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The channel catfish genome has been completely sequenced. In this presentation, progress related improvements of whole genome sequence assembly, scaffolding, and construction of chromosome-level sequence builds will be presented. With the draft or reference genome sequences, the relationship of whole genome variations and performance or production traits can be dissected using RNA-Seq, bulk segregant RNA-Seq (BSR-Seq), or genome-wide association studies (GWAS). We have devoted much effort towards understanding the catfish disease resistance and low oxygen tolerance using genomic approaches including genome sequencing, assembly and annotation, expression after bacterial infection and low oxygen challenge. Earlier research focused on a large set of known genes using microarrays, whereas our most recent studies have adopted the next generation sequencing approaches such as RNA-Seq, BSR-Seq, and GWAS for the analysis of candidate genes involved in disease resistance and low oxygen tolerance. Harnessing genomic techniques, especially GWAS work using the high density 250K SNP array, and ongoing work for the development of the 690K SNP array, and BSR-Seq promise both a better understanding of teleost disease resistance and low oxygen tolerance, and the potential for practical applications in aquaculture..

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Research and application of aquatic animal eco-nutrition based on industrialized culture

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We were the first to be defined and studied the aquatic animal eco-nutrition and feed with nutrition emission reduction in order to reduce the negative effects of water environment and health, those caused by nutrition, feed and feeding. The researches systematically regulated internal and external environment of aquatic animals, guided by new theory and method of eco-nutrition and also adopted modern nutrition, biotechnology, processing technology, feeding strategy, etc. We obtained 6 important achievements after 10 years experiment study. 1) "Rhomb Characteristics" was firstly named and defined that the relationship between WGR and NH4+-N was typical of protein eco-nutrition and the change curve looked like a rhomb. 2) Achieved eco-nutrition requirements of main nutrients for some marine fish in recirculation aquaculture system (RAS), providing important parameters for developing ecological and valuable compound feed. 3) Preliminary ascertained the effects of diet protein, satiety degree on growth, N excretion, digestion and immunity of Cynoglossus semilaevis G. 4) Produced initial success on association study between eco-nutrition and molecule nutrition. 5) The development on compound feed with N and P emission reduction for flatfish made a breakthrough and the new products applied rapidly. 6) Scored important result on study of feeding strategy and intake model. In conclusion, the results provided theoretical basis and applicable technology for the goal of sustainable aquaculture that is the balance and harmonious development among suitable nutrients, stability environment, healthy growth, excellent products and cheap cost.

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