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Growth Performance After Agouti-Signaling Protein 1 (*Asip1*) Overexpression in Transgenic Zebrafish

Authors: Alejandra Godino-Gimeno, Elisa Sánchez, Raúl Guillot, Ana Rocha, Anna Rita Angotzi, Esther Leal, Josep Rotllant, and José Miguel Cerdá-Reverter | AUTHORS INFO & AFFILIATIONS

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Abstract

The melanocortin system is a key structure in the regulation of energy balance. Overexpression of inverse agonists, agouti-signaling protein (ASIP), and agouti-related protein (AGRP) results in increased food intake, linear growth, and body weight. ASIP regulates dorsal-ventral pigment polarity through melanocortin 1 receptor (MC1R) and overexpression induces obesity in mice by binding to central MC4R. *Asip1* overexpression in transgenic zebrafish (*asip1*-Tg) enhances growth, yet experiments show fish overexpressing *Asip1* do not develop obesity even under severe feeding regimes. *Asip1*-Tg fish do not need to eat more to grow larger and faster; thus, increased food efficiency can be observed. In addition, *asip1*-Tg fish reared at high density are able to grow far more than wild-type (WT) fish reared at low density, although *asip1*-Tg fish seem to be more sensitive to crowding stress than WT fish, thus making the melanocortin system a target for sustainable aquaculture, especially as the U.S. Food and Drug Association has recently approved transgenic fish trading.