

GROWTH-ACCELERATING EFFECT OF GAMMA-AMINOBUTYRIC ACID ON KOI CARP, *Cyprinus Carpio*

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The GH/IGF-1 axis is a crucial endocrine system that governs the process of somatic growth. GH secretion is modulated by a complex neuroendocrine system through the interactions of GHRH and somatostatin SS. GABA can promote growth hormone secretion and improve growth performance, thus, it is considered as a potential growth-promoting additive to boost aquaculture efficiency.

The circadian rhythm of GH/IGF-1 axis hormone secretion was investigated, and then, GABA was administrated orally to fish to determine its function on the release of GH/IGF-1 axis hormones. The fish were subsequently fed diets containing GABA at concentrations of 0, 0.1%, 0.3%, and 0.5% for 8 weeks to determine the effects of GABA on somatic growth, GH/IGF-1 axis hormone secretion, and related gene expression. The results indicated that the levels of serum GH, growth hormone releasing hormone (GHRH), and IGF-1 peaked at 01:00 during the dark phase of the photoperiod, whereas the somatostatin (SS) level was the lowest. Oral administration of GABA enhanced the levels of serum GH, GHRH, and IGF-1 and decreased the level of serum SS. Dietary supplementation with GABA increased the levels of serum GHRH, IGF-1, and insulin, but decreased the levels of GH, SS, and glucose. The mRNA expression levels of gabarapl2, gabbr2, and ghrelin were downregulated, but those of gh, npy, ghr1a, and igf-1 were upregulated. Consequently, the feed conversion rate was improved by dietary GABA, and the optimum inclusion rate of GABA in the diet is 1.58 g/kg feed estimated by a cubic regression model. In conclusion, GABA exerts growth-accelerating effect on koi carp by acting on the GH/IGF-1 axis in a dose-dependent manner.

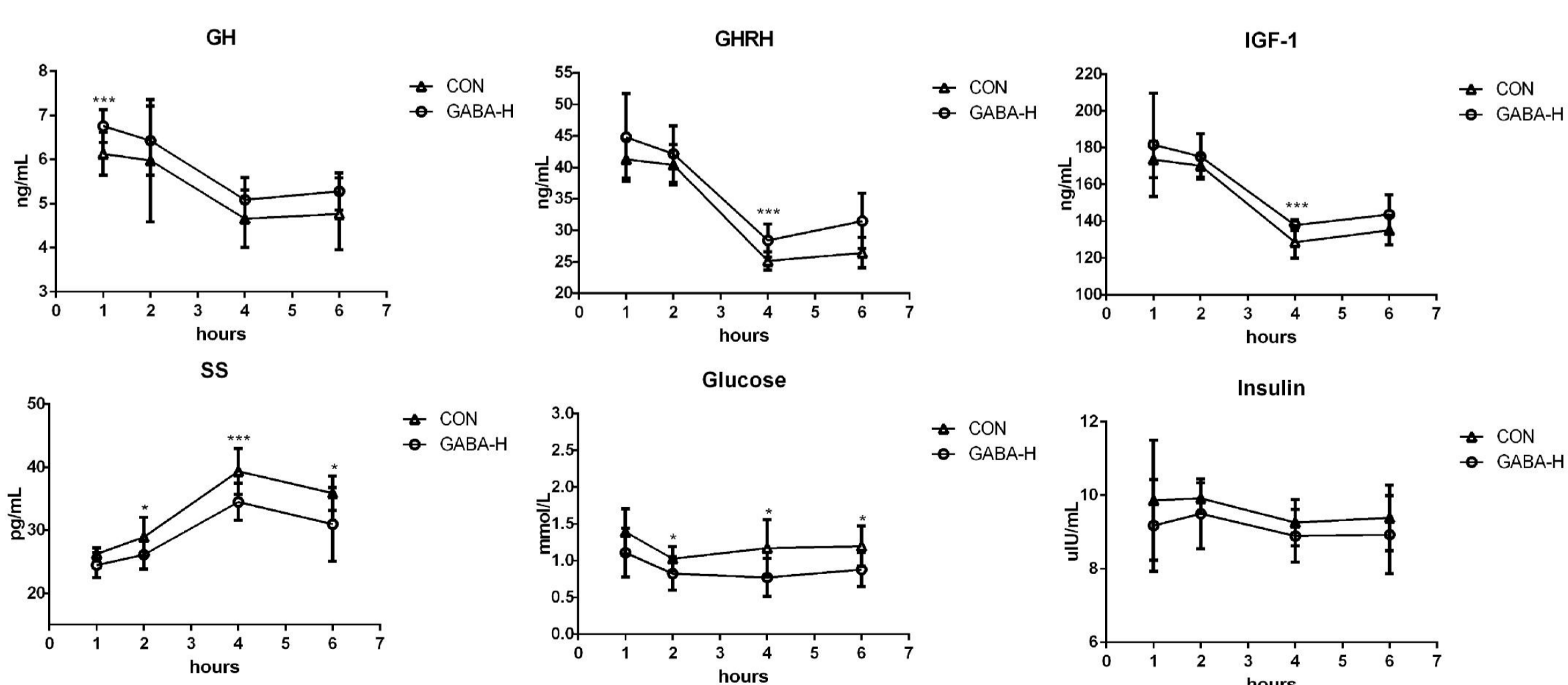


FIGURE 1. Changes in growth-related hormones in response to oral GABA at a low dosage.

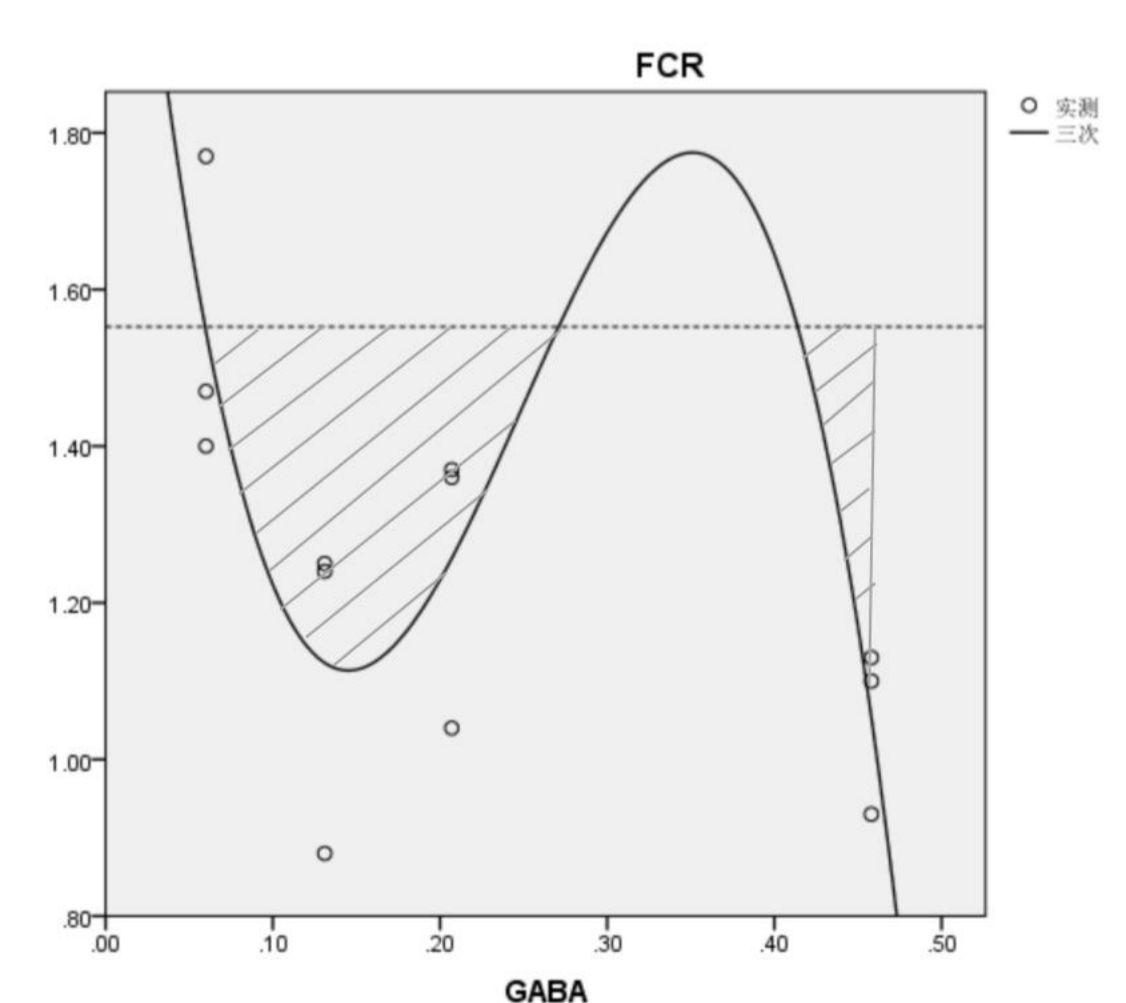


FIGURE 2. The cubic curve regression analysis of FCR with dietary GABA supplementation.