Thanathip Lamkom 2008: Characterization and Expression of GnRH Genes in Channel (*Ictalurus punctatus*) and Blue Catfish (*I. furcatus*) and the Genetic Diversity of the Hatchery Strains. Doctor of Philosophy (Aquaculture), Major Field: Aquaculture, Department of Aquaculture. Thesis Advisor: Professor Uthairat Na-Nakorn, Ph.D. 179 pages.

Channel, *Ictalurus punctatus* and blue catfish, *I. furcatus* are important aquaculture species in the United States. The long term selection programs have led to many strains possess different traits. Recently the transgenic line of channel catfish has been successfully achieved and hence requires a biological containment, e.g. a knockdown of genes regulating reproduction. Therefore this study was conducted to characterize GnRH genes in channel and blue catfish and to express the channel catfish GnRH. Moreover the genetic diversity of 15 channel and 5 blue catfish strains was assessed in order to apply the information for broodstock management.

Genetic diversity of 15 strains of channel and 5 strains of blue catfish were examined utilizing 8 microsatellites loci. Genetic variation of hatchery strains was low, A = 4.00-6.88, H_o= 0.449-0.775, mean H_o=0.54 in channel catfish and A=2.88-3.38, H_o=0.354-0.504, mean H_o=0.41 in blue catfish. Four strains of channel catfish did not conform to Hardy Weinberg equilibrium while all of blue catfish strains did. F_{ST} value bootstrapped across overall loci exhibited significant population differentiation within the channel (0.2136, 95 % CI, 0.131-0.304) and blue catfish (0.2905, 95 % CI, 0.204-0.304). The variation between channel and blue catfish accounted for 15.05 % of the total genetic variation. The variation among population (population-level variation) within channel and blue catfish group were 20.42 % and 23.71 %, respectively. Genetic variation within strains was low, therefore genetic variation of the strains should be increased before further selection is performed.

GnRH (Gonadotropin releasing hormone) cDNA from a brain of channel and blue catfish was characterized by RACE-PCR (Rapid Amplification cDNA Ends-Polymerase Chain Reaction). Two GnRH types, catfish type (*caGnRH*) and chicken type II (*cGnRH II*) were identified. The catfish type GnRH encoded 4 peptides, 21 amino acid (aa), the signal peptide (SP), 10 aa catfish gonadotropin releasing hormone, 3 aa proteolytic processing site, and 46 aa GnRH-associated peptide (GAP). The chicken type II GnRH encoded the 24 aa SP, 10 aa gonadotropin releasing hormone-II, 3 aa proteolytic processing site, and 49 aa GAP. The catfish type GnRH of channel and blue catfish showed higher similarity (87 %) than between the chicken type II GnRH (67 %) in nucleotide identity. Both GnRH cDNA sequences were unique comparing to other forms of GnRH and the same forms of different species. The expression of *caGnRH* was high and restricted in brain and liver of channel catfish, while the *cGnRH II* expressed in brain, head kidney, intestine, spleen and trunk kidney. Moreover, the differential splicing GnRH transcripts were observed.

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