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Gonadal development in male and female domesticated whiteleg shrimp *Litopenaeus vannamei* in relation to age, weight and grow-out conditions

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Cultivation of whiteleg shrimp (<I normal">Litopenaeus vannamei) is now entirely based on closed life-cycle populations, yet few studies have analyzed gonadal development in domesticated shrimp during grow-out in ponds. To determine the effect of age and weight on morphometric, histological, and biochemical variables associated with male and female gonadal development, shrimp from the same cohort, at ages of 6, 8, 10, and 12 months were examined using body weight as a covariable in an ANCOVA design. An additional comparison between two grow-out conditions in 1-year-old shrimp was done to separate the effect of size as a result of initial stocking densities. Age-related growth of gonads was clearly dependent on somatic growth for females but not for males, although differential somatic growth produced by stocking densities explained differences in growth of gonads for both sexes. Increase in oocyte diameter and differentiation associated with age and grow-out condition were independent of body weight. Age-related female gonadal development was accompanied by increases in lipid and protein concentrations, independent of body weight. Maturation of male reproductive organs (testicle, vas deferens, terminal ampoule, and spermatophore) was sequential and depended mainly on age, although body weight could explain differences caused by different grow-out conditions. An age-related decrease in concentration of lactate occurred in all male reproductive organs and could indicate a metabolic adjustment of sperm anaerobic metabolism and lactate clearance associated with gonadal development. We highly recommend waiting for optimal reproductive potential of females at 12 months to enhance spawning frequency and larval quality. At this age, body weight seems to be of secondary importance, although optimal conditions of cultivation are necessary to have adequate growth and balanced nutrition.

Palabras clave: size, Age, Crustacea, Ovary, Reproductive potential, Testis