THE POTENTIAL OF MICROARRAYS TO ASSIST SHRIMP BREEDING AND PRODUCTION: A REVIEW*

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SUMMARY

The shrimp aquaculture industry is a relatively new livestock industry, having developed over the past 30 years. It is thus poised to take advantage of new technologies from the outset of selective breeding programmes. This contrasts with long established livestock industries, where there are already highly specialised breeds. This review focuses specifically on the potential application of microarrays to shrimp breeding.

Potential applications of microarrays in selective breeding programmes are summarised. Microarrays can be used as a rapid means to generate molecular markers for genetic linkage mapping, and genetic maps have been constructed for yeast, *Arabidopsis* and barley using microarray technology. Microarrays can also be used in the hunt for candidate genes affecting particular traits, leading to development of perfect markers for these traits (ie. causative mutations). However, this requires that microarray analysis be combined with genetic linkage mapping, and that substantial genomic information is available for the species in question. A novel application of microarrays is to treat gene expression as a quantitative trait in itself, and to combine this with linkage mapping to identify quantitative trait loci controlling the levels of gene expression; this approach may identify higher level regulatory genes in specific pathways. Finally, patterns of gene expression observed using microarrays may themselves be treated as phenotypic traits in selection programmes e.g. a particular pattern of gene expression might be indicative of a disease tolerant individual.

Microarrays are now being developed for a number of shrimp species in laboratories around the world, primarily with a focus on identifying genes involved in the immune response. However, at present, there is no central repository of shrimp genomic information, which limits the rate at which shrimp genomic research can be progressed. The application of microarrays to shrimp breeding will be extremely limited until there is a shared repository of genomic information for shrimp, and the collective will and resources to develop comprehensive genomic tools for shrimp.

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