AQUACULTURE

PATHOGEN SPECIFIC ANTIBODY RESPONSE IN CATFISH

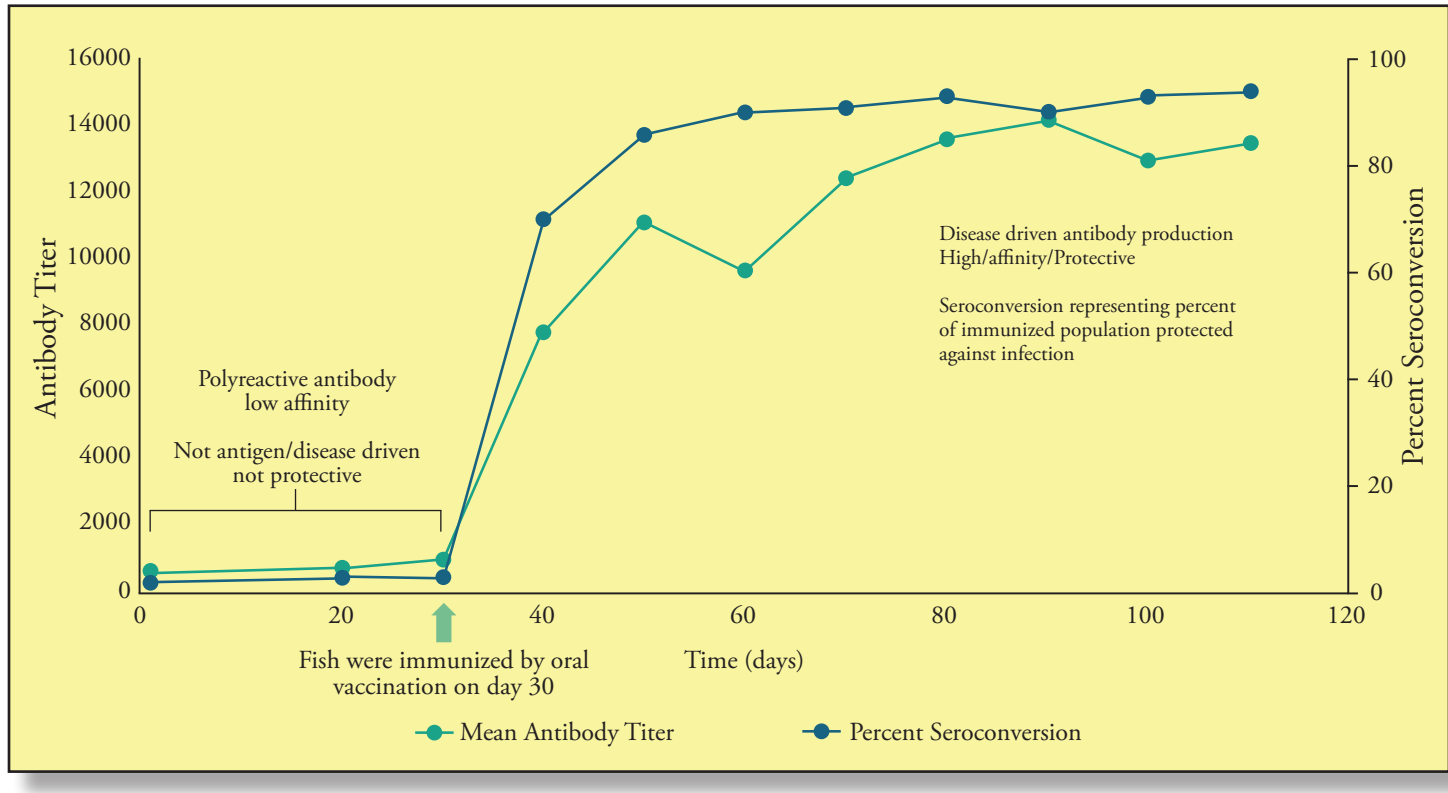
Terry Greenway, Matt Griffin, and David Wise

EVERY SUCCESSFUL ANIMAL DISEASE ERADICATION AND CONTROL PROGRAM HAS EMPLOYED TECHNIQUES ALLOWING FOR PATHOGEN SURVEILLANCE IN THE ENVIRONMENT AND MEASUREMENT OF HOST RESPONSES TO THE PATHOGEN.

Monitoring, evaluation, and surveillance are the cornerstones of any animal health program. Successful disease eradication programs have embraced disease surveillance examining morbidity and mortality patterns, pathogen detection, and antibody prevalence studies. Whether through vaccination or natural exposure to disease causing agents, protection is most often associated with antibody production. Antibodies are substances produced by the body which bind certain areas of disease causing agents. This binding protects by clearing the disease agent from the body. Antibody prevalence and antibody levels are the most commonly used indicators of clinical protection against disease and are used to assess the ongoing status of clinical disease as well as the distribution of immunity within a population-in this case a pond.

Enzyme-linked immunosorbent assays (ELISAs) are one of the most commonly used techniques to determine antibody levels, in part due to their sensitivity and low cost. This assay employs a colorimetric reaction where color intensity reflects antibody concentration. Routine antibody assays commonly used with fish suffer from a lack of specificity. Fish along with other animals possess a subset of antibodies called "natural antibodies" which are continually produced and require no pathogen or antigen induction. A hallmark of this type of antibody is their reactivity to a variety of substances (i.e. not pathogen specific) and a relatively low or weak binding strength (low avidity). When assayed, these samples exhibit artificially high concentrations and are not a true depiction of antibody levels capable of conferring protection from infectious disease. Chemical treatment of the serum sample in an ELISA, with either high concentrations of salt or urea, can dissociate these weakly binding antibodies which is reflected in the color change. This allows researchers to more accurately predict whether the fish has generated sufficient antibody (i.e. following vaccination) to afford protection from disease. We have developed a custom set of reagents reactive to both high and low molecular weight antibodies in blue, channel and hybrid catfish. This coupled with using species specific reference sera for generating a standard curve will allow for

96 well ELISA plates containing duplicate catfish serum samples. Color intensity directly correlates to the concentration of pathogen specific antibody in the serum.



*Longitudinal analysis of anti-*E. ictaluri *antibody*

greater accuracy in reporting antigen specific antibody levels in catfish. Since both innate and acquired arms of the immune system are present in the same individual animal, both low affinity polyreactive and high affinity monoreactive antibodies can be present to the same antigen. The need to discriminate between the relative contribution made by naturally occurring antibody and actively acquired antibody (in response to pathogens) is essential.

This response to vaccine or disease is often termed seroconversion indicating the animal has encountered the vaccine or disease element and has mounted a protective response (antibody). These aforementioned assays measure these responses and are being used in ongoing disease surveillance programs evaluating population responses to vaccines as well as tracking the spread of disease through populations. For example-following vaccination we routinely sample (blood sample) fish and after assay, attempt to determine the percentage of fish within a population that was exposed to the vaccine as well as the magnitude of the immune response of those which consumed the vaccine. In the future we hope to have a formula that takes into account both percentage seroconversion and magnitude of response which predicts survival chances if disease outbreaks occur.