

Antimicrobial Best Use Practices in Catfish Production: Maximizing Effectiveness and Minimizing Bacterial Resistance Development

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In the US catfish industry, there are only three approved antimicrobials available for treating bacterial diseases. These are administered as medicated feeds for practical reasons. Approval of additional antimicrobials for U.S. aquaculture seems unlikely at this time. Consequently, it is important that medicated feeds containing currently approved antimicrobials are used properly to maximize efficacy and minimize the risk of the development of bacterial antimicrobial resistance.

Development of antimicrobial resistance is a complex process. Several practices can contribute to resistance when using medicated feeds such as under-dosing, inadequate duration of therapy, and using ineffective or partially effective antimicrobials. If resistant bacteria result from inappropriate antimicrobial use, infections caused by these pathogens will not respond to future treatments.

Because antimicrobial resistance is a complex problem with many interrelated factors, no single intervention is enough to prevent or address the problem. Coordinated actions are required to prevent development of antimicrobial resistance by bacterial pathogens. Best Use Practices that maximize the effectiveness of antimicrobial therapy and minimize resistance development and spread include:

- 1.** Reduce the need for medicated feed. Consider making operational changes that reduce the risk of a disease outbreak and thus reduce the need for antimicrobial use. Some operational considerations include:
 - a. Minimize fish movements, transfers, and purchases.
 - b. If fish are purchased, purchase from a source with an effective fish health management plan. Purchase fish from the same source each time.
 - c. Monitor water quality and intervene when necessary and possible.
 - d. Improve on-farm bio-security practices including hygiene, sanitation (e.g., of seines), disinfection (e.g., of nets and hauling tanks), & bird control.
 - e. Practice snail control to reduce parasite infestations.
 - f. Use the services of a fish health professional or aquaculture veterinarian to review and design fish health management plans, immunization products and schedules, disease surveillance, diagnostic evaluations, antimicrobial use and outcomes, issue Veterinary Feed Directives, training, and bio-security.
- 2.** Perform diagnostic work on sick, diseased fish to determine the cause of disease and antimicrobial susceptibility if the disease is bacterial in origin; monitor diagnostic and clinical results for signs of antimicrobial effectiveness or resistance. Diagnostic evaluations (culture and sensitivity to antibiotics) are especially important in cases of therapeutic failure.
- 3.** Use medicated feed only when necessary against a known bacterial pathogen. While effective against certain bacteria, antibiotics have no activity against viral pathogens.

4. Use medicated feed early at the onset of a disease outbreak. The interval between clinical signs or diagnosis and the start of treatment is a critical period that directly affects mortality rates in exposed and diseased fish; i.e. the longer the duration, the higher the mortality.
5. Evaluate feed management and feeding practices for a particular pond or group of fish to be sure the feeding strategy is appropriate for antimicrobial administration:
 - a. Fish being fed every two or three days are not candidates for antimicrobial therapy.
 - b. Estimate biomass as accurately as possible.
 - c. Feed medicated feed at the same feeding rate as the fish are feeding at the time of disease diagnosis.
 - d. Feed medicated feed for all feedings during the course of treatment, including topping up.
 - e. Adequate medicated feed consumption resulting in full antimicrobial dose consumption drives effectiveness. Inadequate medicated feed intake which results in partial dosing of antimicrobials drives bacterial resistance development.
6. Read the product label, the medicated feed label, and the VFD to verify the recommended feeding rate, number of consecutive feeding days, and the withdrawal period prior to harvest.
7. Use medicated feed only for treatment or control of bacterial outbreaks. Trying to properly time a course of antimicrobials to prevent a disease outbreak can result in what appears to be therapeutic failure and the development of resistance
8. Rotate antimicrobial use by utilizing different antimicrobials in medicated feeds. Don't use the same medicated feed for every treatment event because resistance is more likely to develop.
9. Keep fish in good nutritional condition to maintain a healthy immune system and robust immune response to help keep fish healthy. Use vaccines to prevent disease.
10. Understand and comply with laws and regulations that govern antimicrobial use. Withdrawal times and other regulations governing veterinary feed directives and over-the-counter medicated feeds must be observed.

Conclusion:

To ensure continued effectiveness, it is important to avoid misuse of antimicrobial medicated feed. It is important to understand which bacterial pathogen(s) you need to control, what options exist for control other than antimicrobials, and then to use the selected antimicrobials correctly to treat the disease and minimize resistance development. Follow your veterinarian's and other fish health professional's instructions. Implementation of the listed Best Use Practices will promote the wise and effective use of medicated feeds now and into the future.