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Section B

Health Implications of Aquaculture

Science and Aquaculture

- Biomedical science has not kept pace with the rapid increase in aquaculture production
- Government and industry have no incentive to study health consequences of practices
- Potential pathways identified
- Paucity of epidemiological evidence

Occupational Hazards in Aquaculture

- Dangerous physical environment
 - Musculoskeletal injuries
 - Drownings, diving accidents
 - Exposure to harmful chemicals
 - Exposure to bacteria and trematodes

Consumer Health Risks

- Exposure to antibiotics
 - Applied in water, aquafeeds
 - Prophylactic use
 - Remains in environment
 - Similar problems to farm animal agriculture misuse

Sources: Jacobs and Chenia. (2006). Characterization of integrons in tetracycline resistance determinants in *Aeromonas* spp. isolated from South African aquaculture systems; Zhao et al. (2002). Antimicrobial resistant serovars isolated from imported foods; Cabello. (2006). Heavy use of prophylactic antibiotics in aquaculture: A growing problem for human and animal health and the environment.

Consumer Health Risks

- Exposure to heavy metals
 - Levels depend on aquafeeds used
 - High levels when animal agriculture waste used in ponds
 - Lead, cadmium, zinc, copper, methyl mercury

Environmental Concerns

- Effluent discharge from either open systems or closed systems without adequate treatment
 - Eutrophication
 - Toxic algae blooms
 - Antibiotic residue
 - Pollution to downstream consumers
 - Diseases

Environmental Concerns

- Excess feed and oil accumulates in water
 - Attracts wild fish: disease
 - Attracts natural predators: mortality
 - Attracts wild fowl: avian influenza

Environmental Concerns

- Escapees from fish pens
 - Decrease fitness of wild stock
 - Outcompetes indigenous species

Environmental Concerns

- Poor land/coastal management
 - Clearing of mangrove areas for aquaculture, leaving coastal areas more vulnerable to tidal surges
 - Water diversion interfering with flood mitigation



Mangroves cleared for shrimp farm

Potential Solutions

- Improved regulations for aquaculture
 - Restrict use of chemicals and veterinary drugs
 - Develop vaccines
 - Restrict effluent discharge

Potential Solutions

- Better stewardship of wild fisheries
 - Restriction of overfishing
 - Reduction of bycatch
 - “Ranching”

Conclusion

- Do benefits of improved diet and food security outweigh harmful aspects of industrial aquaculture?
- Processes by which adverse aquaculture practices can be detrimental to human health are well documented
- More research needed for epidemiology on specific outcomes