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Aquaculture and drought

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Introduction

When access to water is limited during times of drought, water-based agri-businesses need to develop and implement systems that minimise the impact on production. Farmers need to consider strategies to save and conserve water and protect their most valuable stock. In the event that water supply or water quality is severely impacted, emergency management measures are needed.

Water conservation strategies

1. Effluent

Capturing water in an effluent pond following rainfall, harvesting or water exchange allows the farm to recycle water through the production ponds and other water-based agriculture (e.g. hydroponics).

2. Evapotranspiration

Controlling the spread of macrophytes (large aquatic plants) helps reduce water loss through transpiration. Control is generally achieved by maintaining water turbidity (micro-algae and/or dyes) and regular drying and de-silting of ponds.

3. Seepage

Seepage and water loss from ponds can be substantial if ponds are constructed on low clay content, high porosity soils or if ponds are poorly compacted during construction. Seeping ponds should be treated with a sealant (e.g. bentonite), have clay introduced to the bottom and compacted or be fitted with a synthetic pond liner.

4. Water quality

Maintaining water quality will reduce dependence on water exchanges. Using optimum feeding rates will prevent water eutrophication and high ammonia nitrogen levels, and help prevent the development of heavy algae blooms which can cause low dissolved oxygen and require extra water use. Supplementary aeration and scheduling aeration during the night can reduce evaporation, help to maintain water quality and minimise the need for water exchanges.

5. Water exchange

During drought, water should only be introduced to a pond under emergency situations where the immediate welfare of the stock is compromised through disease and/or sub-optimum water quality.

6. Reticulation infrastructure

All pumps and pipes should operate without leaking and open channels should be maintained free of plant growth or replaced with piping if possible. Header and effluent dams should be deep (more than 4 m) to help to reduce evaporation.

7. Filling schedule

Storages and ponds should only be filled if they are to be used promptly. Water losses of up to 45% have been measured in water bodies left standing over several months.

8. Wind barriers

Windbreaks can benefit storages and ponds by reducing wave action and wind speed, minimising both evaporation and pond wall erosion. Windbreaks positioned on the eastern and western sides will also reduce evaporation by blocking solar radiation for a short period of the day.

9. Securing valuable stock

Consideration should be given to securing valuable broodfish resources if water restrictions reduce production capacity. Broodfish should be held in smaller or more secure water bodies (including off-farm) or in tanks if appropriate.

10. Production strategies

The implementation of water restrictions may require lower stocking densities, a reduction in stock numbers or complete de-stocking in severe cases. These actions can reduce the number of ponds under production and potentially shorten the production cycle, allowing fish to be marketed earlier.

11. Feeding strategies

During severe drought conditions when there is a limited capacity to exchange or introduce 'new' water, stock feeding should be significantly reduced (maintenance ration) or stopped completely. Most fish species and other aquatic animals have the ability to survive long periods (weeks) without feed. Pond-reared species in particular, will feed on the natural food production of the pond ecosystem.

Mortality events

In the event of water restrictions indirectly causing stock mortality through high stocking densities, disease or poor water quality, operators need to implement safe carcass disposal measures. This will ensure that disease is not spread and the health of operators and others is not compromised. Under the Fisheries Management Act, 1994 it is a requirement of aquaculture permit holders to notify a NSW Department of Primary Industries officer of any significant mortality event. Smaller mortality events can be dealt with on-farm with local council approval utilising burial techniques and liming materials. Larger mortality events (tonnes of stock) may require the establishment of one-off disposal sites, machinery, carcass transport trucks and the involvement of several government agencies, including the local council.

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