Fisheries Transport Systems

AQS325

14. Week

Carry fishes long distance

Weeks	Topics
1. Week	Carry fish by iced water
2. Week	Carrying the fishes by cooled sea water
3. Week	Carry fishes with ice
4. Week	Carry by cooled store
5. Week	Carry by freezing
6. Week	Carry by salt
7. Week	Fish transport: rules
8. Week	Carry alive fish
9. Week	Carry alive fish with oxygen
10. Week	Carry alive crustacean
11. Week	Carry alive larvae
12. Week	Carrying equipment
13. Week	Carry by frigorific track
14. Week	Carry fishes long distance

Fish transport in the aquaculture sector: An overview of the road transport of Atlantic salmon in Tasmania

Although species-specific aquaculture production systems typically operate over reduced geographical ranges relative to many other terrestrial animal production systems, it is nonetheless often necessary to transport live fish between facilities by road to permit on-growing or finishing. Road transport is therefore common in Australian salmonid (trout and salmon) production and is a particularly significant feature of Atlantic salmon (Salmo salar) culture in Tasmania, where it is necessary to transport juvenile fish (smolts) from inland freshwater hatchery facilities to coastal marine farms for grow-out to slaughter.

King, Henry R. "Fish transport in the aquaculture sector: An overview of the road transport of Atlantic salmon in Tasmania." *Journal of Veterinary Behavior: Clinical Applications and Research* 4.4 (2009): 163-168.

Relationship between body weight and loading densities in fish transport using the plastic bag method

The transportation of live fish in sealed plastic bags was examined. Water parameters and loading densities were analysed. Based on several assumptions an estimation of oxygen consumption during transport was performed indicating that metabolism during transport was about three times higher than routine metabolism. There was some evidence that small fish were more affected by transportation stress, and that large fish need a longer starvation time before transport to reduce ammonia excretion sufficiently.

Froese, R. (1988). Relationship between body weight and loading densities in fish transport using the plastic bag method. Aquaculture Research, 19(3), 275-281.

Methods for reducing stressors and maintaining water quality associated with live fish transport in tanks: a review of the basics

Fish culture operations, public aquariums, fish biologists and aquatic researchers often have the need to transport live fish. These fish are frequently transported in live-haul boxes by ground transportation. Activities involved with transporting fish, such as handling, confinement and exposure to sub-optimal water quality, have the potential to create physiological changes in the fish because of increased stress. Because of the affiliation between stress and fish health, it is important to minimize the amount of potential stressors as well as to minimize the duration of exposure to stressors during these procedures. Furthermore, understanding aberrant environmental conditions and how they affect fish often leads to establishing new protocols that reduce stress. Increased survival rates and the arrival of healthy fish are dependent on transport and on the pre-handling and post-handling procedures associated with fish-hauling operations.

Harmon, T. S. (2009). Methods for reducing stressors and maintaining water quality associated with live fish transport in tanks: a review of the basics. Reviews in Aquaculture, 1(1), 58-66.

The transport of live fish A review

The basic principles of fish transport and the main factors affecting it (fish species, fish developmental stages and quality, transport time, temperature, oxygen content, fish metabolism products, etc.) are evaluated on the basis of an analysis of the pertinent literature. For the two basic fish transport systems, the closed and the open ones, the transport units are described and the densities of transported fish per unit volume under actual conditions are tabulated for guidance. The survey is complemented by the description of the existing methods for the chemical treatment of the environment inside the transport systems and for the treatment of the fish transported, such as fish anaesthetics, chemical water conditioning and antibacterial treatment.

Berka, R. (1986). The transport of live fish: a review (Vol. 48). Rome: Food and Agriculture Organization of the United Nations.

International veterinary guidelines for the transport of live fish or fish eggs

There are two existing codes of practice and one draft proposal with guidelines for the transport of live fish and fish eggs. They provide information for national policies and a level of international standardization. Their efficacy depends, first on implementation by the national official services which tends to restrict fish movements, and second, on acceptance of these guidelines by those involved in the production and utilization of fish. Thus, a critical balance between theory and reality must be achieved if the goals of such international codes are to be realized.

De Kinkelin, P., & Hedrick, R. P. (1991). International veterinary guidelines for the transport of live fish or fish eggs. Annual Review of Fish Diseases, 1, 27-40.

Testing clove oil as an anaesthetic for long-distance transport of live fish: the case of the Lake Victoria cichlid Haplochromis obliquidens

Clove oil can be used as an anaesthetic in the handling of marine and freshwater fish. Few studies report on its use for periods up to 48 h, for example, under long-distance transport conditions. This study tested the effect of different clove oil concentrations for 1–48 h on recovery and survival of the cichlid Haplochromis obliquidens, an ornamental fish species endemic to Lake Victoria. Haplochromis obliquidens were anaesthetized for 1 h using 5–25 µl L−1 clove oil. There was no correlation between clove oil concentration and post-anaesthesia recovery time (P = 0.15).

Kaiser, H., Brill, G., Cahill, J., Collett, P., Czypionka, K., Green, A., Orr, K., Pattrick, P., Scheepers, R., Stonier, T. and Whitehead, M.A., 2006. Testing clove oil as an anaesthetic for long-distance transport of live fish: the case of the Lake Victoria cichlid Haplochromis obliquidens. Journal of Applied Ichthyology, 22(6), pp.510-514.

Testing clove oil as an anaesthetic for long-distance transport of live fish: the case of the Lake Victoria cichlid Haplochromis obliquidens

On average, fish recovered within 9.5 ± 2 min, and no fish died within 24 h after recovery. Results from exposure of fish to 18–20 µl L−1 clove oil for up to 48 h suggested a narrow margin of safety as this concentration range induced mortality. At 18 µl L−1 recovery times ranged from 3 to 43 min between 24 and 36 h exposure, while fish exposed longer than 36 h recovered within 1–10 min, or within 1–2 min after 44–48 h. At the end of a 48-h transport experiment total ammonia levels were higher in transport water containing anaesthetized fish than for non-anaesthetized fish (1.65 ± 0.19 and 0.54 ± 0.08 mg L−1 $NH + NH_3$, respectively). The combined use of clove oil and the selective ammonium ion exchanger zeolite was considered feasible as ammonia levels could be reduced by up to 82% compared to control bags without zeolite.

Kaiser, H., Brill, G., Cahill, J., Collett, P., Czypionka, K., Green, A., Orr, K., Pattrick, P., Scheepers, R., Stonier, T. and Whitehead, M.A., 2006. Testing clove oil as an anaesthetic for long-distance transport of live fish: the case of the Lake Victoria cichlid Haplochromis obliquidens. Journal of Applied Ichthyology, 22(6), pp.510-514.

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De Kinkelin, P., & Hedrick, R. P. (1991). International veterinary guidelines for the transport of live fish or fish eggs. Annual Review of Fish Diseases, 1, 27-40.

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