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NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORT NO. 27

DISEASES OF FRESHWATER REARED
CHINOOK SALMON

by

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Report to: Mr S Denford, Artesia Springs, Tauranga
Confidential to client

Freshwater Fisheries Centre

MAF Fisheries

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CHRISTCHURCH

Servicing freshwater fisheries and aquaculture

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NEW ZEALAND FRESHWATER FISHERIES MISCELLANEOUS REPORTS

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A REPORT PREPARED FOR MR S DENFORD, ARTESIA SPRINGS, TAURANGA

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SCOPE

This report outlines the diseases that may occur on chinook salmon reared in freshwater and makes recommendations on ways to reduce the the risks of contracting these diseases.

OVERVIEW

Knowledge on the diseases of chinook salmon in New Zealand on which this report is based has been gained through research and disease diagnostic work conducted by MAF since 1973 when staff were appointed to study diseases and parasites of fish.

Details of the diseases and parasites of salmon in New Zealand have been published as Freshwater Fisheries Report (FFR) No 112. It is not intended to repeat that work here and thus this report summarises the cause, prevention and treatment of those diseases and elaborates on their significance. Further details of the diseases are available in FFR 112. This report includes some diseases which are not described in FFR 112. The diseases are separated into infectious diseases, ie those caused by microorganisms and parasites, and non infectious diseases caused by environmental or nutritional factors. The list of diseases is complete at time of writing, however with increased fish culture and increased sophistication and effort into the study of disease it is possible that new diseases will be found. Such "new" diseases are likely to be present in natural stocks and only become apparent because of the ease of study of cultured fish compared to wild fish. No distinction is made between diseases of fish farms licensed under the Freshwater Fish Farming Regulations 1983 and the diseases found in Acclimatisation Society or Government Hatcheries. This distinction makes no difference insofar as disease susceptibility is concerned. Of the diseases listed, some are from licensed farms and some from Government and Society hatcheries.

The diseases presented here are the accumulated knowledge from many years experience and contact with approximately 30 farms and hatcheries. It does not follow that all of these diseases occur or may be expected at any one site. The actual situation is that

any one farm may only encounter one or two of these diseases and some farms may not have any of these problems for years. The diseases listed here include most freshwater diseases of salmon in New Zealand. Considering the nature of your proposed farm, the diseases more likely occur at your location are only bacterial gill disease, whitespot and possibly columnaris. The remainder, for the most part, are either not significant or can be avoided. The biggest threat of introducing these infectious diseases into the farm will be from fish or organisms that may already exist in the spring waters that would supply the farm. Fish in the headwaters of any farm may carry diseases at low levels that could infect fish in a farm. The other possible means of introducing disease is from stocks bought into the farm, and this is discussed below.

WHIRLING DISEASE AND THE INTRODUCTION OF STOCK

Whirling disease is not known in the North Island at present but exists at low levels in some wild stocks and hatchery fish in the South Island. To help prevent the transfer of this disease to the North Island MAF restricts the transfer of fish to the North Island through provisions of the Freshwater Fish Farming Regulations 1983. Knowledge of the long and complex life cycle of the parasite which causes the disease enables MAF to introduce procedures which would allow the transfer of fish to the North Island without risk of transferring the disease.

The disease is not transmitted from infected parent to offspring via the eggs. The parasite exists in the bone and cartilage, not the body cavity and must infect tubifex worms before it can reinfect fish. Thus eggs taken from fish, water-hardened, and incubated in disease-free enclosed well or bore water, have no risk of transferring the disease. Furthermore if these eggs are hatched and reared in quarantine hatcheries supplied with the same disease-free waters then those fish likewise contain no appreciable risk of transferring the disease. There are several such hatcheries operating which could supply such fish.

A system of certification of hatcheries as "free" of whirling disease exists in order to meet export requirements. I would not recommend transfer of such "certified" stock to the North Island as salmon are not particularly susceptible to whirling disease and although the tests are adequate for the export requirements, they can only detect disease at a incidence of greater than 5%. The disease may exist at less than 5% thus "certified" stocks have a greater risk of transferring the disease than stock, either eggs or fish, reared on bore water.

For these reasons only an application to transfer fish or eggs from a bore water hatchery to the North Island is likely to be treated sympathetically by MAF, and provided other necessary approvals are obtained.

Following is a list of most of the diseases of chinook salmon known in New Zealand. You should be aware of how to recognise these diseases or alternatively contact fish pathologists to have fish examined. You should be familiar with the treatments that may be required and know where to obtain those remedies. Details are provided in FFR 112.

INFECTIOUS DISEASES

Bacterial gill disease

Cause: Bacteria of the *Flexibacter* group plus dusty food or poor environment. The bacteria is considered ubiquitous.

Significance: Low, this disease usually affects young fry. Preventable and treatable. However outbreaks must be recognised and treated promptly otherwise losses can increase rapidly.

Prevention: Use quality feeds low in dust with frequent feeding of sufficient food.

Treatment: Chloramine T at 6 to 10 ppm for one hour.

Columnaris

Cause: The bacteria *Flexibacter columnaris*.

Significance: Uncommon, known from only one case. Occurs at water temperatures above 18 to 20°C.

Prevention: Good husbandry, high water exchange.

Treatment: Furanace bath or medicated feed.

Nocardiosis

Cause: *Nocardia* bacteria.

Significance: Not significant. This is known from one case in a sports fish hatchery in 1972 and is only of historic interest.

Whirling Disease

Cause: A protozoan parasite *Myxobolus cerebralis*.

Significance: Overrated. For further details see the article in Freshwater Catch No 41.

Prevention: This disease is not transmitted from infected parents to offspring thus providing the water source supplying the farm is free of the disease, prevention can be achieved by stocking the farm with eggs or fish that have been water hardened, incubated and reared on disease free bore water.

Treatment: No treatment but when this disease is present in a facility initial rearing of fish for a few months on disease free bore or spring water will prevent any significant losses.

Whitespot

Cause: A protozoan parasite Ichthyophthirius multifiliis
Significance: Medium. This parasite is considered ubiquitous and may be present at a low level in most streams and lakes. Higher water temperatures and a low water exchange favour outbreaks of disease.
Prevention: Good husbandry, good water exchange, avoid overstocking.
Treatment: Formalin plus malachite green for one hour daily repeated over several days.

Chilodonella

Cause: A protozoan parasite Chilodonella.
Significance: Low. Has been found on fry and already weak juveniles. Unlikely to cause losses by itself but may in association with adverse rearing conditions.
Prevention: Good husbandry, good water exchange, avoid overstocking.
Treatment: Formalin bath for one hour.

Hafnia

Cause: A bacterial infection caused by Hafnia alvei.
Significance: Low. This bacteria is normally found in soil, water and the intestine of fish. It is known to have caused losses of 0.001 % per day from one occurrence only. This organism is not considered a serious pathogen and it is likely that some other factors contributed to the losses.
Prevention: Good husbandry etc.
Treatment: Medicated feed. Improved water flow appeared to be beneficial.

NON INFECTIOUS DISEASES.

Sunburn

Cause: Ultraviolet light at farms located in areas of high sunshine hours.
Significance: Low, known from only one farm where it seriously affected only 4% of fish, no longer a problem, see prevention.
Prevention: Shade cloth over ponds.
Treatment: None.

Gas bubble Disease

Cause: Water supersaturated with nitrogen.
Significance: Low, preventable. Only water from deep bores, taken from beneath dams, or through faulty plumbing is likely to be supersaturated.
Prevention: Vigorous aeration of water before use.

Treatment: As above.

Gill lesions

Cause: Suspected to be due to poor water quality.
Significance: Low, this condition has not been associated with any losses.
Prevention: Maintain good water quality with adequate water exchange.
Treatment: As above.

Pinheads

Cause: Feeding problems in the first few weeks after beginning to feed. It appears to be related to the palatability of diets, Some diets, particularly moist diets prevent this condition.
Significance: Low. Can be avoided.
Prevention: Use quality feeds with frequent feeding of adequate amounts. Avoid overstocking of troughs.
Treatment: Affected fish can be removed and reared separately but many do not recover and those that do are always behind normal fish in their growth rate.

Nephrocalcinosis

Cause: High levels of dissolved carbon dioxide in the water supply, incidence begins at about 12 ppm but much higher levels are needed to induce losses, ie 25 to 60 ppm.
Significance: Not significant in most farms.
Prevention: Vigorous aeration of the water supply.
Treatment: When affected fish are transferred to waters low in carbon dioxide the condition can be reversed.

Fin rot and coldwater disease

Cause: Initial lesions are induced by crowding and underfeeding. The damage so caused can be infected by Cytophaga bacteria, which are found in most freshwaters.
Significance: Low, can be avoided.
Prevention: Avoid overcrowding and underfeeding.
Treatment: As above.

Signed

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