



Australian and New Zealand College of Veterinary Scientists

Membership Examination

June 2016

Medicine and Management of Aquaculture Species

Paper 1

Perusal time: **Fifteen (15)** minutes

Time allowed: **Two (2)** hours after perusal

Answer **ALL FOUR (4)** questions

Answer **FOUR** questions each worth 30 markstotal 120 marks

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Paper 1: Medicine and Management of Aquaculture Species

Answer all four (4) questions

1. Answer **all parts** of this question:

- a) Describe the general structure of a prawn hepatopancreas **and** list **two (2)** main functions of this organ. (6 marks)
- b) Describe the general structure of a teleost fish kidney **and** list **two (2)** main functions. (6 marks)
- c) Identify major structural differences between the swim bladder of a barramundi and that of a rainbow trout, **and** describe the **two (2)** main functions of the teleost swim bladder. (6 marks)
- d) Compare the physiological mechanisms involved in osmoregulation in a saltwater fish versus a freshwater fish. (6 marks)
- e) Briefly describe **three (3)** non-specific immune mechanisms of a fish. (6 marks)

2. Answer **both** parts of this question:

- a) Relate the pathway by which nitrification occurs in a freshwater fish tank to the following: (15 marks)
 - interactions between pH, ammonia, nitrite and nitrate
 - water temperature
 - factors that can lead to an increase in the amount of ammonia
 - ammonia toxicity.
- b) Describe **five (5)** factors that may affect water quality, and therefore the health of barramundi fish, weighing 500 grams, being cultured in a recirculation system. (15 marks)

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3. Answer **both** parts of this question:

a) For **five (5) only** of the following diseases, describe what tissue samples should be taken **and** the laboratory tests used to diagnose the diseases:
(3 marks each, total 15 marks)

- disease associated with *Marteilia sydneyi* (QX disease) in oysters
- Mycobacteriosis in a goldfish
- Viral encephalopathy and retinopathy (VER) in marine grouper
- Epizootic ulcerative syndrome in rainbow trout
- Vitamin E deficiency in barramundi fish
- Infectious hypodermal and haematopoietic necrosis virus in the tiger prawn *Penaeus monodon*

b) Briefly describe the clinical signs, causative agent **and** pathogenesis of **five (5)** of the following seven diseases listed below. Note pathogenesis refers to cellular events, reactions and other pathological mechanisms occurring in the development of the disease: (3 marks each, total 15 marks)

- Ganglioneuritis in abalone
- Streptococcosis in barramundi
- Pacific oyster mortality syndrome in Pacific oysters
- Taura syndrome in prawns
- Vibriosis in an adult grouper farmed in Queensland
- Crayfish plague in a crayfish
- Blood fluke infestation in southern bluefin tuna in Australia

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4. Answer **both** parts of this question:

a) Discuss the following: *(5 marks each, total 15 marks)*

- i. The sensitivity and specificity of a molecular diagnostic test such as PCR to be used in an active surveillance program.
- ii. The difference between passive surveillance and active surveillance.
- iii. The factors that influence sample size in an epidemiological investigation.

b) A veterinarian is consulting to a southern bluefin tuna grow out farm that is experiencing ongoing problems with blood fluke infestation. The tuna are being grown in sea cages. Praziquantel is an effective treatment for blood flukes in fish, but is not registered for this application. You are considering prescribing this treatment for the tuna.

Answer **both** parts of this sub-question:

- i. Determine what information would be required to permit appropriate treatment of the tuna with praziquantel. Your answer should address factors relating to pharmacology and safety. *(9 marks)*
- ii. List information that must be included in a medication authority ('prescription') for praziquantel treatment of the tuna at this facility. *(6 marks)*

End of paper



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Paper 2

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Answer **ALL FOUR (4)** questions

Answer **FOUR** questions each worth 30 markstotal 120 marks

Paper 2: Medicine and Management of Aquaculture Species

Answer all four (4) questions

1. There is a major fish kill in an estuary. The likely cause is an algal bloom.

Answer **both** parts of this question:

- a) Explain the ecological and environmental processes that may lead to development of an algal bloom. (24 marks)
- b) Briefly explain the cause(s) of death in fish exposed to an algal bloom. (6 marks)

2. You are contacted by a fish farmer who wishes to move barramundi fish (*Lates calcarifer*) from another state (where this fish is a native, endemic species) to farm this species in your state (where the fish is non-native). Explain in detail the regulatory and biosecurity measures likely required to permit the translocation of these fish. (30 marks)

3. Answer **one** (1) of the following:

- a) Discuss the economic and other relevant considerations that would influence the decision to implement a vaccination program against vibriosis across farms that are on-growing rainbow trout ('ocean trout') in sea cages in Tasmania. In your answer consider vaccine costs at **each** stage of the production cycle, types of vaccines, efficacy, risks to farm workers and other relevant factors. (30 marks)

OR

- b) You are contacted by a fish farmer growing barramundi in fresh water. It is spring and the weather is improving. He tells you that some of his young barramundi (average weight approximately 5–10 grams) are starting to die and he is concerned. Describe a suitable approach to the investigation of this problem. Your answer should include questions you would immediately ask the farmer, conduct of an appropriate diagnostic investigation, and samples to be collected if you visited his property. (30 marks)

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4. Answer **one (1)** of the following:

- a) While visiting an Atlantic salmon farm in Tasmania, the farmer comments to you that he believes the feed conversion ratio (FCR) he is currently achieving is less than the FCR for the same age/size stock he was growing last year.

Answer **all** parts of this sub-question:

- i. The farmer questions whether or not the feed company has changed the formulation of the feed. Explain how changing the feed formulation could have an effect on the FCR. *(15 marks)*
- ii. Identify components of the feed that could be tested to determine whether the formulation is unchanged. *(5 marks)*
- iii. Besides the composition of the feed, list **five (5)** other possible reasons for the FCR being less this year compared to last year in the same age/stock on this farm. *(10 marks)*

OR

- b) For **both** abalone being grown in a pump ashore farm **and** yellowtail kingfish being grown first on land based hatcheries and then in open water, compare and describe:

- i. The type of housing used and the maintenance of appropriate water quality for the aquatic animals. *(15 marks)*
- ii. Factors that could lead to the aquatic animals being exposed to poor water quality. *(10 marks)*
- iii. For **each** system, list **one (1)** problem that could potentially cause a total loss of stock. *(5 marks)*

End of paper