國立嘉義大學九十三學年度
水產生物學系碩士班招生考試試題

科目：專業英文

英翻中

第一題（25%）

Here is a summary of some of the criteria a salmon farm must fulfil in order to be certified as 'organic':

a. Feed

At least 50 per cent of the aquatic feed ration in the fish pellets must come from the by-products of wild fish caught for human consumption (eg, the waste from filleting). The balance must be sourced from wild marine resources independently certified as sustainable. All of the agricultural feed ration must be certified as organic.

No growth hormones, genetically modified organisms or ingredients are permitted.

No artificial or synthetic pigmentation [dye] is permitted.

b. Health and parasite [sea lice] control

Genetically engineered vaccines and synthetic pesticides including organophosphate, pyrethroid and ivermectin products are prohibited. All efforts should be made in animal husbandry to reduce the need for disease control and sea lice treatments such as hydrogen peroxide.

c. Environmental impact and site location

An environmental management plan must be developed and should define:

i) The environmental loading of the site and its impact on the surrounding area, with appropriate controls or reductions.

ii) Measures to prevent fish escapes.

For further information or for details on organic aquaculture contact the Soil Association.

第二題（25%）

New genetic biotechnologies for fish aquaculture:
Genomes, Microarrays, and "DNA Chips"

Scientifically-based aquaculture requires detailed knowledge of factors that affect response of farmed fish to modified conditions, including genetic variation in animals selected as broodstock, and the differential survival and growth response of animals in consequence of such variation. The advent of **genomics** (the study of complete gene sets in organisms) and "**genomic thinking**", which emphasizes the use of high-volume, high-throughput biotechnologies to investigate interactions in large sets of genes simultaneously, now opens the possibility of routine collection of comprehensive data sets for such practical applications in aquaculture. We have begun to develop such approaches for the investigation of fish **mitochondrial DNA (mtDNA) genomes**, including those of **Atlantic Cod**. The **mtDNA** genome is pivotal, both as a source of **genetic markers** for identification and monitoring of broodstock, and in its direct influence on **oxygen consumption** and the supply of **energy for growth**.

A centerpiece of the project will be development of **new biotechnologies**, including a **complete-mtDNA-genome microarray-based "DNA re-sequencing chip"** method for measurement of **genetic biodiversity** in aquaculture species, as well as high-throughput **microarray-based methods**, such as **allele-specific oligonucleotide (ASO) assays**, for practical assessment of markers of interest to aquaculture.

第三題（25%）

The color of pond water varies. A change in color or intensity indicates a change in phytoplankton flora and density. A pond with a predominance of green phytoplankton will usually have a green color; blue-green phytoplankton often impart a bright blue-green color, and there are a host of other colors. Suspended soil particles produce muddy water. Humic substances (e.g. leaves from an oak tree or pine tree) impart a tea or cola color. An experienced pond manager can sometimes read these signs and take appropriate action, such as water exchange and emergency aeration. Freshwater ponds were fertilized to produce fingerlings of several sportfish. Pond water with a healthy phytoplankton bloom was green, whereas a, dying bloom began to take on a brownish color. A faint odor could sometimes be noted by smelling a handful of water. These indications, however, were always verified with water analysis.

第四題（25%）

Herbivorous Fish- A number of fish species has been used successfully to control aquatic weeds. A partial list includes grass carp, common carp, *Oreochromis mossambicus*, *O. niloticus*, *Tilapia zilli*, and *T. melanopleura*. Ideally a herbivorous fish will meet the following criteria: (1) effectively control weeds, (2) be economical to use, (3) not interfere with other fish species, and (4) add to the fishery. Grass carp 25 to 41 cm (10 to 16 inch) long, when stocked at 50 to 100 per ha (20 to 40/ac), control a wide variety of weeds within a year or two. Grass carp are hardy and excellent eating. Their many small bones, however, sometimes make them undesirable for eating.