COURSE CODE:	FIS405
COURSE TITLE:	Fish Hatchery Management, Fingerlings and Fry Production
NUMBER OF UNITS:	3 Units
COURSE DURATION:	Three hours per week

COURSE DETAILS:

Course Coordinator:	Dr. (Mrs.) O.T. Agbebi
Email:	agbebi20@yahoo.com
Office Location:	Room D204, COLERM
Other Lecturers:	Dr. D.O. Odulate and Dr. A.A. Idowu

COURSE CONTENT:

Maintenance of hatcheries and nursery ponds, constant supply of quality water, quarantine, segregation and matching of brooders. Spawning techniques; induced breeding, artificial and natural sex reversal, hybridization.

COURSE REQUIREMENTS:

This is a compulsory course for all students in Departments of Aquaculture & Fisheries Management and Forestry & Wildlife Management. In view of this, students are expected to participate in all the course activities and have minimum of 75% attendance to be eligible to write the final examination.

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READING LIST:

LECTURE NOTES

SEGREGATION AND MATCHING OF BREEDERS

The first spawners or virgins are usually used for artificial propagation. Larger fish produce more eggs, but the handling of giants weighing over 10-15kg is rather difficult and tiresome. The most suitable size of spawners is 3-5kg. Larger specimens are convenient if breeders spawn spontaneously without having to be stripped. Very large fishes are less suitable for hormone treatment, because of the requirement of large doses of hormones and the difficulties in handling them.

Before releasing the breeders in special spawning ponds for spontaneous spawning, or before they are prepared for induced spawning, the fish culturist should make sure that they are in a "ready-for-spawning" condition. Unless their gonads have developed up to the resting or dormant stage, they will not respond to any propagation technique. Therefore, sorting out of the right breeders is very important for successful artificial propagation.

In general, mature females are selected as follows:

- A well distended, swollen abdomen from which ripe eggs can be obtained by slightly

pressing the abdomen toward the genital papilla. Ripe eggs are generally uniform in size and an experience breeder can see the nucleus as a small dark part in the centre of the egg.

- A swollen sometimes reddish or rise coloured genital papilla.
- They should be larger than 200g and not less than seven months old.
- The release of few drops of thick milt when its abdomen is probed slightly.

Many fishes exhibit distributive sexual demonstration which is necessary to examine the female of some fishes that are fed, to ensure that the abdominal fullness and size of gonads and not gorged food. Some of the above mentioned symptoms may kill some fishes while there may be additional symptoms in others. In the case of *colosssoma oculus,*the belly of the female becomes soft and rounded only a little before the actual spawning. This hard-bellied condition is a sort of adaptation for the co-existence of this fish.

If both sexes are together in the same pond or cistern, as soon as the males indicate their readiness for spawning the females also achieve the same condition. Since the river spawners do not breed in confined water; there is no need to segregate their sexes. On the other hand, the segregation of sexes is mostly necessary in the case of uncontrolled pond spawners, since otherwise it may lead to uncontrolled spawning in the storing pond or unnecessary fighting among males.

It is important that the culturist carefully observe the brood fish with respect to their anatomical and behavioral changes during their readiness for spawning.

SPAWNING TECHNIQUES: INDUCED BREEDING, ARTIFICIAL AND NATURAL SEX-REVERSAL, HYBRIDIZATION

Because development occur externally, it is possible to direct what phenotype sex is.

During early embryology, an embryo is phenotypic ally, neither male or female in that it does not possess ovaries, testes, or other characteristics associated with the reproductive systems. Instead an embryo possess embryological pre=cursors of ovaries and testes (primordial germ cells), and not at this stage an embryo is “totipotent” because it could develop into either male or female. (It is different for each species), a chemical signal originated from a gene or set of genes, and this signal ‘informs’ the totipotent tissue which may be develop. Once this occurs and the tissues complete its development, the fish becomes either a phenotype male or phenotype female.

There is a window of time, during which phenotype sex can be altered, and this window is specific. If a fish injects or absorbs anabolic steroids during this period, the steroid can direct the development of the totipotent cells. The exact dosage, duration of feeding, beginning and ending dates, and access to natural sources of food are major factors that determine the success of these endevours.

General methods used to produce either monosex female populations, either by feeding sexually undifferentiated fry rations that contain anabolic steroids or by raising fry in water that contains a dilute concentration of anabolic steroids. It major goal in tilapia farming is to produce all male population in order to prevent reproduction and to eliminate females, which grow more slowly than males. To accomplish this, swim-up fry are typically fed rations containing 60mg of 17α-methy/testosterone.kg fed for 30 to 60 days. This usually changes about 90-100% of the females into male which creates a population that is 95-100% male.

In salmon farming, the goal is to produce all female population in order to eliminate precocious males who die after they mature. To accomplish this, when salmon fry first begin to feed they are typically fed rations containing 20mg of 17β-estradiol/kg feed for 40 to 60 days.

The amount of hormone consumed by each fish is miniscule and most is eliminated rapidly. For instance, it is found rainbow trait exceeds 69% of ingested 17β-methy/testosterone within 24 hours and also 0.9% of injected 17α-methy/testosterone remained Juvenile T. aurea 21 days after it was removed from the diet. This means that the hormones used to sex reverse fish might be detectable only in parts per billion when sex-reversed fish reach marketable size, so the use of these hormones should pose no health hazards.

HYBRIDIZATION

This is the mating of genetically different groups from the same species (intra-specific hybridization) or from different species (inter-specific hybridization). Inter-generic hybrid is requires when parents from two different generic are crossed. Hybridization can be used to combine good traits from two different species into one group of fish or to transfer a characteristic of one group to another.

USES

Hybridization is for the production of new breeds or strains. It involves the production of uniform products. Processing of plants, and consumers often desire uniform products.

It is the most efficient method of producing uniform progeny. It involves the production of monosex populations and for the production of hybrids to be stocked in natural bodies of water that are unable to maintain self-reproducing population.

One thing that hybridization generally does not do is produce good brood stock; meaning not to egg/kg female, but to the ability of the hybrids to produce above average progeny. If hybrids do not produce above average progeny (unless they exhibit material heterosis) because their superiority is not original and is disrupted during gametogenesis, because hybrid superiority is due to interactions, when hybrids reproduce, their progeny exhibit a wide range of interaction effects. Although hybridization can be used to create new breeds and thus provide new pools that can be exploited by selection, hybridization is mainly used to produce superior animals and plants for grow-out. Selection is used to produce superior brood stock.

Hybridization has been used to improve productivity in catfish culture as a stop-gap method until selection could be employed to create a better strain of channels catfish.

Some hybrids crosses produce monosex population. Monosex population has been produced by inter-specific hybridization (hybridization of two species) in sunfish. The most famous and most important example is that which occurs in tilapia. It was discovered that progeny produced b y the hybridization of two species were all males.

What is DNA Extraction?

- A routine procedure to collect DNA for subsequent molecular or forensic analysis.
- DNA is extracted from human cells for a variety of reasons. With a pure sample of DNA you can test a newborn for a genetic disease, analyze forensic evidence, or study a gene involved in cancer.

Steps to DNA Extraction

1. Breaking the cells open to expose DNA
2. Remove membrane lipids by adding detergent
3. Precipite DNA with an alcohol — usually ethanol or isopropanol. Since DNA is insoluble in these alcohols, it will aggregate together, giving a *pellet* upon centrifugation. This step also removes alcohol-soluble salt.