MUDFISH INDUCED SPAWNING TECHNOLOGY, ANYONE?

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PRESENTATION OUTLINE

- DEFINING “INDUCED SPAWNING”
- WHY IS INDUCED SPAWNING ESSENTIAL TO AQUACULTURE?
- THE SPAWNING PROCESS IN FISH: A SIMPLISTIC MODEL
- THE SCIENCE BEHIND INDUCED SPAWNING
- APPLICATION OF INDUCED SPAWNING TECHNOLOGY FOR MUDFISH PRODUCTION
- CONCLUSION
INDUCED SPAWNING

is defined as

- Regulation of environmental condition or by introduction of hormones to stimulate factors that trigger reproduction.

- Promotion of gonadal ripening and timely release of sperms and eggs
WHY IS INDUCED SPAWNING ESSENTIAL TO AQUACULTURE?
The technique is very simple and does not need too much technical assistance or knowledge.
#2 Removes uncertainties in breeder spawning
Targeted/scheduled spawning is possible and can produce fry outside spawning season for hatchery and/or grow-out.

For example:

**REPRODUCTION CYCLE OF MUDFISH**

- Matures after one (1) to two (2) years
- Spawns in freshwater habitats
- Spawning occurs throughout the year with its peak prior to or with the onset of monsoons or between February to March, June to September and November
- Favors increased in water level
#4 Can provide pure spawn on fish under cultivation

- Breeder selection is possible, good quality fish can be selected and bred.
- Higher chance that the offspring inherits the good traits of its parents.
- Pure spawn can be obtained from the fish under cultivation.
#5 Offers more controlled hatchery or aquaculture operations
THE SPAWNING PROCESS IN FISH

A SIMPLISTIC MODEL
SPAWNING PROCESS

ENVIRONMENTAL STIMULI
- photoperiod
- water temperature
- water quality
- flooding and water current
- tides and cycles of the moon

In view of AQUACULTURE
- Natural spawning is difficult to control and predict
- Erratic production and aquaculture operations are more difficult to manage

In view of AQUACULTURE
- weather cycles
- spawning substrate
- nutrition
- disease and parasites
- presence of other fish

ENVIRONMENTAL STIMULI

In view of AQUACULTURE

- In view of AQUACULTURE
- In view of AQUACULTURE
THE SCIENCE BEHIND INDUCED SPAWNING
THE SCIENCE BEHIND INDUCED SPAWNING

The objective is to bypass natural biological processes to speed up (or induce) spawning in fish.

- Environmental Stimuli
- Brain (Hypothalamus)
- Pituitary
- Gonads
- Gametes

Regulation of Conditions

Pituitary Extract or Purified Gonadotropins

Gonadotropin Hormones

Gonadotropin Releasing Hormones

Gonadotropin Releasing Hormone Analogues

Steroids and Prostaglandins

Progesterone, testosterone, Prostaglandins, oxytocin
GONADOTROPIN RELEASING HORMONE ANALOGUES

PITUITARY EXTRACTS or PURIFIED GONADOTROPINS

STEROIDS and PROSTAGLANDINS
Environmental Stimuli → Brain (Hypothalamus) → Pituitary → Gonads → Gametes

* Regulation of Conditions
* Pituitary Extract or Purified Gonadotropins
* Gonadotropin Hormones
* Gonadotropin Releasing Hormones
* Gonadotropin Releasing Hormone Analogues

Steroids and PG
- Progesterone, testosterone, PGα, oxytocin
APPLICATION OF INDUCED SPAWNING TECHNOLOGY FOR MUDFISH PRODUCTION
TAXONOMY

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haruan, haluan, aluan, anak dalag, dalag, bulig, amanu, bundaki, bakuli
VALUE AS A COMMODITY

- white, firm, almost bone free flesh and good taste
- high nutritional value
- medicinal and pharmaceutical purposes
- air-breathing freshwater species
- high aquaculture potential
- high tolerance to adverse environmental conditions
- highly profitable
MARKETABILITY IN THE PHILIPPINES

- Highly marketable in inland areas such as Central Luzon, Ilocos/Cagayan Region, Cotabato and various areas of the Mindanao region
- Typically sold live in local markets
- Commercially sold as a fermented rice-fish mixture locally called as *burong dalag*
INDEUCED SPAWNING PROCESS

**SAMPLING**

- Sampling is done once or every two months
- Measure and record length and weight of fish
- Determine oocyte maturity
- Treat diseases/manually remove parasites
- Salt bath the fish if necessary

The objective is to select good quality and mature broodstock to be induced
**INDUCED SPAWNING PROCESS**

**SEX IDENTIFICATION**

**Male Breeders Distinguishing Characteristics**

- Lean, usually longer than females
- No bulging of abdomen
- Genital papilla is small
- Anal papilla-like structure is prominent, its tip is pointed

**Sampling**

**Hormone Injection**

**Egg Collection**

**Larval Rearing**
**INDUCED SPAWNING PROCESS**

**SEX IDENTIFICATION**

Female Breeders Distinguishing Characteristics

- Soft and bulging of abdomen
- Genital pore is prominent, round
- Reddish, protruding, swollen vent
- Anal papilla-like structure broad, slightly reddish and tip blunt with a reddish dot

![Lateral view part of a female mudfish breeder](image1)

![Ventral part of a female mudfish breeder](image2)

**Sampling** ► **Hormone Injection** ► **Egg Collection** ► **Larval Rearing**
SEXUAL MATURITY

- Individually scoop out *Channa* sp. breeders from hapa nets.
- Expose fish to anaesthesia for 1-3 minutes.
- Identify sex of the fish.
- Gently insert cannula to the urogenital pore of the female fish to collect eggs.
- Place eggs collected in a saline solution.
- Examine under microscope to determine maturity.

- Ratio of water to anaesthesia is 0.5 grams for 1 liter. Exposure of fish to anaesthesia may last to 1-3 minutes. Anaesthetized fish, can be observed by loss of balance (vertical side-up), immobility with rapid and shallow opercular movement.
- Cannulation can be done once a month during sampling.
- Cannulation technique in male brooders is hard due to very small genital pore, thus, male is selected based on its external characteristics described.
INDUCED SPAWNING PROCESS

HORMONE INJECTION

- Weigh the fish
- Cover the head of the fish with a towel to keep it calm
- Using a sterile 1cc syringe, withdraw hormone to be injected
HORMONE INJECTION

Inject needle at an angle of 30-45 degrees intramuscularly above lateral line

Massage injected area so that the suspension will be evenly distributed throughout the muscles

Place male and female (1:1 ratio) fish in the same hapa nets (fine mesh) provided with cover
**INDUCED SPAWNING PROCESS**

**EGG COLLECTION**

- Spawning usually occurs 24-32 hours after injection
- Fertilized eggs are free floating, spherical, non adhesive, transparent and bright yellow in color
- Collect eggs after 2-3 hours after spawning
INDUCED SPAWNING PROCESS

INCUBATION AND HATCHING

- Stock in fiberglass tanks with 300-400 liters of water until hatching
- Provide water heaters to maintain a temperature range between 26-30°C
- Hatching occurs 24-30 hours after fertilization at 26-28°C
- After collection of eggs, removed breeders in breeding hapa nets and return them to their respective hapas.
For 3-DAH mudfish larvae:

Stocking
- 10-15 individuals/liter

Feeding
- Mixed zooplankton or *Moina sp.*
- Ad libitum
- Feed 3 to 4 times daily
- Feed with zooplankters until 14-DAH
LARVAL REARING

For 14-DAH fry onwards

Stocking
- 300 fry/m² in fine mesh hapa net
- 1,000-3,000/ 1x 5 m²

Feeding
- ground trash fish
- 2-3 times a day

Grading/Sorting
- Once a week
- Remove dead fry
- separate shooters
IN CONCLUSION

✓ Induced spawning technology in fish offers a straightforward, smart and efficient approach to increase fisheries and aquaculture production resulting to higher yields and increased profits for fish farmers;

✓ The technique is easy to perform and does not require expensive materials or equipment;

✓ Induced spawning also helps in addressing concerns on food security, reduces dependence on wild stocks, and alleviates the sharp decline of fish population due to overfishing/anthropogenic activities.
ACKNOWLEDGMENTS

FUNDING AGENCIES

COLLABORATING AGENCIES