



MUDFISH INDUCED SPAWNING TECHNOLOGY, ANYONE?

CASIANO H. CHORESCA JR. PhD

DA-NFRDI/ Scientist 1
Center Chief, DA-FBC



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





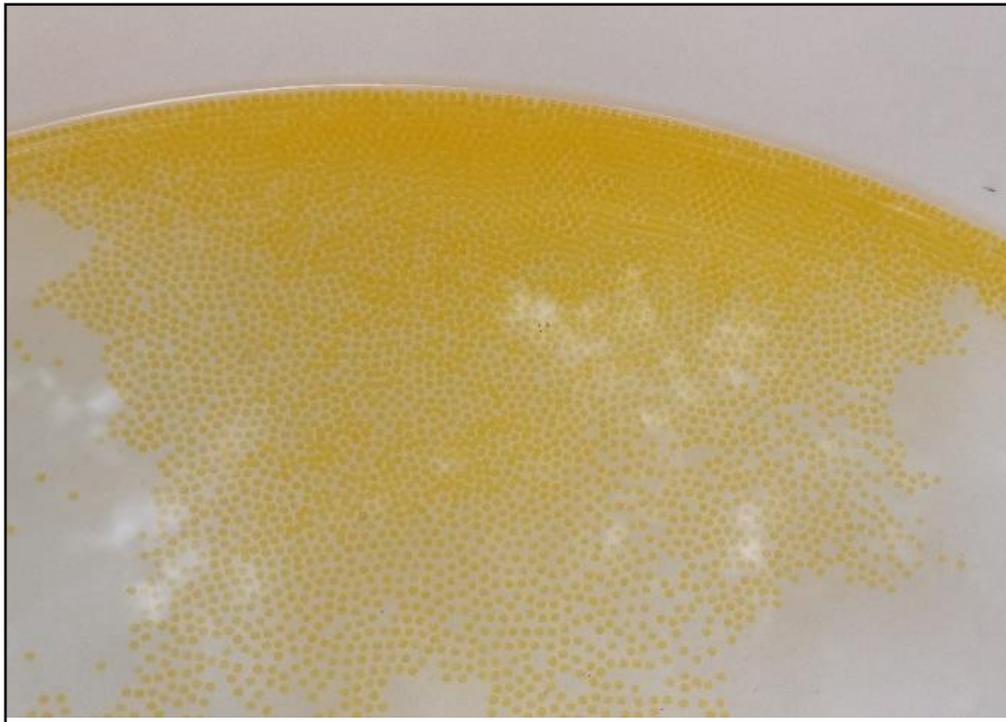
WHY IS INDUCED SPAWNING ESSENTIAL TO AQUACULTURE?



#1 The technique is very simple and does not need too much technical assistance or knowledge.



#2 Removes uncertainties in breeder spawning



#3 Targeted/scheduled spawning is possible and can produce fry outside spawning season for hatchery and/or grow-out

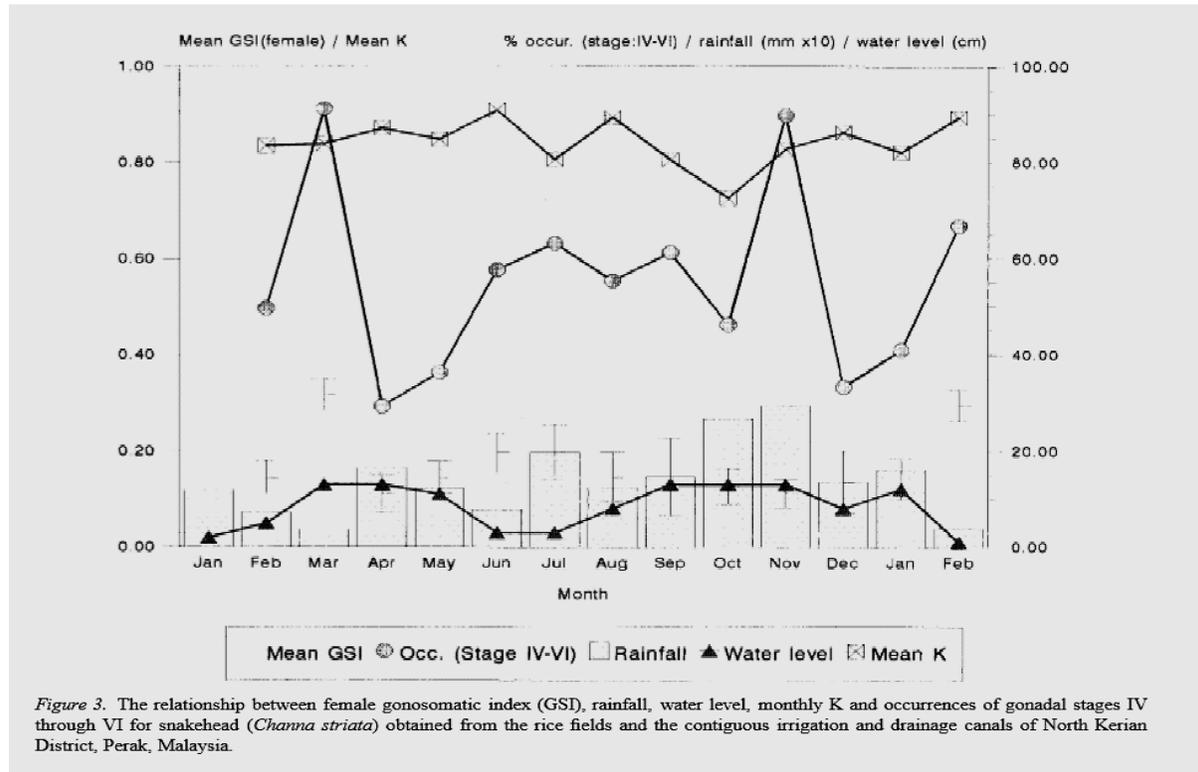


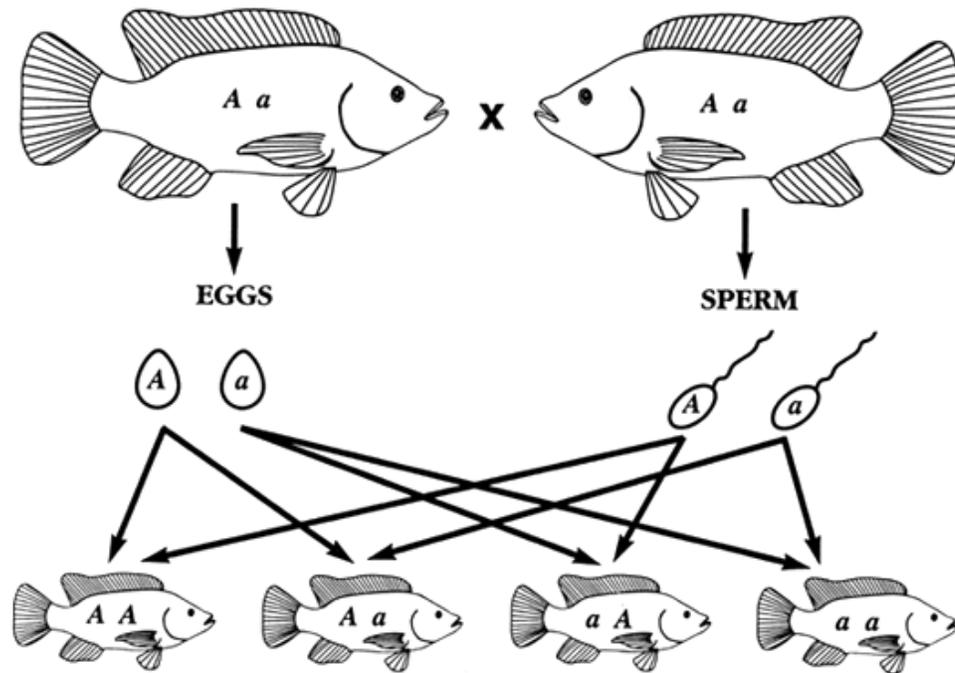
Figure 3. The relationship between female gonosomatic index (GSI), rainfall, water level, monthly K and occurrences of gonadal stages IV through VI for snakehead (*Channa striata*) obtained from the rice fields and the contiguous irrigation and drainage canals of North Kerian District, Perak, Malaysia.

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



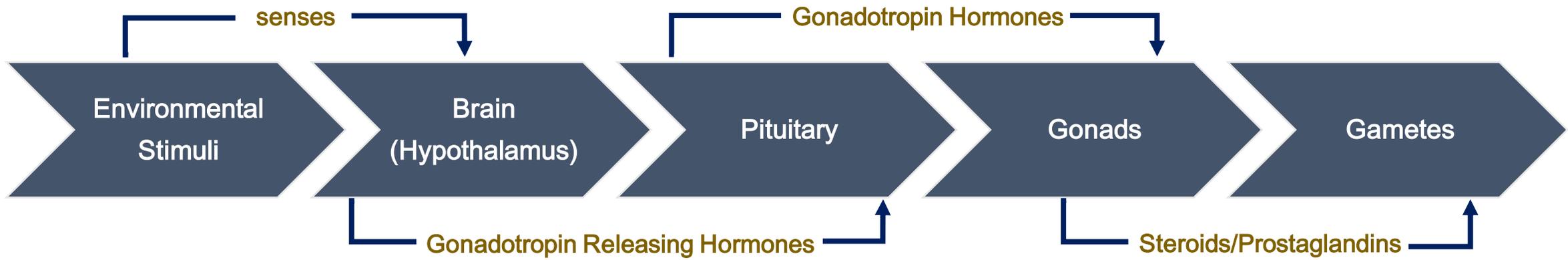


THE SPAWNING PROCESS IN FISH

A SIMPLISTIC MODEL



SPAWNING PROCESS



ENVIRONMENTAL STIMULI

- photoperiod
- water temperature
- water quality
- flooding and water current
- tides and cycles of the moon
- weather cycles
- spawning substrate
- nutrition
- disease and parasites
- presence of other fish

In view of AQUACULTURE

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

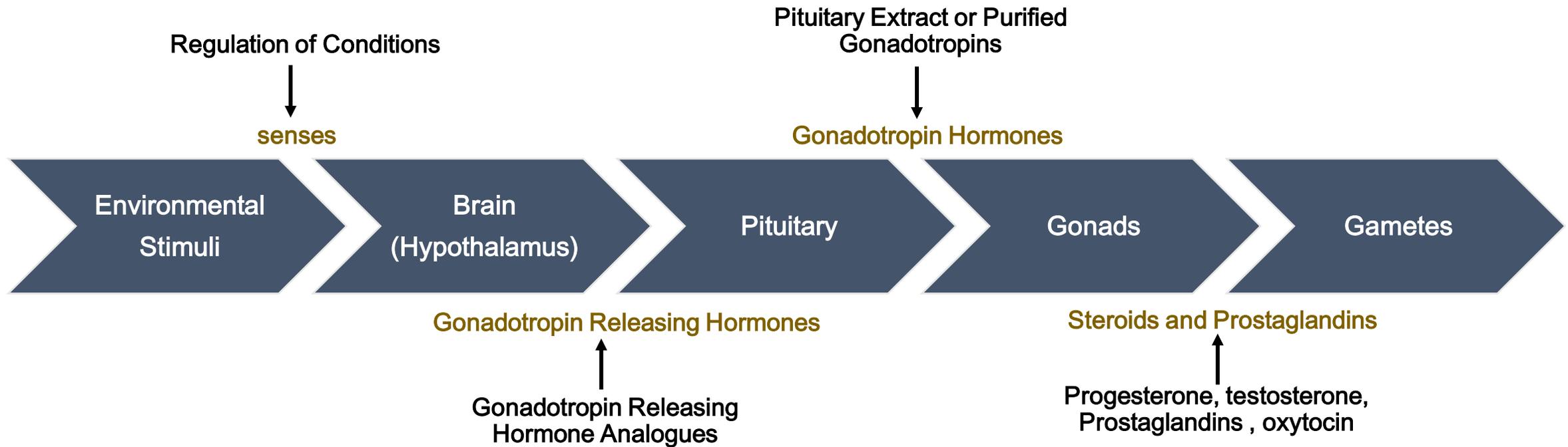


THE SCIENCE BEHIND INDUCED SPAWNING



THE SCIENCE BEHIND INDUCED SPAWNING

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





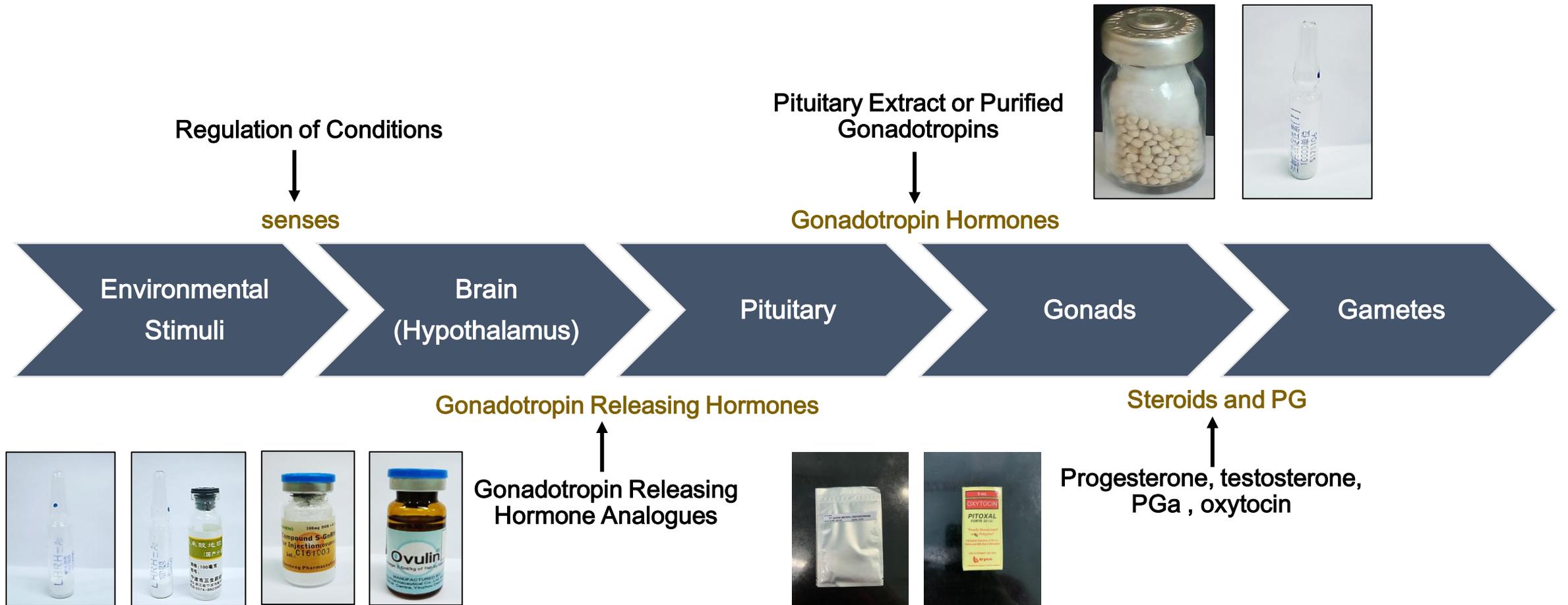
GONADOTROPIN RELEASING HORMONE ANALOGUES



PITUITARY EXTRACTS or PURIFIED GONADOTROPINS



STEROIDS and PROSTAGLANDINS





APPLICATION OF INDUCED SPAWNING TECHNOLOGY FOR MUDFISH PRODUCTION

TAXONOMY

PHYLUM	:	Chordata
SUBPHYLUM	:	Vertebrata
CLASS	:	Actinopterygii
ORDER	:	Perciformes
SUBORDER	:	Channoidei
FAMILY	:	Channidae
GENUS	:	Channa
SPECIES	:	striata



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*

INDUCED 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

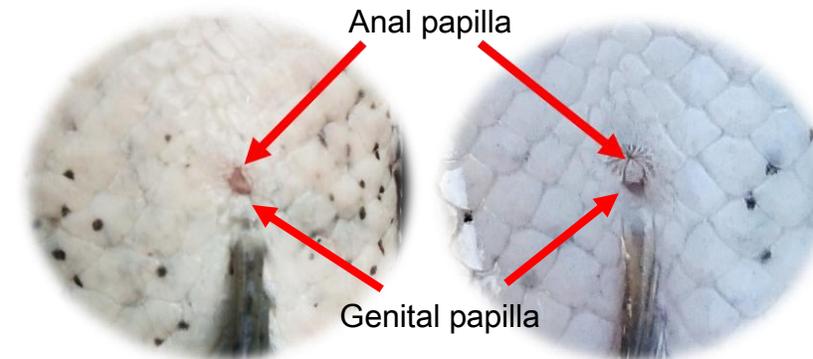
SEX IDENTIFICATION

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



Lateral view of a male mudfish breeder



Ventral part of a male mudfish breeder



INDUCED SPAWNING PROCESS

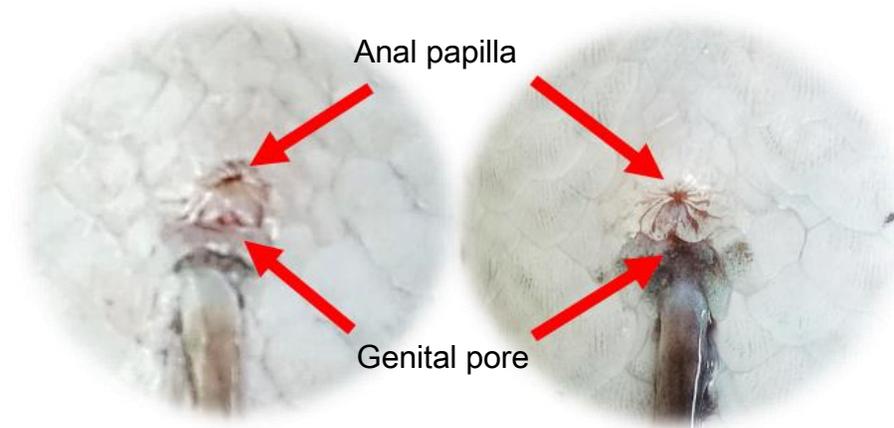
SEX IDENTIFICATION

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



Ventral part of a female mudfish breeder



INDUCED SPAWNING PROCESS

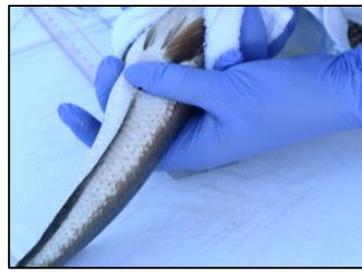
SEXUAL MATURITY



Individually scoop out *Channa* sp. breeders from hapa nets



Expose fish to anaesthesia for 1-3 minutes



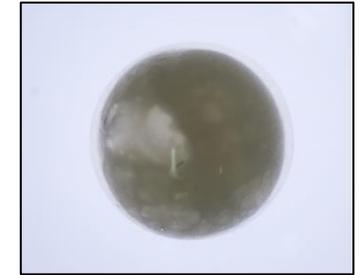
Identify sex of the fish



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



INDUCED SPAWNING PROCESS

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

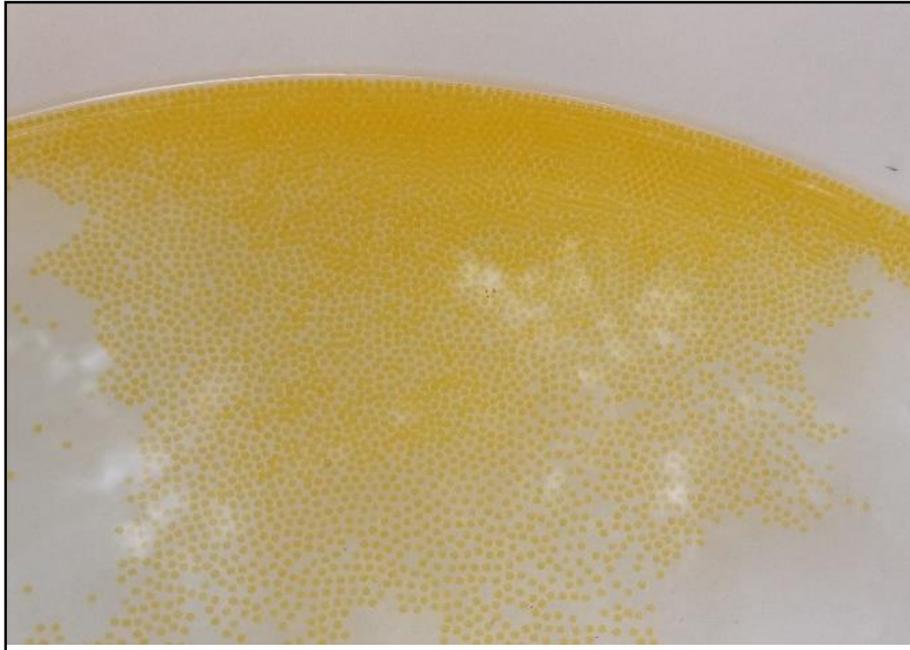


Place male and female (1:1 ratio) fish in the same hapa nets (fine mesh) provided with cover



INDUCED SPAWNING PROCESS

EGG COLLECTION

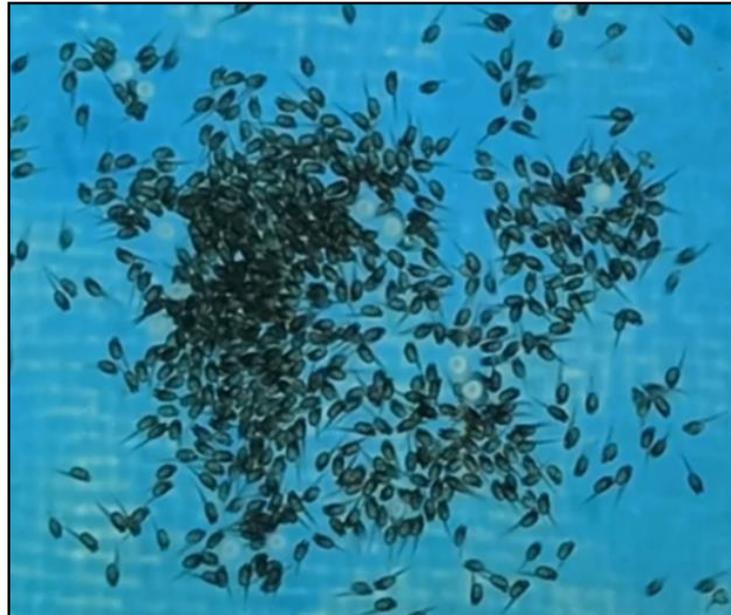


- Spawning usually occurs 24-32 hours after injection
- Fertilized eggs are free floating, spherical, non adhesive, transparent and bright yellow in color
- Collect eggs after 2-3 hours after spawning



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.



LARVAL REARING

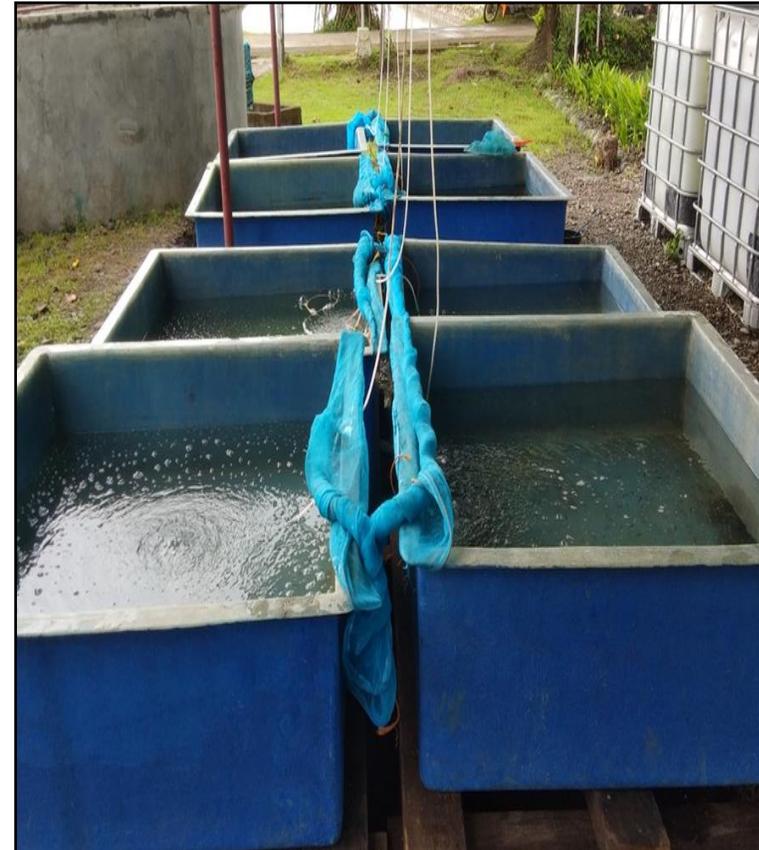
For 3-DAH mudfish larvae:

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



Sampling

Hormone Injection

Egg Collection

Larval Rearing

LARVAL REARING



For 14-DAH fry onwards

Stocking

- 300fry/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

Sampling

Hormone Injection

Egg Collection

Larval Rearing



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



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COLLABORATING AGENCIES