



PRESENTATION ON AQUACULTURE TECHNOLOGIES FROM NCoS- AQUACULTURE, NIGERIA

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Outline

1. Brief introduction of the NCoS
2. Introducing Technologies available through NCoS.
3. Priority Technology
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 - Priority Technology 2
 - Priority Technology 3
4. Partnership engagement
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Brief Introduction of NCoS

Project Development Objective (PDO)

- The main objective of WAAPP was to increased agricultural productivity while promoting regional integration as instruments for promoting shared growth and poverty reduction in West Africa.
- The development objective of WAAPP Nigeria was to strengthen the National Agricultural Research System (NARS), to contribute to technology development, dissemination and adoption, to boost agricultural productivity increases in Nigeria's top commodity sub-sectors that are aligned with sub-regional priorities.

Brief Introduction of NCoS

National Centre of Specialization in Aquaculture:

- Support to core research programs in;
- Fingerlings research and adoption;
- Fish feeds research and adoption;
- Post-harvest (processing, packaging and marketing) research and adoption.
- Upgrading of core facilities and equipment and;
- Strengthening capacity of researchers.

Introducing Technologies available through NCoS Aquaculture

- The NCoS generated and released a total of eleven (10) technologies.
- These technologies which cuts-across the various aquaculture value chains are;
 1. Fish smoking kiln.
 2. Fish solar tent dryer.
 3. Fish cooling boxes.
 4. Techniques for production of all-male tilapia species.
 5. Clupeid fishmeal production.
 6. Fish retail tables.
 7. Techniques for the production of all-year round fingerlings of *Clarias gariepinus* and *Heterobranchus longifilis*.
 8. Improved progenies of *Clarid* species developed from intra-specific hybridization of germplasms for multiplication.
 9. Fish packaging materials.
 10. Fish meal processed from lantern fish.

Priority Technologies

- Detachable Improved Fish Smoking Kiln
- Fish Cooling Box
- Clupeid Fishmeal Production
- Lantern Fishmeal Production

*Detachable improved fish
smoking kiln*

What is this Technology about?

- Developing a smoking kiln that will meet international standards.
- Increase quick transportation, assembling and dismantling of smoking kiln in rural and sub-rural areas.
- Improve fish quality and food safety by eliminating challenges associated with traditional fish processing methods.
- Reducing the time period of smoking to about 6 to 8 hours.

What are its components?

- Fabrication of improved smoking kiln design.
- Fabrication of detachable smoking kiln.
- Components include;
 - Smoking chamber
 - Oil collection chamber
 - Solar powered fan for even circulation of heat and filtered smoke.

How does this technology function?

- The equipment smokes and dries fish using charcoal or gas as the fuel sources.
- It has a fan attached to the kiln that is powered by a solar panel to ensure even distribution of heat and filtered smoke within the smoking chamber.
- It adequately dries fish within 6 to 8 hrs depending on the quantity of fish and the prevailing temperature in the smoking chamber.
- The damper prevents the direct contact of smoke on the fish thereby reducing the level of polyaromatic hydrocarbon (PAHs) in the fish.

What are its deliverables?

- Detachable smoking kiln.
- High quality smoked fish with low level polycyclic aromatic hydrocarbon (PAHs).
- Fish oil.
- Increase farmers income.

Some evidence of success

- Adoption of NCoS aquaculture smoking kiln by fish farmers in Nigeria with over 3,000 women and youths trained between 2015 to 2021
- Adoption of NCoS aquaculture smoking kiln by fish farmers in other WAAPP countries namely;
 - Ghana,
 - Cote *d'* Ivoire,
 - Benin,
 - Gambia
 - Guinea



Trainings of Youths and Women by NIOMR



Fabrication of detachable Fish Smoking Kiln



Detachable Improved Fish Smoking Kiln



Interior view



WAAPP-Nigeria Smoking Kiln Produced for WAAPP-Gambia

Partnership engagement

Private Sector engagement or opportunity.-

- State Agricultural Development Program (ADPs),
National Directorate of Employment (NDE),
Fisheries Society of Nigeria (FISON)

Extension agencies or Development organizations.-

- Federal Department of Fisheries, State
Department of fisheries and State ADPs.

Youth engagement opportunities.-

- Training of unemployed youths and women in
aquaculture and fish post harvest technology

How does one access the technology

Make linkage to demonstration items in Booth or Video.-

<http://www.youtube.com/watch?v=tSGKGMsitGY>

<https://www.youtube.com/watch?v=P5PcblydBCE>

Ice Fish Box

What is this Technology about?

- **The Ice Fish Box** is a cold chain handling and storage facility for fish preservation.
- The development of the technology was supported by West African Agricultural Productivity Program (WAAPP).
- It can preserve fresh fish for up-to 48 hours without quality deterioration and can be used for Transportation of fresh fish.
- It can be used for:
 - Storage of fresh fish
 - Retailing of fresh fish

Components of Ice Fish Box



Handle

Drain

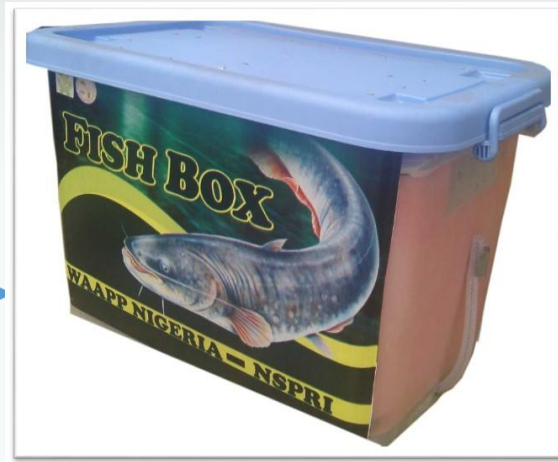
Wheel



Cover/Lid

Internal Wall

Evolution of Ice Fish Box



1st Developmental Stage:

- Research
- NSPRI's effort before WAAPP intervention

2nd Developmental Stage:

- Research
- WAAPP intervention

3rd Developmental Stage:

- Commercialization
- NSPRI/Grant and Lange partnership

How does this technology function?

Procedure
for usage
of Ice Fish
Box

Wash the box

Collect fish and ice block

Weigh fish and ice of equal weight for ratio 1:1

Put some quantity of fish

Add ice block, continue the arrangement until the lot is exhausted or filled to capacity

Open the drain at an interval of 3 hours to discharge melted ice water

Wash the box after usage

How does this technology function?

**Deliverables
of Ice Fish
Box[®]**

- Extension of shelf life of fresh fish for 48 hours
- Retailing facility for fresh fish hawkers
- Fish quality retention during transportation



Traditional
method



Success Story on Ice Fish Box

Evidence

- The technology has been commercialized in partnership with Grant and Lange
- 1000 units of the box have been produced and distributed to stakeholders in aquaculture value chain in Nigeria in 2021
- Reduces fish spoilage and increases fish marketers income.

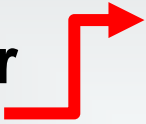


Distribution
of Ice Fish
Box
to Stake
holders



- Adoption of NCoS aquaculture fish cooling box by fish farmers in other WAAPP countries namely;
 - Ghana,
 - Cote *d'* Ivoire,
 - Benin,

Partnership Engagement

Private Sector Engagement  Grant and Lange

Extension Agencies  State Agricultural Development Programme (ADPs)

Youth Engagement Opportunities  Over 500 youths benefitted from the distribution made this year

How does one access the technology

Accessibility

- The technology could be accessed through all NSPRI offices

Demonstration Link

- Ice Fish Box

..\NSPRI CORAF FAIR DOCUMENT\ICE FISH BOX
VID_20211021_122142_20211021142724849_s01.mp4

*Clupeid fishmeal
Production*

What is this Technology about?

- Developing a cost effective fishmeal from local aquatic resources (clupeids) to replace imported fishmeal in fish feed production.
- The processing of fresh clupeids into clupeids fishmeal using a fishmeal processing.
- Formulation and compounding of clupeid fishmeal in aqua-feed.

What are its components?

- Abundant clupeid fish in the inland waters of Nigeria.
- Fishmeal processing machines

How does this technology function?

- The obtained clupeid is used as a fishmeal replacer and formulated according to nutrient requirement of cultured fish species.
- The clupeid fishmeal is a highly qualitative local resource and contains excellent amino acids profile and proximate crude protein composition which makes it a perfect replacer of the foreign fishmeal in fish feeds production in Nigeria.

What are its deliverables?



Fresh clupeid fish



Processed Clupeid fishmeal

Some evidence of success



Fishmeal

Fishmeal

Clupeid Fishmeal

Some evidence of success

- The Cost of this local fishmeal is less than that of the foreign fishmeal.
- Economic analysis of feed production indicated a significant reduction in feed cost with the use of clupeid fishmeal in fish diet.
- Adoption of NCoS aquaculture clupeid fishmeal by fish farmers in other WAAPP countries namely;
 - Ghana,
 - Cote *d'* Ivoire,
 - Benin,

Partnership engagement

Private Sector engagement or opportunity.-

- State Agricultural Development Programs (ADPs), National Directorate of Employment (NDE), Fisheries Society of Nigeria (FISON)

Extension agencies or Development organizations.-

- Federal Department of Fisheries, State
- Department of fisheries, State ADPs.

Youth engagement opportunities.-

- Training of unemployed youths and women in aquaculture, fishmeal production and fish post harvest technology.

Lantern fishmeal production

What is this Technology about?

- Trawl and harvest of lantern fish from the deep sea of Nigeria's territorial waters.
- The processing of lantern fish into fish meal using a pilot scale fishmeal processing facility at NIOMR
- Formulation and compounding lantern fishmeal with other feed ingredients into aqua-feed.
- Design and conduct a feeding trial of the compounded feed on *Clarias gariepinus* fingerlings.

What are its components?



Plate : RV.BAYAGBONA

What are its components?



Deep sea trawling on board NIOMR Vessel (RV. Bayagbona) for lantern fish

Plate : RV. BAYAGBONA



State of the Earth's Navigation Equipment

Characteristics of Vessel

- The vessel was built at **WISLA Shipyard**, under the supervisions of **Bureau Veritas**.

Main characteristics:

- Length over all: 36,30 m
- Length b.p.: 29,50 m
- Breadth: 9,00 m
- Depth to upper deck: 5,90 m
- Depth to lower deck: 3,70 m
- Draught: 3,25 m
- Speed: 10 knots
- Crew: 18 people

- The vessel is specially designed for conducting **both fishery and oceanographic research operations in deep seas**.
- She is **equipped with modern echosounding** and sampling equipment, as well as **on-board fully equipped research laboratories**.
- **Fish hold structure installed on board operates at a temperature of -24°C**, while the **blast freezer is being capable of freezing fish to -40°C**. For fisheries and oceanography research both dry and wet laboratories are installed on board.

How does this technology function?

- Deep sea trawling of lantern fish species along the Nigeria's territorial waters.
- Acoustic surveys to estimate stock biomass was also carried out.

Trawling for lantern fish



Rehabilitated NIOMR fish cold room for Lantern fishmeal storage



Plate 4: NIOMR Cold Room Facility

Species of lantern fish



Lantern fish

Processing flow-chart

Trawling for Lantern fish



Sorting



Hooper



Pre-cooking



Squeezing



Drying



Milling



Packaging

What are its deliverables?

- The feeding trial has been conducted using *C. gariepinus* and the result obtained compared favorably with imported fishmeal based diet.



Lantern fishmeal

Deliverables

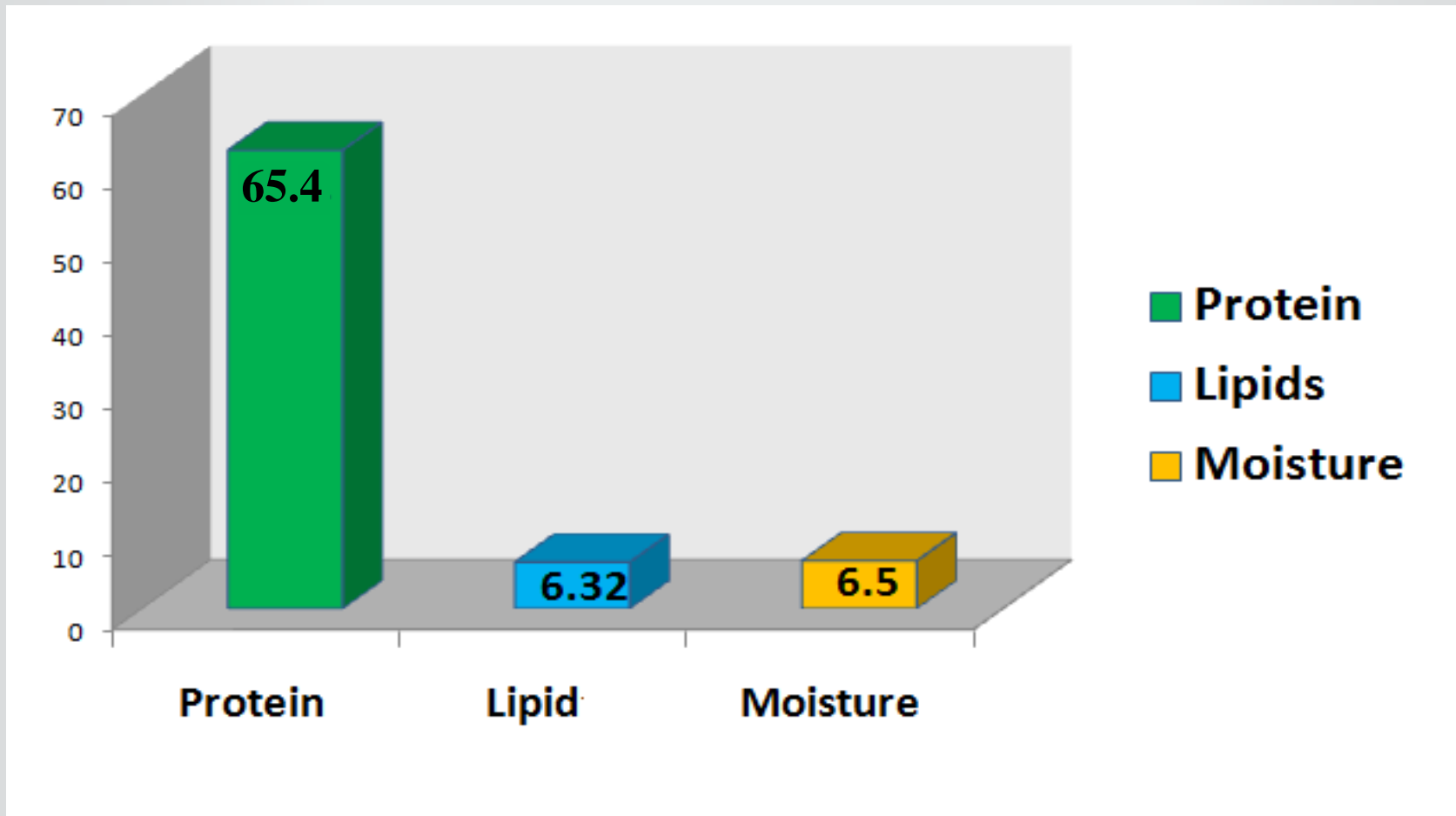


Fig 1: Chemical composition of Dried Lantern fish

Partnership engagement

- Investors have approached NIOMR for partnership for the exploitation of lantern fish for fish meal production.

Private Sector engagement or opportunity

- Lagos State government has approached the institute as up-taker for the Lantern fish meal production.

Extension agencies or Development organizations

- State Agricultural Development Agencies, State department of fisheries.

Youth engagement opportunities (actual or potential)

- The institute has trained youth on the production of fish feed.

How does one access the technology

Proceedings of the 52nd Annual Conference of the Agricultural Society of Nigeria (ASN), Abuja. Pages 1051 – 1057

General Conclusion

- All the technologies are working with improvement in all areas.
- Any interested individual can obtain information or contact the Director/Coordinator, NCoS, Aquaculture, Agricultural Research Council of Nigeria (ARCN).

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THANKS FOR LISTENING