# DETERMINATION OF OPTIMAL BIOTIC AND ABIOTIC FACTORS, FEED TYPES AND FEEDING REGIMES FOR FINGERLING PRODUCTION OF LAKE MALAWI CHAMBO, OREOCHROMIS KARONGAE (TREWAVAS 1941)

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# Seed Production In Malawi

- Over 6000 fish farmers in Malawi, & only 20 or less fingerling producers and non is certified.
- Species : *O. shiranus, C. rendalli , O mossambicus , O. karongae and C. gariepinus*

- Limited Fish Production due to inconsistent seed supply

factors

- Poor feed quality and improper feeding practices

- Lack of proper understanding of the environmental optimal for fingerling production

# Determining Feed Types And Stocking Densities

- Malawian-plus-Live feed, Malawian feed, Zambian-Novatek Feed, German Coppens feed.
- Stocking Densities: 2500fry/$m^3$ ,5000fry/$m^3$, 7500fry/$m^3$
- Egg Collection, Incubation and fry Stocking
- Feeding
  - Every two to four hrs
  - Ad lib feeding
  - Zooplankton feeding during the first week
- Culture Period: 35 days

# Nursing Buckets

**After complition**

**Suspended in big tanks**

# Feed Types

**Local Feed**

**Commercial Feed**

# Hatchery Routine Operations

- Hatchery operations and water quality management
  - Management and Operation of devices
  - Water measurements
    - Temperature, pH, DO, Saturation, Ammonia,
  - General Cleaning of Equipment
  - Sampling Every 7 days
    - Weight and Length

# Results

| Treatment | Initial WT | Final WT(g) | WT Gain(g) | DWG(g) | SGR (%) | FCR | SR (%) |
|---|---|---|---|---|---|---|---|
| **2500fy/m$^3$** | | | | | | | |
| **CZAM** | 0.01 | 1.13 | 1.12 | 0.04 | 14.05 | 6.67 | 97.44 |
| **GEM** | 0.01 | **1.83** | **1.82** | 0.06 | 15.66 | 3.87 | 97.44 |
| **LMW** | 0.01 | 0.93 | 0.91 | 0.03 | 13.6 | 5.8 | 94.87 |
| **MW** | 0.01 | 1.23 | 1.22 | 0.04 | 14.62 | 5.71 | 92.31 |
| **5000fy/m$^3$** | | | | | | | |
| **CZAM** | 0.01 | 0.86 | 0.85 | 0.03 | 12.88 | 5.8 | 97.33 |
| **GEM** | 0.01 | 1.57 | 1.55 | 0.05 | 14.31 | 3.03 | 97.33 |
| **LMW** | 0.01 | 0.74 | 0.73 | 0.02 | 12.57 | 5.23 | 96 |
| **MW** | 0.01 | 0.97 | 0.95 | 0.03 | 13.73 | 4.68 | 98.67 |
| **7500fy/m$^3$** | | | | | | | |
| **CZAM** | 0.01 | 0.83 | 0.82 | 0.03 | 13 | 6.16 | 97.14 |
| **GEM** | 0.01 | 1.37 | 1.36 | 0.04 | 14.57 | 3.18 | 98.1 |
| **LMW** | 0.01 | 0.63 | 0.62 | 0.02 | 12.23 | 6.27 | 95.24 |
| **MW** | 0.01 | 0.97 | 0.95 | 0.03 | 13.71 | 5.05 | 61.9 |

# Feed Type and Fish Growth

| Feed Type | | FWT(g) | WG(g) | ADWG(g) | SGR (%) | FCR | SR (%) |
|---|---|---|---|---|---|---|---|
| CZAM | | 0.94±0.06 | 0.93±0.06 | 0.03± 0.01 | 13.31± 0.06 | 6.21±0.09 | 95.30±0.12 |
| GEM | | 1.61±0.06 | 1.60±0.06 | 0.05± 0.01 | 14.93± 0.08 | 3.32±0.067 | 97.62± 0.13 |
| LMW | | 0.77 ±0.05 | 0.75±0.05 | 0.02± 0.01 | 12.80±0.08 | 6.77±0.12 | 97.37± 0.17 |
| MW | | 1.06 ±0.05 | 1.04±0.05 | 0.03± 0.01 | 14.02 ±0.05 | 5.14±0.10 | 84.29±0.05 |
| P-value | | 3.18e-10 | 3.471e-10 | 3.471e-10 | 6.50e-06 | 5.84e-10 | 0.206 |

# Stocking Densities and Fish Growth

| Stocking Density | Average of FWT(g) | Average of WG(g) | Average of ADWG(g) | Average of SGR (%) | Average of FCR | Average of SR (%) |
|---|---|---|---|---|---|---|
| A(2500/$m^3$) | 1.30±0.10 | 1.28±0.10 | 0.04±0.02 | 14.55±0.07 | 5.48±0.15 | 97.33±0.18 |
| B(5000/$m^3$) | 1.04±0.09 | 1.02±0.09 | 0.03± 0.02 | 13.40±0.07 | 4.68± 0.14 | 95.51±0.10 |
| C(7500/$m^3$) | 0.95±0.08 | 0.94±0.08 | 0.03± 0.01 | 13.36±0.08 | 5.16±0.18 | 88.10± 0.8 |
| P value | 0.0508 | 0.0495 | 0.0495 | 0.00595 | 0.314 | 0.302 |

# Testing For Best Temperature Ranges

- Used a range of 24$^{o}$C to 28$^{o}$C
- Stocking Densities : 2500fry/m$^{3}$
- Feeding :
  - Used Malawian Feed
  - uniform amounts (16g)
- Culture Period: 35 days

# Results

| Temperature($^0$C) | Initial Weight(g) | Average of FWT(g) | Average of Weight Gain(g) | Average of ADWG (g) | Average of SGR (%) | Average of FCR | Average of SR (%) |
|---|---|---|---|---|---|---|---|
| **28** | 0.011 | 2.98± 0.09 | 2.89± 0.10 | 0.09± 0.02 | 11.10± 0.10 | 5.57 ± 0.13 | 98.6± 0.06 |
| **24** | 0.011 | 1.69 ± 0.10 | 1.60± 0.10 | 0.05± 0.03 | 9.16 ± 0.09 | 10.15± 0.28 | 96.01±0.06 |
| **P-value** | | 0.003974 | 0.00394 | 0.00805 | 0.01099 | 0.008101 | 0.2879 |

# Optimal Light Regimes

- 16L:8D and 24L
- Stocking Densities : 2500fry/$m^3$
- Temperature was set at 28$^oC$
- Feeding :
  - Used Malawian Feed
  - uniform amounts (16g)
- Culture Period: 35 days

# Results

| Light Regime(L:D) | Initial Weight (g) | FWT(g) | WG(g) | ADWG(g) | SGR (%) | FCR | SR (%) |
|---|---|---|---|---|---|---|---|
| **24:0** | 0.013 | 3.18± 0.12 | 3.16± 0.11 | 0.08 ± 0.02 | 17.10± 0.08 | 3.22± 0.12 | 97.67 ± 0.07 |
| **16:8** | 0.013 | 1.93± 0.06 | 2.09 ± 0.12 | 0.05 ± 0.03 | 15.65 ± 0.07 | 5.13± 0.23 | 99.00± 0.06 |
| **P-value** | | 0.005 | 0.01747 | 0.02131 | 0.02375 | 0.0272 | 0.7247 |

# All male Seed Production

- 20 mg/kg, 30mg/kg, 60mg/kg and 90mg/kg
- 28 days after hatching
- Followed by an 8 months grow-out

# Results

| MT level | %Females | | %males |
|---|---|---|---|
| **20 mg/Kg** | 56.7 | | 43.3 |
| **30 mg/Kg** | 44.4 | | 55.6 |
| **60 mg/Kg** | 24.4 | | 75.6 |
| **90 mg/Kg** | 44.4 | | 56.7 |

# Lessons

- Inadequate expertise in management of water parameters contribute a lot in poor fingerling quality.
- Good quality feed can reduce the culture period from fry to fingerling stages , thereby reducing fingerling production costs
- Extended periods of light during fry nursing maximises feeding activities thereby improving growth.
- It is not only the form , but the nutritive value of feed is of paramount importance
- Doing a Co-feeding with zooplanktons has not been successiful until further research would be conducted

# Existing Gaps

- Development of high quality feed using locally available ingredients
- Improving Brood stock quality to improve egg and fry quality
- Assessing the profitability of using solar powered indoor hatchery
  - Develop a model for resource poor farmers
- Live Feeding in Tilapia fingerling Production