

**CHAPTER FIVE**  
**V. SUMMARY**

This study was conducted in the fish farm of EL - Max Research Station, National Institute of Oceanography and Fisheries (NIOF), Alexandria Governorate. The present study included two factorial experiments design; the first one was designed to study the effects of C/N ratio levels on water quality, survival rate, growth performance, and economic feasibility on *M. cephalus* fingerlings, meanwhile, the optimal dietary protein level under both change water (CS), and BFT system. While the second was designed to detect the best salinity for rearing *M. cephalus* fingerlings under biofloc conditions.

### **The first experiment:**

The effects of energy levels (0, 30%, and 60%) starch with three dietary protein levels (16%, 20%, and 24%CP) on flathead grey mullet *M. cephalus* growth performances and feed utilization under both change water system (CS) and BFT system were studied. Results could be summarized as follows:

#### **1. Water quality.**

Regarding to dietary protein levels, total ammonia nitrogen (TNA) and nitrite (NO<sub>2</sub>) values numerically changed in the normal range (0.5-2 mg/l), (0.5 mg/l) respectively for both (CS) and (BFT), and a significant difference was recorded for the benefit of treatment 60% starch with CP 20% which recorded the lowest measurements, but nitrate was noticed higher values than normal range for both (CS) and (BFT) during whole experimental period. Also, the results indicated that there were significant differences in water, salinity, TDS, Do, and pH due to different culture system types (CS and BFT), and no significant difference in water temperature and organic phosphors.

#### **2. Total account of zooplankton and phytoplankton.**

The results showed that, the highest total account of zooplankton and phytoplankton were recorded in treatments fed on different dietary protein under (BFT) compared to other treatments under (CS).

### **3. Growth performance.**

Biofloc system (BFT) showed superiority over change water system (CS) for FBW, WG, and SGR values. Regarding interaction between protein and starch under BFT conditions, fish fed 20%CP with 60% starch under biofloc system showed the highest growth performance, while the lowest values was noticed for 16% CP with 30% starch under biofloc system.

### **4. Feed utilization.**

Mullet fed under BFT system noticed for the highest feed utilization parameters, the best values for feed intake (OF), feed conversion ratio (FCR), protein efficiency ratio (PER), energy retention (ER), and protein productive value (PPV) were recorded for mullet fed 20%CP with 60% starch under BFT system. With increasing dietary protein above 20%CP under biofloc conditions, a decrease in feed utilization parameters occurred, but it was better than mullet fed under change water system.

### **5. Mullet and biofloc chemical composition.**

Regarding culture conditions, better chemical composition was noticed for biofloc system except for dry matter. Interaction results showed that higher dry matter content was recorded for fish fed dietary protein 24% under change water system while protein content was higher for fish fed dietary protein (24% with 60% starch) under BFT system. Ether extract content was higher for fish fed dietary protein (24% with 30% starch) under BFT system. Increase in biofloc nutrient composition occurred with elevation of dietary protein level.

### **5. Conclusion.**

In summary, the results of this study showed that mullet fish fed different dietary protein (16%, 20% and 24%) with two starch ratio (30% and 60%) under biofloc system showed superiority for fish performance, and the optimal dietary protein under biofloc system is (20%CP with 60% starch).

## **The second experiment**

The experiment was designed to detect the best salinity of (fresh, brackish 15.5ppt and marine water) for mullet fingerlings rearing under BFT system. Fish fed with two diets (20% CP and 24%CP) with 60% starch which were noticed the two best fish performances in experiment (1), diets fed at 3% of body weight for 70 days. Results could be summarized as follows.

### **1. Water quality.**

Total ammonia nitrogen (TNA) and nitrite (NO<sub>2</sub>) values numerically changed in the normal range for all salinities under BFT conditions, but nitrate was higher than that of all salinities under (BFT) system during whole experimental period.

### **2. Total account of zooplankton and phytoplankton.**

The results showed that there is no significant difference among the treatments for microorganisms accounting, but the highest total account of zooplankton and phytoplankton was recorded in the treatment (20%CP with 60% starch) under fresh water.

### **3. Growth performance.**

Results showed that the best mullet growth performance was recorded for fish fed 20%CP with 60% starch in fresh water under BFT system but the effects of different salinities on mullet growth were limited.

### **4. Feed utilization.**

The best values for feed intake (OF), feed conversion ratio (FCR), and energy retention (ER), were recorded for mullet fed 20%CP with 60% starch under fresh water BFT system while the best value for protein efficiency ratio (PER) was recorded for both mullet fed 20%CP with 60% starch under fresh water BFT system, mullet fed 24%CP with 60% starch under brackish and marine water BFT system. The best protein productive value (PPV) was recorded for mullet fed 24%CP with 60% starch under marine water BFT system.

## **5. Mullet and biofloc chemical composition.**

The highest protein contents were recorded for protein 24% with marine water, while the best dry matter and fat extract were recorded for protein 24% with brackish water, and the best content of ash was recorded for protein 20% with fresh water. Increase in biofloc nutrient composition occurred with elevation of dietary protein level and reducing of salinity.

## **6. Conclusion.**

In summary, mullet fed 20%CP with 60% starch under fresh water BFT conditions recorded the best fish performance, feed utilization, water quality, and total account of zooplankton and phytoplankton.