

an imported commercial feed. The experimental diet is made up of ingredients including earthworms, maggots and brewer's yeast used as a source of protein that completely replaces fish meal (Table 1). With a feeding frequency of 4 times a day, the fish were fed for 90 days at a ration rate of 5% with the tested feeds.

Table 1 Feed composition of the imported feed (T0) and the local feed (T1) developed

| Ingredients | T0 (%) | T1 (%) |
|----------------|--------|--------|
| Rice bran | - | 5 |
| Soy flour | - | 25 |
| Brewer's yeast | - | 5 |
| Cotton cake | - | 15 |
| Earthworm meal | - | 12 |
| Maggot flour | - | 30.5 |
| Palm oil | - | 3 |
| Vitamin | - | 1 |
| Minerals | - | 1 |
| Starch | - | 2 |
| Methionine | - | 0.5 |
| Crude protein | 42 | 40 |
| Fats and oils | 11 | 12.9 |
| Total ash | 7.9 | 6.5 |

To make the food, the ground ingredients were weighed and mixed until a homogeneous powder was obtained, to which palm oil was added. Water was then added to obtain a malleable paste. A pelletiser with a mesh size of 1.5 and 2 mm was used to produce the pellets, depending on the development of the fish. The manufactured feeds were dried in the sun before being stored in boxes for conservation (-4 °C) before distribution (Table 2).

Table 2 Composition in essential amino acids (EAA) of the local feed developed (g.kg⁻¹ of feed)

| Essential amino acids | T1 | EAA requirements of <i>C. gariepinus</i> * |
|-----------------------|----|--|
| Threonine | 8 | 5-5.6 |
| Valine | 7 | 7.1-8.4 |
| Methionine | 9 | 6-6.4 |
| Isoleucine | 11 | 6-7.3 |
| Leucine | 19 | 8-9.8 |
| Phenylalanine | 13 | 12-14 |
| Histidine | 9 | 4-4.2 |
| Tryptophan | 6 | 1.2-1.4 |
| Lysine | 14 | 12-14.3 |
| Arginine | 20 | 10-12 |

Table caption: : * NRC (2011)

2.5 Water physico-chemistry and biological monitoring

Water quality was monitored every 3 days by determining (twice a day) physico-chemical parameters such as temperature, dissolved oxygen, pH, conductivity and TDS using a multiparameter (ORCHIDIS SN-ODEOA-2138). Control fishing took place every two weeks, followed by emptying and cleaning of the tanks. The number and biomass of fish in each tank were determined by counting and using a centesimal- precision scale (TANITA KD-192).

2.6 Zootechnical and economic parameters

Growth, feed utilization and economic performances were determined by the average final weight (AFW), the Percentage Weight Gain (PWG), the Specific Growth Rate (SGR), the Survival Rate (SR), the Consumption Index (CI), the Protein Intake (PI), the Protein Efficiency Coefficient (PEC), the cost of manufacturing one kilogram of