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Study to the estimation of protein deposition and maximum growth capacity for Tilapia hybrid (O.niloticus and Red Tilapia). (Untersuchungen zur Ermittlung von Proteinansatz, Proteinverwertung und Wachstumskapazität für Tilapia Hybriden *(O.niloticus* and *Red Tilapia)*

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Abstract

Ten semi purified diets were formulated with fish meal and wheat gluten (3:1, constant ratio) from 16% to 48% CP (diets 1-5 were isoenergetic) and from 16-48% CP (diets 6-10,were adapted in their energy levels). Threonine was the limiting amino acid (except diet 8). These diets were fed 3 times/day for 70 days in triplicate to hybrid tilapias (O.niloticus ?) and red tilapia (O.mossambicus x O.hornorum,B ?) with an initial body weight of 12,3± 0,10 g . 25 fish/tank in recirculated filtered rearing system maintained at 27-28 C° were analyzed. The results indicated that independent on CP-level and feed intake of the diets hybrid tilapia grew significantly faster on diets with 32%,40%,48% CP than on the other diets. The SGR-data followed the same pattern as weight gain. Furthermore, the most efficient FCR-data were observed for 40% and 48% CP indicating genotype and sex differences to total amino acid requirements. The daily N-deposition (mg/d) increased with increasing level of protein and net protein utilization (NPU%) decreased with increasing protein content. The calculation of maximum daily N-retention capacity, based on graded CP levels of diets 1-5 resp. 6-10, resulted in 410 mg/$BW_{kg}^{0,67}$, independent on genotype of fish and level of energy.

Introduction

The optimal dietary protein levels for growth of nile tilapia have been estimated by several authors. It was found to be 30%-40% (Wang et al., 1985) and (El-Sayed and Teshima, 1992). The difference in the protein requirement due to species, sex and age of fish or the recommended amino acids such as threonine requirement from published data may probably not ensure the maximum growth for these fish. Aim of the investigation was, to estimate the daily protein requirements for maximum growth and to create basic data for such a model application in fish (family Tilapia).

Material and Method

Ten semi purified diets were formulated with fish meal and wheat gluten (3:1, constant ratio) from 16% to 48% CP (diets 1-5 were isoenergetic) and from 16-48% CP (diets 6-10,were adapted in their energy levels). Threonine was the limiting amino acid (except diet,8). These diets were fed 3 times/day for 70 days in triplicate to hybrid tilapias (O.niloticus ?) and red tilapia (O.mossambicus x O.hornorum,B ?) with an initial body weight 12,3± 0,10 g . 25 fish/tank in recirculated filtered rearing system maintained at 27-28 C° were analyzed. The data concerning the feeding experiments are given in Table 1.

Results and Discussion

The results of this experiment is shown in Table 1. Independent on CP-level and feed intake of the diets hybrid tilapia grew significantly faster on diets with 32%,40%,48% CP than on the other diets . The SGR-data followed the same pattern as weight gain. Furthermore, the most efficient FCR-data were observed for 40% and 48% CP indicating genotype and sex differences in total amino acid requirements. The daily N-deposition (mg/d) increased with increasing the level of protein and the net protein utilization (NPU%) decreased with increasing protein content. The calculation of maximum daily N-retention capacity, based on graded CP levels of diets 1-5 resp. 6-10, resulted in (410 mg/$BW_{kg}^{0,67}$) independent on genotype of fish and level of energy. The actual data showed a lower capacity of protein deposition as compared with the other tilapia genotypes (450 mg/$BW_{kg}^{0,67}$) (Mohamed et al., 2001)

Table 1. The effect of protein level on final body weight (BW), feed conversion ratio (FCR), specific growth rate (SGR), nitrogen intake, nitrogen deposition, productive protein value (PPV) and net protein utilization (NPU)

Diet	CP %	ME [1)]	Final (BW) (g)	FCR (g/g)	SGR (%)	N-Intake (mg/d)	N-Deposition (mg/d)	PPV (%)	NPU (%)
1	16%	15.6	48 ^{b}	1.61 ^{f}	1.92 ^{c}	27 ^{e}	12 ^{c}	45.2 ^{ab}	53.7 ^{b}
2	24%	15.6	60 ^{b}	1.45 ^{dfe}	2.26 ^{b}	43 ^{d}	18 ^{bc}	40.6 ^{bc}	45.7 ^{c}
3	32%	15.6	84 ^{a}	1.28 ^{bc}	2.72 ^{a}	70 ^{c}	28 ^{a}	40.3 ^{bc}	43.6 ^{cd}
4	40%	15.6	78 ^{a}	1.24 ^{ab}	2.64 ^{a}	80 ^{bc}	27 ^{a}	34.1 ^{cd}	36.9 ^{e}
5	48%	15.6	83 ^{a}	1.06 ^{a}	2.73 ^{a}	87 ^{b}	30 ^{a}	34.1 ^{cd}	36.7 ^{e}
6	16%	13.6	48 ^{b}	1.60 ^{fe}	1.97 ^{c}	27 ^{e}	13 ^{bc}	49.3 ^{a}	59.7 ^{a}
7	24%	14.6	62 ^{b}	1.40 ^{cd}	2.30 ^{b}	44 ^{d}	19 ^{b}	43.1 ^{ab}	48.3 ^{bc}
8	32%	15.6	83 ^{a}	1.41 ^{cde}	2.70 ^{a}	77 ^{bc}	28 ^{a}	35.7 ^{c}	38.8 ^{de}
9	40%	16.6	85 ^{a}	1.18 ^{ab}	2.74 ^{a}	83 ^{b}	29 ^{a}	34.9 ^{cd}	37.7 ^{e}
10	48%	17.6	84 ^{a}	1.19 ^{ab}	2.74 ^{a}	100 ^{a}	29 ^{a}	28.7 ^{d}	31.0 ^{f}

[1)] (MJ/kg) . Different superscripts indicate significant differences ($P \leq 0,05$).

References

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