

EFFECT OF DIFFERENT SOURCES AND LEVELS OF SOME DIETARY BIOLOGICAL ADDITIVES ON:

II- FEED UTILIZATION BY NILE TILAPIA FISH

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ABSTRACT

The present study aimed to investigate the effect of dietary graded levels of Aqua Superzyme, Garlen Allicin, and Diamond V (Original XPC) on feed utilization by Nile tilapia fish for 16 weeks. Dietary inclusion of the tested pre-and probiotics improved significantly ($P \leq 0.05$) all criteria measured including feed utilization parameters, digestibility, and energy retention. The significantly ($P \leq 0.05$) best results of feed utilization were calculated for the treatments Aqua Superzyme at 0.01%, Garlen Allicin at 0.01%, and Diamond V-Original XPC at 0.5% of the diet. Yet, the comparison among additives and their levels shows that the overall significantly ($P \leq 0.05$) best treatment was Garlen Allicin at 0.01% of the diet. Concerning the digestibility, the significantly ($P \leq 0.05$) best level within each treatment was also Aqua Superzyme at 0.01%, Garlen Allicin at 0.01%, and Diamond V-Original XPC at 0.5% of the diet, respectively. The CF followed by EE were more positively affected than the other nutrients digestibility. The comparison among additives and their levels on ADC clears that the significantly ($P \leq 0.05$) best treatment and level was Aqua Superzyme at 0.01% of the diet for ADC of all nutrients, comparing with the other additives and levels. Aqua Superzyme at 0.02%, Garlen Allicin at 0.01%, and Diamond V-Original XPC at 0.5% of the diet, respectively were the best in energy retention (in an ascending order) among their corresponding levels. The comparison among treatments revealed that best energy retention was realized by the treatment of Diamond V-Original XPC at 0.5% of the diet. Generally, it is recommended to add Garlen Allicin at 0.01% of the tilapia diet to improve its feed and nutrients utilization.

Keywords: Feed – Nutrients – Utilization – Nile tilapia.

INTRODUCTION

The research of probiotics for aquatic animals is increasing with the demand for environment friendly aquaculture. The probiotics were defined as live microbial feed supplements that biocontrol and antagonist pathogens. The most promising prospects are sketched out, but considerable efforts of research will be necessary to develop the applications to aquaculture (Castillo, 2008). Since, natural agriculture or organic farming is a return for the nature or working with, but not against, the nature (Abdelhamid, 2002). Therefore, the microbiota management tools of probiotics, prebiotics and synbiotics have been developed and, indeed, commercialized over the few decades with the expressed purpose of increasing number of bifidobacteria and/or lactobacilli within the gastrointestinal tract (Tuohy *et al.*, 2003). So, a feeding experiment was conducted to examine the effects of dietary administration of *Bacillus subtilis* on feed utilization of juvenile large yellow croaker, *Larimichthys crocea* (mean initial body weight $7.82 \text{ g} \pm 0.68$). The

results showed that dietary supplementation of 1.35×10^7 cfu g^{-1} *B. subtilis* significantly ($P \leq 0.05$) increased the feed efficiency ratio (FER) compared with the groups without *B. subtilis* supplementation (Ai et al., 2011). The present work aimed to study the effects of some commercial pre-and probiotics at different dietary graded levels on feed utilization by Nile tilapia fish.

MATERIALS AND METHODS

All the experimental conditions, diets, and facilities were as mentioned before in Abdelhamid et al. (2013). The 1st and 2nd additives used were the prebiotic Aqua Superzyme and the probiotic Garlen Allicin, each at 0.01, 0.02, and 0.03% of the diet. The 3rd additive used was the probiotic Diamond V-Original XPC at 0.4, 0.5, and 0.6% of the diet, besides the control without additives.

Digestibility trails:

Every morning of the last two experimental weeks, faeces were collected by siphoning, separated from water, and stored at $-20^{\circ}C$ for analysis. Apparent digestibility coefficients (ADC) of crude protein, ether extract crude fiber, ash and nitrogen free extract were determined using the direct method according to Lovell (1989) by using the following equation:

$$ADC = 100 [(nutrient\ intake - nutrient\ in\ faeces) / nutrient\ intake]$$

Chemical analysis of diets and faeces:

The faeces were collected in a petery dish for each fish group. Uneaten feed and water were separated from the collected faeces, homogenized and stored in plastic bags at $-20^{\circ}C$ for chemical analysis. The tested diets and faeces were analyzed in triplicates. Chemical analysis of feed and faeces was carried out according to the methods described by A.O.A.C. (1990) for dry matter, crude protein, ether extract, crude fiber and ash. Nitrogen free extract (carbohydrate) content was calculated by subtraction the total percentages of CP, EE, CF and ash from 100. The gross energy contents of the experimental diets and fish samples were calculated by using factors of 5.65, 9.45 and 4.2 Kcal/g of protein, lipid and carbohydrate, respectively (NRC, 1993). Digestible energy content was calculated from standard physiological fuel values as 4, 4 and 9 Kcal/g of protein, carbohydrate and lipid, respectively (Garling and Wilson, 1976).

Feed utilization:

Feed conversion ration (FCR) and feed efficiency percent (FE%) were calculated according to the following equations:

$$FCR = \text{Feed intake (g)} / \text{Weight gain (g)}$$

$$FE \% = (\text{Weight gain (g)} / \text{feed intake}) \times 100.$$

Protein utilization:

Protein efficiency ratio (PER) and protein productive value (PPV %) were calculated according to the following equations:

$$PER = \text{Weight gain (g)} / \text{Protein intake (g)}$$

$$PPV \% = \{(\text{Retained protein (g)}) / (\text{protein intake (g)})\} \times 100.$$

Energy utilization (NRC, 1993):

Gross energy retention (GER%)={Energy gain (Kcal)/GE intake(kcal)} X100.

Digestible energy retention (DER%)={Energy gain (Kcal)/DE intake (kcal)} X100.

Metabolizable energy retention (MER%)={Energy gain (Kcal)/ME intake (kcal)} X100.

Statistical analysis:

Data obtained were analyzed using one-way analysis of variance which was performed according to SAS (2006). Differences were subjected to Duncan's (1955) multiple range test.

RESULTS AND DISCUSSION

Feed utilization:

Mean values are given in Tables 1-3 for feed intake (FI), feed conversion ratio (FCR), feed efficiency (FE), protein efficiency ratio (FER), protein productive value (PPV), and energy utilization (EU) for Nile tilapia fish fed the experimental diets which were supplemented with the tested pre-and probiotics at their different graded levels. These Tables reflect significant ($P \leq 0.05$) differences among levels of each additive tested for all criteria tested comparing with the control, except EU of the 1st two additives (Aqua Superzyme and Garlen Allicin, Tables 1 and 2, respectively). The dietary inclusion of the tested pre- and probiotics led to significantly ($P \leq 0.05$) increased FI, FE, PER, PPV, and EU besides improving the FCR comparing with their controls. The significantly ($P \leq 0.05$) best results were calculated for the treatments A₁, G₁, and XPC₂. Yet, Table 4 (comparison among additives and their levels) shows the the overall significantly ($P \leq 0.05$) best treatment was 2*1, i.e. G₁, Garlen Allicin at 0.01% of the diet.

Table 1:Feed consumption, feed conversion ratio and nutrients utilization of Nile tilapia (*O.niloticus*) fed the Aqua Superzyme experimental diets.

Treat.	FI (g)	FCR	FE (%)	PER	PPV(%)	EU(%)
Cont.	61.04 ^c	2.11 ^a	47.41 ^b	1.57 ^b	26.89 ^c	20.44 ^a
A ₁	73.84 ^a	1.76 ^b	56.91 ^a	1.89 ^a	37.30 ^a	21.22 ^a
A ₂	66.79 ^b	1.86 ^b	53.69 ^a	1.78 ^a	34.43 ^a	23.08 ^a
A ₃	65.42 ^b	1.88 ^b	53.37 ^a	1.77 ^a	32.61 ^a	21.06 ^a
P > F	0.0002	0.0024	0.0021	0.0023	0.005	0.231
± SE	1.05	0.042	1.11	0.037	1.43	0.85

a-c: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 2: Feed consumption, feed conversion ratio and nutrients utilization of Nile tilapia (*O. niloticus*) fed the Garlen Allicin experimental diets.

Treat.	FI (g)	FCR	FE (%)	PER	PPV(%)	EU(%)
Cont.	61.04 ^d	2.11 ^a	47.41 ^c	1.57 ^c	26.89 ^c	20.44 ^a
G ₁	80.04 ^a	1.55 ^c	64.46 ^a	2.13 ^a	43.26 ^a	24.68 ^a
G ₂	74.22 ^b	1.80 ^b	55.54 ^b	1.84 ^b	34.0 ^b	21.45 ^a
G ₃	69.87 ^c	1.93 ^b	51.75 ^{bc}	1.71 ^{bc}	32.33 ^{bc}	21.12 ^a
P > F	0.0001	0.0001	0.0001	0.0001	0.0016	0.148
± SE	0.97	0.043	1.34	0.044	1.83	1.23

a-d: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 3: Feed consumption, feed conversion ratio and nutrients utilization of Nile tilapia (*O. niloticus*) fed the Diamond V (Original XPC) experimental diets.

Treat.	FI (g)	FCR	FE (%)	PER	PPV(%)	EU(%)
Cont.	61.04 ^d	2.11 ^a	47.41 ^b	1.57 ^b	26.89 ^b	21.81 ^b
XPC ₁	89.95 ^b	1.59 ^b	62.69 ^a	2.08 ^a	40.25 ^a	24.55 ^a
XPC ₂	99.80 ^a	1.55 ^b	64.54 ^a	2.14 ^a	42.97 ^a	25.33 ^a
XPC ₃	83.57 ^c	1.58 ^b	63.03 ^a	2.09 ^a	39.82 ^a	25.08 ^a
P > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.034
± SE	1.31	0.033	1.02	0.034	1.183	0.74

a-d: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 4: Comparison (T*L) among feed consumption, feed conversion ratio and nutrients utilization by Nile tilapia (*O. niloticus*) fed Aqua Superzyme, Garlen Allicin, and Diamond V-Original XPC experimental diets.

T*L	FI (g)	FCR	FE (%)	PER	PPV(%)	EU(%)
Cont.	61.04 ^h	2.11 ^a	47.41 ^d	1.57 ^d	26.89 ^d	20.44 ^c
1*1	73.84 ^e	1.76 ^c	56.91 ^b	1.89 ^b	37.30 ^{bc}	21.22 ^c
1*2	66.79 ^{fg}	1.86 ^{bc}	53.69 ^{bc}	1.78 ^{bc}	34.43 ^c	23.08 ^{abc}
1*3	65.42 ^g	1.88 ^{bc}	53.37 ^{bc}	1.77 ^{bc}	32.61 ^c	21.06 ^c
2*1	80.07 ^d	1.55 ^d	64.46 ^a	2.13 ^a	43.26 ^a	24.68 ^{ab}
2*2	74.22 ^e	1.80 ^c	55.54 ^b	1.84 ^b	34.0 ^c	21.45 ^{bc}
2*3	69.87 ^f	1.93 ^b	51.75 ^c	1.71 ^c	32.33 ^c	21.12 ^c
3*1	89.95 ^b	1.59 ^d	62.69 ^a	2.08 ^a	40.25 ^{ab}	24.55 ^{ab}
3*2	99.80 ^a	1.55 ^d	64.54 ^a	2.14 ^a	42.97 ^a	25.33 ^a
3*3	83.57 ^c	1.58 ^d	63.03	2.09 ^a	39.82 ^{ab}	25.08 ^a
P > F	0.0001	0.0001	0.0001	0.0001	0.0001	0.0097
± SE	1.17	0.037	1.182	0.039	1.60	1.04

a-h: means in the same column having different letters are significantly ($P \leq 0.05$) different.

In an indoor experiment, the prebiotic Avian Plus was evaluated by adding it at graded levels into isonitrogenous-isocaloric-diets of tilapia fish for 112 days. The obtained results revealed the superiority of the Avian Plus containing diets, particularly at level of 25 mg/kg feed which led to significantly ($P \leq 0.05$) best feed intake, feed conversion ratio (FCR), protein intake, protein productive value, and protein efficiency ratio comparing with the control (Abdelhamid *et al.*, 2011).

Amer (2012) concluded that *Diamond V XP* (inactive yeast a commercial product containing 100% dried *Saccharomyces Cerevisae*) could be used successfully as feed additive for feeding Nile tilapia *Oreochromis niloticus* without any adverse effects on their feed utilization. Also, results obtained showed that using *Diamond V XP* at level (1.5g) had the best results on feed utilization with levels of protein (30 %). Moreover, it could be suggested that dietary supplement with *Diamond V XP* (1.5g) is useful in the intensive production system of fish.

Hassan (2013) and Khalil *et al.* (2013) obtained results concerning the effects of the probiotic Hydroyeast Aquaculture® on adult male *O. niloticus* showed that the 15 g/kg diet realized best significantly ($P \leq 0.05$) values for feed and nutrients utilization. So, based on the obtained results, the optimum level of the tested probiotic Hydroyeast Aquaculture® was depending on fish sex.

Apparent digestibility:

The digestibility coefficients for different dietary organic nutrients were calculated at the end of the experimental period and given in Tables 5, 6, and 7 for the three preparations used (Aqua Superzyme, Garlen Allicin, and Diamond V-Original XPC, respectively). The ADC percentages were increased significantly ($P \leq 0.05$) by the dietary inclusion of these tested additives comparing with the controls (without the tested additives). However, the significantly ($P \leq 0.05$) best level within each treatment was A₁, G₁, and XPC₂, respectively. The CF followed by EE were more positively affected than the other nutrients digestibility. The comparison (Table 8) among additives and their levels on ADC clears that the significantly ($P \leq 0.05$) best treatment and level was 1*1, i.e. Aqua Superzyme at 0.01% of the diet for ADC of all nutrients, comparing with the other additives and levels.

Table 5: Apparent diestibility coefficient (ADC%) of nutrients the diets supplemented with the prebiotic (Aqua Superzyme).

Treat	DM	CP	EE	CF	NFE
Control	85.53 ^c	96.52 ^c	76.09 ^c	68.60 ^d	81.35 ^c
A ₁	94.29 ^a	98.14 ^a	89.67 ^a	92.65 ^a	92.67 ^a
A ₂	92.09 ^b	97.36 ^b	85.30 ^b	87.81 ^b	90.56 ^b
A ₃	92.11 ^b	97.19 ^b	85.68 ^b	83.33 ^c	91.27 ^b
P > F	0.0001	0.002	0.0001	0.0001	0.0001
±SE	0.29	0.18	0.78	0.69	0.32

a-d: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 6: Apparent digestibility coefficient (ADC%) of nutrients the diets supplemented with the probiotic (Garlen Allicin).

Treat	DM	CP	EE	CF	NFE
Control	85.53 ^b	96.52 ^b	76.09 ^b	68.60 ^b	81.35 ^c
G ₁	91.68 ^a	97.43 ^a	84.81 ^a	85.94 ^a	89.94 ^{ab}
G ₂	90.12 ^a	96.66 ^{ab}	81.05 ^a	81.66 ^a	88.48 ^b
G ₃	91.83 ^a	96.91 ^{ab}	83.11 ^a	83.64 ^a	91.01 ^a
P > F	0.0001	0.122	0.0042	0.0001	0.0001
±SE	0.546	0.246	1.187	0.1471	0.686

a-c: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 7: Apparent digestibility coefficient (ADC%) of nutrients the diets supplemented with the probiotic (Diamond V-Original XPC).

Treat	DM	CP	EE	CF	NFE
Control	85.53 ^c	96.52 ^c	76.09 ^d	68.60 ^d	81.35 ^c
XPC ₁	93.04 ^a	97.95 ^a	86.75 ^b	87.28 ^b	91.76 ^a
XPC ₂	93.85 ^a	98.41 ^a	88.98 ^a	92.49 ^a	92.33 ^a
XPC ₃	91.60 ^b	97.24 ^b	82.53 ^c	83.05 ^c	90.57 ^b
P > F	0.0001	0.0002	0.0001	0.0001	0.0001
±SE	0.27	0.16	0.46	0.63	0.36

a-d: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 8: Comparison (T*L) among apparent digestibility coefficient (ADC%) of nutrients of the diets supplemented with Aqua Superzyme, Garlen Allicin, and Diamond V-Original XPC.

T*L	DM	CP	EE	CF	NFE
Control	85.53 ^e	96.52 ^e	76.09 ^g	68.60 ^e	81.35 ^e
1*1	94.29 ^a	98.14 ^a	89.67 ^a	92.65 ^a	92.67 ^a
1*2	92.09 ^{bc}	97.36 ^c	85.30 ^{cde}	87.81 ^b	90.56 ^{bc}
1*3	92.11 ^{bc}	97.19 ^{cd}	85.68 ^{cd}	83.33 ^{cd}	91.27 ^{abc}
2*1	91.68 ^{bc}	97.43 ^{bc}	84.81 ^{cde}	85.94 ^{bc}	89.94 ^{cd}
2*2	90.12 ^d	96.66 ^{de}	81.05 ^f	81.56 ^d	88.48 ^d
2*3	91.83 ^{bc}	96.91 ^{cde}	83.11 ^{def}	83.64 ^{cd}	91.01 ^{abc}
3*1	93.04 ^{ab}	97.95 ^{ab}	86.75 ^{bc}	87.28 ^b	91.76 ^{ab}
3*2	93.85 ^a	98.41 ^a	88.98 ^{ab}	92.49 ^a	92.33 ^a
3*3	91.60 ^c	97.42 ^{cd}	82.53 ^{ef}	83.05 ^{cd}	90.57 ^{bc}
P > F	0.0001	0.0001	0.0001	0.0001	0.0001
±SE	0.430	0.182	0.941	1.041	0.532

a-g: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Lara-Flores *et al.* (2003) evaluated the effects of probiotics on growth performance in Nile tilapia. The probiotics used based either upon *Streptococcus faecium* and *Lactobacillus acidophilus* or *Saccharomyces cerevisiae*. Results indicated that the fry fed diets with a probiotics supplement exhibited greater growth than those led the control diet without probiotic. Of all probiotic treatments, yeast was an appropriate growth stimulating additive in tilapia cultivation. The authors stated that the increased

growth rate as a positive response to added probiotics could be attributed to increased efficiency of existing digestive processes or by promoting the digestion of previously indigestible substances. In addition, probiotics may have a protein sparing effect.

Energy retention:

Data of the energy retention (GER, gross energy retention; DER, digestible energy retention; and MER, metabolizable energy retention) by the tested fish fed the experimented material are given in Tables 9, 10, and 11, respectively. All forms of energy utilization were increased significantly ($P \leq 0.05$) by dietary inclusion of the tested agents. A₂, G₁, and XPC₂ were the best (in an ascending order) among their corresponding levels. The comparison among treatments (Table 12) revealed that best energy retention was realized by the treatment of XPC₂.

Table 9: Energy utilization of Nile tilapia (*O. niloticus*) fed the Aqua Superzyme experimental diets.

Treat.	GER %	DER %	MER %
Cont.	12.56 ^b	15.01 ^b	23.47 ^b
A ₁	15.53 ^a	18.37 ^a	28.49 ^a
A ₂	15.64 ^a	18.52 ^a	28.58 ^a
A ₃	13.88 ^{ab}	16.41 ^{ab}	25.23 ^{ab}
P > F	0.0286	0.0301	0.0500
± SE	0.631	0.749	1.25

a-b: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 10: Energy utilization of Nile tilapia (*O. niloticus*) fed the Garlen Allicin experimental diets.

Treat.	GER %	DER %	MER %
Cont.	12.56 ^c	15.01 ^c	23.47 ^c
G ₁	19.65 ^a	23.27 ^a	35.66 ^a
G ₂	15.95 ^b	18.85 ^b	29.17 ^b
G ₃	14.26 ^{bc}	16.86 ^{bc}	25.74 ^{bc}
P > F	0.0005	0.0005	0.0008
± SE	0.677	0.809	1.29

a-c: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 11: Energy utilization of Nile tilapia (*O. niloticus*) fed the Diamond V (Original XPC) experimental diets.

Treat.	GER %	DER %	MER %
Cont.	12.56 ^c	15.01 ^c	23.47 ^c
XPC ₁	21.41 ^b	25.39 ^b	37.68 ^b
XPC ₂	24.76 ^a	29.42 ^a	45.01 ^a
XPC ₃	20.38 ^b	24.17 ^b	36.83 ^b
P > F	0.0001	0.0001	0.0001
± SE	0.689	0.816	1.069

a-c: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Table 12: Comparison among energy utilization by Nile tilapia (*O. niloticus*) fed the Aqua Superzyme, Garlen Allicin, and Diamond V-Original XPC experimental diets.

T*L	GER %	DER %	MER %
Cont.	12.65 ^d	15.01 ^d	23.47 ^e
1*1	15.53 ^c	18.37 ^c	28.49 ^{cd}
1*2	15.64 ^c	18.52 ^c	28.58 ^{cd}
1*3	13.88 ^{cd}	16.41 ^{cd}	25.23 ^{de}
2*1	19.65 ^b	23.27 ^b	35.66 ^b
2*2	15.95 ^c	18.85 ^c	29.17 ^c
2*3	14.26 ^{cd}	16.86 ^{cd}	25.74 ^{cde}
3*1	21.41 ^b	25.39 ^b	37.68 ^b
3*2	24.76 ^a	29.42 ^a	45.01 ^a
3*3	20.38 ^b	24.17 ^b	36.38 ^b
P > F	0.0001	0.0001	0.0001
± SE	0.687	0.812	1.191

a-e: means in the same column having different letters are significantly ($P \leq 0.05$) different.

Magouz *et al.* (2002) concluded that adding Lacto-Sacc at 4 g/kg diet of *O. niloticus* was the optimum for producing the best feed and protein utilization. Also, El-Ebiary and Zaki (2003) showed that feed and nutrients utilization was improved with increasing the level of active yeast up to 3 g/kg of the diet. Since using pre-and probiotics improve the gut health (Tuohy *et al.*, 2003). However, pro-nutrients can benefit animal health and performance through improving availability or utilization of nutrients in a variety of ways (Staykov *et al.*, 2005). Therefore, El-Haroun *et al.* (2006) reported significantly ($P \leq 0.01$) enhancement in nutrients utilization (protein efficiency ratio, protei productive value, and energy retention) by Nile tilapia fed diets included Biogen® than the control. Moreover, Yanbo and Zirong (2006) and Suzer *et al.* (2008) showed that probiotics highly increased the digestive enzyme activities and decreased feed conversion ratio. Additionally, El-Haroun (2007) found that Biogen® improved the feed conversion by African catfish comparing with the control. Feed conversion and protein efficiency ratio were improved too by using Biogen® in Nile tilapia diets (Mohamed *et al.*, 2007). Bio-Mos in diets of carp, rainbow trout and European catfish decreased the feed conversion ratio (Barbu *et al.*, 2008).

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تأثير اختلاف مصدر ومستوى بعض الإضافات الحيوية العلفية على :

2- الاستفادة الغذائية لأسمك البلطي النيلي

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استهدفت الدراسة الحالية بحث تأثير مستويات غذائية متدرجة من كل من المركبات الحيوية التجارية Aqua Superzyme, Garlen Allicin, and Diamond V-Original XPC على الاستفادة الغذائية في أسماك البلطي النيلي في تجربة غذائية لمدة 16 أسبوعاً. أدى احتواء العلائق على هذه الإضافات إلى تحسين معنوي في كل قياسات الاستفادة الغذائية ومعاملات الهضم والطاقة المحتجزة. أفضل نتائج الاستفادة الغذائية ومعاملات الهضم كانت مع المعاملات Aqua Superzyme (0.01%)، الإطلاق معنويًا كانت Aqua Superzyme (0.01%) و Garlen Allicin (0.01%)، إلا أن أفضل معاملة على الإطلاق لمعاملات الهضم. وبالنسبة للطاقة المحتجزة فكانت المعاملات Aqua Superzyme (0.01%)، و Diamond V-Original XPC (0.5%)، Garlen Allicin (0.01%)، هي الأفضل، وبمقارنة المعاملات الكلية أتضح أن أفضل المعاملات احتجازاً للطاقة هي المحتوية على Diamond V-Original XPC (0.5%) من العليقة. عموماً فيمكن التوصية بإضافة Aqua Superzyme بتركيز 0.01% من عليقة أسماك البلطي النيلي لتحسين استفادتها من الغذاء والمغذيات.

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