Universe Scientific Publishing

ORIGINAL ARTICLE

Feed Protein and Energy Content of Moire Gentian Grouper Juvenile Growth, Body Composition and Digestive Enzyme Activities of Influence*

Qingjia Zeng

Ocean University Fisheries and Life College, Shanghai

Abstract: For explore Moire gentian Grouper(Epinephelus lanceolatus♂×E. moara♀)Juvenile feed of the most suitable protein and Of content to fish meal and soybean concentrated protein for protein source, add fish oil construction energy gradient preparation crude protein content46%,50% 54%Energy content20.00,20.50And21.00 kJ/gEggs can than22.04 ~ 26.87 mg/KJOf9Group feed numberD1 ~ D9Group feeding initial weight(46.23 ± 0. 51) gOf Moire gentian grouper juvenile56 d. Results display protein and energy of interaction role of Moire gentian grouper juvenile weight gain rate influence significantly(P<0.05)Protein and energy increased significantly improve weight gain rate and specific growth rate(P<0.05). Protein and energy of interaction role of protein deposition rate and liver body than influence significantly(P<0.05)Protein increased significantly improve energy retention rate and fat Full Scale(P<0.05)Protein efficiency rise after drop(P<0.05); Energy increased significantly improve protein efficiency and energy retention rate(P<0.05);D6Group protein deposition rate and protein efficiency was significantly higher than that of other group(P<0.05). Protein and energy of interaction role of whole fish and muscle water, crude protein, crude ash no significant influence(P> 0.05)Whole fish and muscle crude protein with feed crude protein increased and increased(P<0.05)Water with energy increased and reduce(P<0.05)Whole fish crude fat with eggs can than reduce and increased(P<0.05). Protein and energy of interaction role of trypsin, lipase and amylase activity significantly(P<0.05)Gastric protease activity with protein content increased and increased(P<0.05)Energy of its no significant influence(P> 0.05);D6Group trypsin activity its with feed egg can than reduce was first increased and then after drop of trend(P<0.05)Energy21.00 kJ/gWhen lipase activity was significantly higher than that of other group(P<0.05). Comprehensive the in set of protein and energy range in Moire gentian grouper juvenile feed50%Crude Protein,

Keywords: Moire gentian grouper; protein; energy; eggs can than; body composition; digestive Fish

Crude Protein Content of fish(%);CP_FCrude Protein Content of Feed(%);E_0For the beginning of the experiment fish body always(KJ/g);E_TFish body for experiment(KJ/g);E_FFor the unit feed always(KJ/g);FDry weight of feed for fish(G);DFor breeding days.

1. Data analytics

Experimental data usingSPSS 19.0The two-factor variance analysis was carried out with the feed protein and energy content as the influencing factors.(Two-way ANOVA)When the interaction was not significant, the main effect of protein and energy was analyzed. Take protein and energy as a factor, and analyze the data with one-way

Copyright © 2019 .

This is an open-access article distributed under the terms of the Creative Commons Attribution Unported License (http://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

ANOVA.(One-way ANOVA)When the difference is significant,Ducan'sMultiple comparisons, significant level setP<

2. Results

2.1 Effects of diets with different protein and energy contents on Growth Performance of juvenile Epinephelus mogulicus

By table2.It is known that protein and energy only show significant interaction in weight gain.(PLess than 0.05)In energy content21.00 kJ/gCrude protein content was50%And54%When the growth rate of juvenile Grouper was the highest. The main effect analysis showed that the increase of feed crude protein content can significantly improve the weight gain rate and specific growth rate of juvenile grouper (Epinephelus moara).(PLess than 0.05)And significantly reduced feed coefficient(PLess than 0.05)Increase the feed energy content can significantly increase the weight gain rate and specific growth rate.(PLess than 0.05)No significant effect on feed coefficient(P> 0.05). One-way ANOVA showed that,D6The weight gain rate and specific growth rate of experimental fish in the group were significantly higher than those in other groups.(PLess than 0.05)Feed coefficient was significantly lower than other groups.(PLess than 0.05);D7,D8AndD9The growth index of each group was significantly lower than that of other groups(PLess than 0.05).

2.2 Effects of diets with different protein and energy contents on protein utilization, energy retention rate and body shape indices of juvenile Epinephelus mogulatus

Table3.Table4.As shown, protein and energy only show significant interaction between protein deposition rate and liver-body ratio.(PLess than 0.05)The crude protein content in the feed was50%Energy content is20.50 kJ/gAnd21.00 kJ/gProtein deposition rate was higher than other groups.46%Energy content is21.00 kJ/gThe liver-body ratio is the highest. The main effect analysis showed that the protein efficiency increased first and then decreased with the increase of crude protein content.(PLess than 0.05)Energy retention rate and fertility(PLess than 0.05), Dirty body ratio decreased significantly(PLess than 0.05)Protein efficiency and energy retention rate increased significantly when the energy content increased.(PLess than 0.05)However, no significant changes were found in the ratio of dirty body to fat(P> 0.05).

One-way ANOVA showed that,D6Protein deposition rate and protein efficiency of(PLess than 0.05);D9The liver-body ratio and dirty body ratio in the group were significantly higher than those in other groups.(PLess than 0.05).

It should be analyzed that when the crude protein content of the feed increases, the muscle moisture and crude ash content significantly reduces.(PLess than 0.05)Protein content increased significantly(PLess than 0.05)Crude fat content first increased and then decreased(PLess than 0.05)Feed Energy

2.3 Effects of diets with different protein and energy contents on grouper Moisture and crude ash content decreased significantly when the content increased(PLess than 0.05),

Effects of juvenile whole fish and muscle composition No significant changes in crude protein content(P> 0.05)Significant increase in crude fat content(PLess than 0.05).

Vitality was significantly higher than other groups(PLess than 0.05);D3,D6AndD9Lipase Activity in the group was significantly higher than that in the other groups(PLess than 0.05). Trypsin activity increased firstly and then decreased with the decrease of feed-egg energy ratio.(PLess than 0.05).

3. Discussion

3.1 Effects of Dietary protein and energy content on Growth of juvenile Epinephelus mogulatus

In this study, the growth, body composition and digestive enzyme activities of juvenile Epinephelus mogulicus were studied at a certain growth stage, and the appropriate protein and energy content in the feed was obtained.(22.04 ~ 26.87 mg/kJ)The suitable egg energy ratio for juvenile grouper of Gentiana moara. The experimental results show that the increase in weight is significantly influenced by protein and energy interaction, which is essentially the effect of egg

energy ratio on its growth. As one of the important factors affecting the feeding efficiency of fish, the egg energy ratio is affected by fish, fish species, large, small and growth, and the stage of the impact.(Jiang Xiang, Hui, *et al*, 2010)The protein-energy ratio is too high, resulting in a waste of protein energy. The fish intake of energy is insufficient, affecting their metabolism and slowing down their growth, the source of the material needed for growth is insufficient, and the growth slows down. InRahimnejadWait.(2015)The results of the study, the Pearl Dragon Grouper(E. lanceolatus♂*E. fuscoguttatus♀)Suitable egg energy ratio for juvenile23.90 mg/KJ. In song Lin(2013)The results showed that the suitable egg energy ratio of juvenile27.15 mg/KJ.

In this study, with the increase of feed crude protein content(46%Rose50%)The weight increase, weight gain rate and specific growth rate of the experimental fish were significantly improved, and the feed coefficient was significantly reduced.(PLess than 0.05)And continue to improve the protein content in the feed.(50%Rose54%)The fish body growth and feed coefficient are no longer significantly changed.DengWait.(2011)Ding liyun(2010)To the Lord(2012)Zhang Jing, *et al*.(2016)The results are similar. As an important component of the body, protein content levels often play an important role in fish growth.(TuanEt al, 2007)Grouper for egg and white matter40% ~ 55% (LuoEt al, 2004; shapawiEt al, 2014;Lin Jianbin, *et al*., 2008;Qiu Jinhai, 2009). Adding appropriate protein into the feed is conducive to the digestion and absorption of fish, and the insufficient or excessive protein content will affect the normal utilization of fish.(ShiauEt al, 1996; TengEt al, 1978;Jiang Xianghui, 2016). In this study, protein efficiency and protein deposition rate increased with the increase of feed protein content.(46%Rose54%)Was first increased and then after drop of trend reason may is when protein content insufficient when fish body intake protein will first for maintain weight makes of weight relative reduce; protein content too much, feed non-protein energy source insufficient part feed protein will transformation for energy gong yu body use. By this research results shows that when feed crude protein content50%When Moire gentian grouper juvenile of protein use degree highest this and first before reports of coioides Grouper(LuoEt al2004), Point with grouper(ChenEt al1994)And brown point Grouper

(E. fuscoguttatus) (ShapawiEt al2014)Research results similar but low in camel back perch(Chromileptes altivelis) (UsmanEt al2005)And Nassau Grouper(E. striatus) (EllisEt al1996)The study results reason may is due to experimental fish body style, size, Experimental Design and breeding environment different and cause.

Energy is maintain all life activities of Source(Cui Yi Wave1989). Fish from feed in uptake energy in vivo digestion absorption and a series of metabolism activities after most energy will first for maintain normal of life signs only30%About the energy for growth(More than even Wei2003).

By table2The when feed energy content gradually rise when its of weight, weight gain rate and specific growth rate were stability improve and feed coefficient gradually decreased (this institute design energy content(20.00 ~ 21.00 kJ/g)In Moire gentian grouper juvenile tolerance range. Study show that suitable energy range in fish of growth speed and feed energy there is correlation(AliEt al2005; shiauEt al2001). Protein efficiency, protein deposition rate with feed energy content of increased certain increased trend this show that appropriate improve feed in energy content not only not influence Moire gentian grouper juvenile of growth speed, at the same time also can improve its the protein of utilization and retention rate the to energy of protein of save Effect(Peng shi ming and2005). Energy retention rate with feed energy content increased and increased (fish in non-protein material energy supply sufficient this favorable reduce fish body of protein decomposition energy supply of demand the same results in Chen Jia Yi and(2008)The Zander fish(Lucioperca)Also found in the study. When the feed energy gradually increased, the liver-to-body ratio increased slightly, but there was no significant difference between the two groups. It indicated that the designed energy gradient had little effect on the relative quality of organs. The experimental results show that when the energy content in the feed is21.00 kJ/gThe growth of juvenile Grouper was better than that of juvenile grouper.RahimnejadWait.(2015)Results of optimal energy demand for Pearl Grouper(20.90 kJ/g)Similar, higher than Liu Yongjian(2002)Sautéed fish(Sciaenops ocellatus)Results(14.79 kJ/g)The reason may be due to the different fish species, feeding habits and breeding environment.

3.2 Effects of Dietary protein and energy content on Body Composition of juvenile

Epinephelus mogulatus

The results showed that the crude fat content of whole fish was significantly affected by the interaction of protein and energy, and the content of crude fat increased with the decrease of feed-egg energy ratio, this suggests that excess energy in the feed is converted into fat and deposited by the fish body. Protein and fat are transformed into one another in the fish body, and the fish body takes in an appropriate amount of fat to ensure its energy demand, and to avoid or reduce the decomposition of protein as a source of energy, it is conducive to nitrogen balance and increase nitrogen storage. When the protein and energy content increased, the crude protein and crude fat content of whole fish increased.JiangWait.(2015)We also found the results of the study on Pearl grouper.

Protein Content is50%Crude fat content is higher and water content is lower, which will play a positive role in the evaluation of meat quality. The reasonable feeding level can affect the fish body composition, and the fat in the feed will be deposited in the intestine and mesentery after being absorbed by the fish body. The effect of the digestive system can affect the fat content in the liver.(Zhou Xinghua, 2007)As an important digestive organ in fish, the normal function of the liver always determines the healthy level of the fish.(Huang qingda, *et al*., 2013). Feed energy content has great effect on fish body Water Content(DuEt al, 2005)Improve feed in energy content help fish body slow down the fat decomposition energy supply of demand makes muscle in keep certain of fat storage certain degree can improve fish body of environment of tolerance(Into Yong Xu and1995).

3.3 Feed protein and energy content of Yunlong grouper digestive enzyme activity of influence

This research in protein and energy in trypsin, lipase and amylase activity in show significant of interaction role and trypsin activity with feed egg can than reduce showed first increased and then decreased trend, (feed in suitable of eggs can ratio in certain degree stimulation of the Digestive Enzyme of secretion improve fish body on the Nutrition Composition of decomposition utilization promote fish body digestion absorption.

Protease complex of regulation mechanism can feed restriction in high protein of decomposition efficiency when feed in protein content gradually rise when Moire gentian grouper juvenile gastric protease and trypsin activity was significantly enhanced, this may is feed in protein content increase when substrate level increased and then promote the enzyme of vitality(GiriEt al2003)Similar results found in Li GUI front and(2012)Of Jian carp (Cyprinus carpio var. Juvenile(Cyprinus carpiovar)Of study; when protein content continuing to rise high gastric protease activity has decreased but not significant trypsin activity was significantly reduce show that feed in protein content once beyond some boundaries, moire gentian grouper of juvenile protein of digestion ability not only not enhanced and may be weakened. Trypsin activity with feed energy content increased and significantly increased when feed crude protein content50%Energy content21.00 kJ/gEggs can than23.61 mg/KJWhen its vitality strongest reason may is the composition of the feed can significantly influence fish in environment suitable feeding level can significantly improve fish body growth status, trypsin as an specific strongest of protease internal environment changes more sensitive(Bed natural detox hong and2006)Can on Feeding System of change which effective response. Trypsin activity was gastric protease activity advanced mathematics times similar results found in Chen strong and(2014)The bass(Lateolabrax Japonicus)Of study reason may is this experiment in trypsin determination samples from intestinal before central gastric protease determination samples from stomach and intestinal as an fish body digestion main place, its function structure more easy to enzyme of catalytic role so2Of protease activity gap is big.

The lipase activity was significantly enhanced when the content of fish oil gradually increased. The reason may be that the substrate area was changed by adjusting the energy gradient of fish oil, and then affect the activity of lipase.

In this study, the activity of amylase was low, indicating that the ability to digest and metabolize carbohydrates of juvenile grouper moara was poor.(Pelteobagrus fulvidraco)Also found in the research results(Yu lianwei, 2003).

4. Conclusion

The suitable protein and energy content in feed can not only significantly improve the growth of fish, but also save

protein and improve productivity.

References

1. Ali Mz, jauncey K. Approaches to optimize diet protein to energy ratio for African catfishAs gariepinus(Burchell, 2005). aquacture nutrition, 101, 11 (2): 95-1822
2. Chen hy, Tsai JC. optimal dietary protein level for the growth of the juvenile group,Epinephilus malabaricus, Fed semipurified 3.
3. Chen Z, Liang MQ, Zheng KK,Et al. Impact of secondary Protein Level on Growth PerformanceLateolabrax Japan. Progress in fishers sciences, 2014, 35 (2): 51-59
4. Cheng Yx, Wang LH, Chen JM. effects of Different feeds sources in feed on Growth and muscle and liver fat content of grass carp. fishers science & technology information, 1995 (4): 171-172
5. Cheng yongxu,Wang Union,Chen juming.Effects of different dietary fat sources on growth, muscle and liver fat content of grass carp.Aquatic Science and Technology Information, 1995 (4): 171-172]
6. Cui Yb. bioenergics of fishes: Theory and Methods. Acta hydrobiologica Sinica, 1989, 13 (4): 369-383 [Cui Yibo.Theories and Methods of fish bioenergetics.JOURNAL OF AQUATIC BIOLOGY, 1989, 13 (4): 369-383]
7. Deng DF, Ju ZY, Domino W,Et al. Optimal Dietary Protein Levels for juvenile Pacific threadfin (Polydacylus sexfilis) Fed dies with two levels of lipid. Aquaculture, 2011,316 (1): 25-30
8. Ding ly, Zhang LM, Wang JY,Et al. Effects of secondary Protein Level on Growth Performance,PlatichthysStellatus. Journal. Fishery sciences. 2010 17 (6):1285-1292
9. Dingli cloudZhang LiminKing International EnglishSuch..Feed Protein LevelThe starry flounder Juvenile Growth, body composition and Plasma Biochemical Index of influence., China Fisheries Science2010 17 (6): 1285-1292]
10. Du ZY Liu YJ Tian LX,Et al. Effect. dietary Lipid level. growth feed utilization, body composition by juvenile grass carp (Ctenopharyngodon idella). Aquaculture Nutrition 2005 11 (2): 139-146
11. Jiang ST Wu XY Li WF,Et al. Effects. dietary protein, lipid levels. growth feed utilization body, Plasma Biochemical compositions. hybrid grouper (EpinephelusLanceolatus♂× Epinephelus fuscoguttatus♀) Juveniles.Aquaculture 2015,446: 148-155
12. Jiang XH Liu G Jin GH,Et al. Effects. dietary protein, lipid levels. growth, Body Composition.CtenopharyngodonIdellus. Chinese Journal Fisheries 2010 23 (1): 24-27 [Jiang xiang huiLiu GangGold guanghaiSuch..Feed protein and energy level on Grass Carp Growth and fish body composition of influence.Fisheries of magazine2010 23 (1): 24-27]
13. Jiang XH Luo XN Jin GH,Et al. Effects. different protein, lipid level diets. growth body composition, immunity. juvenilePhoxinus lagowskii. Acta zoonutrimenta Sinica 2016 28 (3): 864-871 [
14. Jiang xiang huiLuo off-yearGold guanghaiSuch..Different Protein and fat level diets on's juvenile growth, body composition and immunity of influence.Animal Nutrition Journal2016 28 (3): 864-871]