UNIVERSITI PUTRA MALAYSIA

Commercial Feeds and Temperatures Effect on the Growth of Carassius auratus (Linnaeus, 1758) Oranda Juveniles

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This project report is submitted in partial fulfillment of the requirements for the degree of Bachelor of Agriculture (Aquaculture)

DEPARTMENT OF AQUACULTURE
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ABSTRACT

Goldfish *Carassius auratus* (Linnaeus, 1758) oranda variety is a popular tropical ornamental fish in Malaysia. The aims of this study were to determine the effect of different commercial pellets with different protein levels and temperatures on the growth of juveniles *Carassius auratus* oranda variety. Feeding and temperature experiments were carried out separately. Protein content of three commercial fish pellets 27, 32 and 42% were confirmed using the Kjeldahl method. Fifteen aquaria (40 X 20 X 20cm) were prepared with 15 replicates. Dechlorinated water was used for all aquarium. Five orandas juveniles were placed in each aquaria. Each experiment was carried out for six weeks. Weight and length increments of these goldfishes were monitored weekly. Results showed that commercial feed 42% protein produced significantly highest ($P<0.05$) weight increment followed by 32 and then 27% protein. However, there was no significantly different ($P>0.05$) on the length increment between all treatments. As for the temperature experiment, 27˚C produced sigificant higher ($P<0.05$) weight increment as compared to 30˚C. However there was no significant ($P>0.05$) in length increment between treatments. Orandas juveniles had a better growth fed with feed containing 42% protein and culture at temperature of 27˚C.

ABSTRAK

Ikan emas *Carassius auratus* (Linnaeus, 1758) jenis oranda ialah ikan hiasan tropika popular di Malaysia. Matlamat kajian ini adalah untuk menentukan kesan pelet komersial dengan tahap protein dan suhu terhadap pertumbuhan juvana *Carassius auratus* jenis oranda. Pemakanan dan suhu eksperimen telah dijalankan secara berasingan. Kandungan protein tiga pelet komersial 27, 32 dan 42% telah disahkan menggunakan kaedah Kjeldahl. Lima belas akuarium (40 X 20 X 20cm) telah disediakan dengan 15 replika. Air nyahklorin telah digunakan untuk semua akuarium. Lima orandas juvana telah diletakkan di dalam akuarium. Setiap eksperimen telah dijalankan selama enam minggu. Kenaikan berat dan panjang ikan emas telah seminggu sekali. Keputusan menunjukkan bahawa pelet komersial 42% protein menghasilkan kenaikan berat ketara tertinggi ($P < 0.05$) diikuti oleh 32 dan kemudian 27% protein. Walau bagaimanapun, terdapat tidak jauh berbeza ($P > 0.05$) tentang kenaikan panjang antara semua rawatan. Seperti bagi eksperimen suhu, 27 ˚ C menghasilkan kenaikan berat lebih tinggi ($P < 0.05$) berbanding dengan 30˚C, namun ada perbezaan yang ketara ($P > 0.05$) dalam kenaikan panjang antara rawatan. Juvana orandas menghasilkan pertumbuhan yang lebih baik dengan makanan yang mengandungi protein 42% dan suhu 27 ˚ C.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

%	Percent
L	Liter
℃	Degree Celsius
cm	Centimeter
ANOVA	Analysis of variance
mg	Miligram
mm	Milimeter

CERTIFICATION OF APPROVAL

DEPARTMENT OF AQUACULTURE

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Title of project : Commercial Feeds and Temperatures Effect on the Growth of *Carassius auratus* (Linnaeus, 1758) Oranda Juveniles

This is to certify that I have examined the final year project report and all corrections have been made as recommended format stipulate in the AKU 4999 project guidelines, Department of Aquaculture, Faculty of Agriculture, and University Putra Malaysia.

Signature and official stamp of supervisor:

_____

Dr. Annie Christianus

Date:

CHAPTER 1

INTRODUCTION

Goldfish *Carassius auratus* (Linnaeus, 1758) is a native species of China (Kang, 1984). Later goldfish was introduced to Japan and Taiwan. These countries produce higher quality of goldfish offspring.

Goldfish is a temperate species which grows rapidly in pond. Commercial rearing of goldfish is carried out in earthern ponds and large cement tanks (Kang, 1984). Goldfish can tolerate salinity of 2% without adverse effect on feeding level and growth (Luz et al., 2008). It is one of the hardy species in ornamental species and very popular among fish hobbyist in Malaysia.

In the natural environment, goldfish feeds aquatic plants such as phytoplankton and insects such as mosquito and midge larvae in the epilimnion zone. In deeper water column, goldfish also consumes small organisms such as tadpoles and small fish in deeper water column. Goldfish would search through the mud for various benthic organisms like black worms, freshwater shrimp and snails. Sometime they feed on mud, bacteria and fungi (Aka, 2009).

Commercial fish feed has different protein, lipid and carbohydrate proportions. One of the most important component affecting goldfish growth is the protein. Protein is required for tissue building and as source of energy. Ten amino acids essential for fish are phenylalanine, histidine, isoleucine, leucine, lysine, methionine, tryptophan, valine, arginine, and threonine (Aka, 2009). These essential amino acids are important in their diet for normal growth and gonadal development.

The main objectives of this experiment were to determine the effect of different protein levels pellets and temperatures on the growth of juveniles *Carassius auratus* oranda variety.

REFERENCES

Abi-Ayad, A., and P. Kestemont. (1994). Comparison of the nutritional status of goldfish (Carassius auratus) larvae fed with live, mixed, or dry diet. *Aquaculture.*, ***128***, 163–176.

Aka. (2009). Goldfish Nutrition Part 1: The natural diet and digestive processes. http://thegab.org/Goldfish/goldfish-nutrition-part-1-the-natural-diet-and-digestive-processes.html. Retrieved March 1, 2012.

Aka. (2009). Goldfish Nutrition Part 2: Food and Nutrition. http://thegab.org/Goldfish/goldfish-nutrition-part-2-food-and-nutrition.html. Retrieved March, 2012.

Aksnes, A., Izquierdo, M.S., Robaina, L., Vergara, J.M., and Montero, D. (1997). Influence of fish meal quality and feed pellet on growth, feed efficiency and muscle composition in gilthead seabream (*sparus aurata*). *Aquaculture*., ***153***, 251-261.

Ayad, A.A. and Kestemont, P. (1994). Comparison of the nutritional status of goldfish (*Carassius auratus*) larvae fed with live, mixed or dry diet. *Aquaculture, **128**, 163-176.*

Bandyopadhyay, P., Swam, S.K., and Mishra, S. (2004). Growth and dietary utilization in goldfish (*Carassius auratus* Linn*)* fed diets formulated with various local agro-produces. *Bioresource Technology, **96**, 731-740.*

Ford, T. and Beitinger, T.L. (2004). Temperature tolerance in the goldfish, *Carassius auratus*. *Journal of Thermal Biology, **30**, 147-152.*

Freeman, J.A. (1950). Oxygen consumption, brain metabolism and respiratory movements of goldfish during temperature acclimatization, with special reference to lowered temperatures. *Biol. Bull, **99,*** 416-424.

Fry, F.E.J. and Hart. J.S. (1946). The relation of temperature to oxygen consumption in the goldfish. *Anatonomical Record, **96,*** 4-11

Fry, F.E.J., Black, V.S., and Black, E.C. (1947). Influence of temperature on the asphyxiation of young goldfish (*Carassius auratus* L.) under various tensions of oxygen and carbon dioxide. *Biol. Bull, **92**, 217-224.*

Goolish, E.M. and Adelman, I.R. (1984). Effects of ration size and temperature on the growth of juvenile common carp (*Cyprinus carpio*). *Aquaculture*., ***36***, 27-35.

Hazel, J.R. and Prosser, C.L. (1974). Molecular mechanisms of temperature compensation in poikilotherms. *Physiol*., ***54***, 620-668.

Johnston, I. And Lucking, M. (1978). Temperature induced variation in the distribution of different types of muscle fibre in the goldfish (*Carassius auratus*). *Journal of Comparative Physiology*., ***124***, 111-116.

Kang, L.C. (1984). *Goldfish and Tropical Fish.* Tropical Press Sdn Bhd., Kuala Lumpur.

Kaushik, S.J. (1995). Nutrients requirements, supply, supply and utilization in the context of carp culture. *Aquaculture*., ***129***, 225-241.

Kestemont, P. (1995). Influence of feed supply, temperature and body size on the growth of goldfish *Carassius auratus* larvae. *Aquaculture.*, ***136***, 341-349

Lochmann, R.T. and Phillips, H. (1994). Dietary protein requirement of juvenile golden shinners (*Notemigonus crysoleucas*) and goldfish (*Carassius auratus*) in aquaria. *Aquaculture*, ***128***, 277-285.

Luz, R.K., Alvarez, R.M.M., Pedro, N.D., and Delgado, M.J. (2008). Growth, food intake regulation and metabolic adaptations in goldfish (*Carassius auratus*) exposed to different salinities. *Aquaculture*, ***276***, 171-178.

Ma, T.S. and Zuazaga, G. (1942). Micro-Kjeldahl Determination of Nitrogen. *Industrial and Engineering Chemistry*., ***14***, 280–282.

Moreira, R.L., Da Costa, J.M., Teixeira,E.G., Moreira, A.G.L., De Moura, P.S., Rocha, R.S., and Vieira, R.H.S.F. (2011). Performance of Carassius auratus with different food strategies in water recirculation system. *Arch. Zootec.*, ***60***, 1203-1212.

Ostrow, M. (2003). *Goldfish.* Barron's Educatonal Series,Inc., China.

Riege, W.H. and Cherkin, A. (1972). One-trial learning in goldfish: temperature dependence. *Behavioral Biology*., ***7***, 255-266.

Sales, J. and Janssens, G.P.J. (2003). Nutrient requirements of ornamental fish. *Aquat.Living Resour*., ***16***, 533-540.

Sinha, A.K., Liew, H.J., Diricx, M., Blust, R., and Boeck, G.D. (2011). The interactive effects of ammonia exposure, nutritional status and exercise on metabolic and physiological responses in goldfish (*Carassius auratus L.*) *Aquatic Toxicology*, ***109***, 33-46.

Smartt, J. (2001). Goldfish Varieties and Genetics. Sparks Computer Solutions Ltd., Oxford.

Sollid, J., Weber, R.E., and Nilsson, G.E. (2005). Temperature alters the respiratory surface area of crucian carp *Carassius carassius* and goldfish *Carassius auratus*. *The Journal of Experimental Biology*, ***208***, 1109-1116.

Wallat, G.K., Lazur, A.M., and Chapman,F.A. (2004). Caratenoids of different types and concentrations in commercial formulated fish diets affect color

and its development in the skin of the red oranda variety of goldfish. *North American Journal of Aquaculture*., ***67***, 42-51.

Watson, C.A., Hill, J.E., and Pouder, D.B. (2004). Species profile: Koi and Goldfish. *Southern Regional Aquaculture Center.*, ***7201***, 1-3.