

**Effect of dietary supplementation of blood meal and Azolla on
growth performance of *Cyprinus carpio haematopterus***

(Koi carp)



M.M. Shamindra Bandara Nawarathne



**FACULTY OF AGRICULTURE
EASTERN UNIVERSITY
SRI LANKA
2018**

**PROCESSED
Main Library, EUSL**

ABSTRACT

Fish feed forms an important part of aquaculture and one of the most important factors to its development. A major determinant of successful progression and intensification of aquaculture production is aquafeed. But cost of aquafeed is the major limitation in aquaculture.

For commercial fish feed formulation, one of the expensive ingredients that is generally used as the protein source is good quality fish meal. The price of the commercial feed is increased due to high operational cost of fish meal. To reduce the price of a complete feed, locally available feed ingredients would be included in the feed such as blood meal and Azolla. Hence, experiment was conducted to study the suitability of replacing fish meal by blood meal and Azolla meal in aquafeed.

The experiment was conducted at the Nutrition Laboratory of the Department of Animal Science, Faculty of Agriculture, Eastern University, Sri Lanka, for a period of 42 days. Blood was collected from slaughter house located at Eravur and Azolla was cultivated and harvested in Livestock Farm of Eastern University, Sri Lanka. The nutrient composition of blood meal and Azolla was determined by proximate analysis.

The experiment consisted of four treatments including a control diet (commercial feed) and three experimental diets. The experimental diet was prepared by blood meal at the proportions of 25%, 25.5% and 26%. Azolla was incorporated at the proportions of 35%, 34.5% and 34%. Six fish were used per replicate, and three replicate per treatment were allocated in a Completely Randomized Design (CRD). Records were maintained for water quality parameters, feed intake, length and weight of *Cyprinus carpio haematopterus* fingerlings, starting from 76 days up to 118 days of growth. Weight were recorded at weekly interval and length were recorded once in two weeks.

The present study showed that, there were no significant ($P>0.05$) differences of survival rate, standard length, length gain, weight gain, feed conversion ratio and specific growth rate of fish among treatments. Results indicated that, commercial feed can be replaced with blood meal and Azolla meal content in *Cyprinus carpio haematopterus* diets without any negative effects on growth performance. As well according to cost analyzed results denote that the cost of T₁, T₂, T₃ has reduced and profit increased with replacement of commercial feed with blood meal and Azolla meal diet.

TABLE OF CONTENTS

CONTENTS	Page No.
ABSTRACT.....	i
ACKNOWLEDGEMENT	iii
TABLE OF CONTENTS.....	iv
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER 01	1
INTRODUCTION	1
1.1 General introduction.....	1
1.2 Objectives.....	5
CHAPTER 02	6
LITERATURE REVIEW	6
2.1 Koi carp (<i>Cyprinus carpio haematopterus</i>),	6
2.2 Physiology of koi carp.....	6
2.2.1 Growth.....	6
2.2.2 Reproduction	7
2.3 Feeding.....	7
2.4 Nutritional requirement.....	7
2.4.1 Carbohydrate	8

2.4.2 Fat	8
2.4.3 Protein.....	9
2.4.4 Vitamins.....	10
2.4.5 Minerals	10
2.5 Energy	11
2.6 Feed ingredients used in aquafeed	12
2.7 Protein sources	12
2.7.1 Conventional Protein Source for Fish Feed.....	12
2.7.2 Alternative Protein Sources	13
2.8 Plant Protein Sources	13
2.8.1 Corn Gluten Meal	13
2.8.2 Soybean Meal	14
2.8.3 Sunflower Meal	14
2.8.4 Palm kernel cake.....	14
2.8.5 Seaweed Meal.....	15
2.8.6 Azolla.....	15
2.9 Animal protein sources.....	16
2.9.1 Poultry by product meal	16
2.9.2 Krill meal	16
2.9.3 Squid meal	16
2.9.4 Blood meal.....	17

2.10 Potential of using Azolla in koi feed.....	17
2.11 Potential of using blood meal in koi feed.....	18
2.12 Blood meal processes.....	19
2.12.1 Solar and oven drying.....	19
2.12.2 Drum drying.....	19
2.12.3 Ring and flash drying.....	20
2.12.4 Spray drying.....	20
CHAPTER 03.....	21
MATERIALS AND METHODS.....	21
3.1 Experimental animal.....	21
3.2 Experimental setup.....	21
3.3 Treatments.....	22
3.4 Culture of Azolla.....	23
3.4.1. Preparation of Azolla meal.....	23
3.5 Preparation of blood meal.....	23
3.6 Feed preparation.....	24
3.7 Feeding of experimental diet.....	25
3.8 Water quality monitoring.....	26
3.9 Data collection.....	26
3.9.1 Weight gain.....	26
3.9.2 Length gain.....	26

3.9.3 Feed conversion ratio.....	27
3.9.4 Specific growth rate.....	27
3.9.5 The survival rate.....	27
3.10 Data processing and analysis.....	27
CHAPTER 04.....	28
RESULTS AND DISCUSSION.....	28
4.1 Water quality.....	28
4.2 Survival.....	29
4.3 Growth performance of <i>Cyprinus carpio haematopterus</i> fingerlings.....	30
4.3.1 Standard length and length gain.....	30
4.3.2 Live body weight and weight gain of <i>Cyprinus carpio haematopterus</i>	31
4.4 Specific growth rate (SGR).....	34
4.5 Feed consumption.....	35
4.6 Feed conversion ratio.....	37
4.7 Cost analysis.....	38
CHAPTER 05.....	40
CONCLUSION.....	40
REFERENCES.....	42
ANNEXURES.....	57