



Mycofeeds for UPV-Saline Tolerant population of Improved Nilotica (SPIN) Tilapia



Mark Henry F. De Leon* and Rex Ferdinand M. Traifalgar

Institute of Aquaculture, College of Fisheries and Ocean Sciences,
University of the Philippines Visayas, Miagao, Iloilo, Philippines
mdeleon@up.edu.ph

ABSTRACT

An 80-day growth trial experiment was conducted to evaluate the effects of replacing soybean meal (SBM) by mycomeal (MM) on the growth performance, feed utilization, nutrient retention, and survival of UPV-SPIN Tilapia. The experiment was conducted in a completely randomized design with five treatments and four replicates for each treatment (5 treatments x 4 replicates x 20 fish per tank). Five isonitrogenous and isolipidic experimental diets were formulated with four MM replacement levels (25%, 50%, 75% & 100%) replacing soybean meal by weight. Results showed that MM could replace SBM up to 100% without significantly reducing growth performance and feed utilization. Though a decreasing trend was observed in % weight gain and specific growth rate, no significant difference was observed between the fish-fed control diet and 100% SBM replacement. High survival was observed in all treatments and feed intake showed no significant difference among treatments ($p>0.05$) implying that palatability of the diet was not affected by MM replacement. Moreover, the amino acid profile of MM showed the limiting amino acids were lysine and isoleucine. However, tryptophan was not detected in MM. A lower amino acid index was observed, thus, resulting in a lower growth performance of fish-fed with higher inclusion of MM compared to the control. Higher inclusion of MM could be due to its high protein content at 40%. Results of the present study showed that mycomeal can replace soybean meal up to 100% in the diet of UPV-SPIN Tilapia without compromising the growth performance, feed utilization and survival.

INTRODUCTION

Expansion in Philippine tilapia aquaculture has been adapted to meet the increasing demand of the population for cheap fish protein and address diminishing marine fish catch (Pontecorvo and Schrank, 2012). This intensification requires higher feed inputs. Aquaculture currently depends on expensive feedstuff such as fish meal but continuously increasing demand leads to a decline in its production and increased cost. Soybean meal, a plant-based protein source, was utilized as an ingredient in the diet of various farmed aquatic species, however, local production was not yet fully realized and there has been high competition on the utilization of soybean both as human food and as feed material in animal growing industries. The need to develop a sustainable and plant-based high-protein feedstuff for Philippine aquaculture is deemed needed. The present study utilized higher fungal mycelia as an alternative feed material in diet formulations. Previous studies have been conducted utilizing fungal mycelia to produce feed-grade protein source for aquaculture use.

OBJECTIVES

The present study aims to evaluate the effect of replacing soybean meal by mycomeal on the survival, growth performance, feed utilization and nutrient retention in UPV-SPIN Tilapia.

METHODOLOGY

Preparation of Mycomeal



Feed Formulation



Table 1. Composition of formulated diets at different mycomeal replacement levels (g/100 g diet).

Ingredients	T1 (Control)	T2 (MM ₂₅)	T3 (MM ₅₀)	T4 (MM ₇₅)	T5 (MM ₁₀₀)
Fish meal	10	10	10	10	10
Mycomeal	0	8.75	17.5	26.25	35
Soybean meal	35	26.25	17.5	8.75	0
Gluten	15	15	16	16	17
Yeast	11	12	12	13	12
Flour	10	7	7	7	6.4
Rice bran	6.5	7.9	6.9	5.9	6.5
Coconut oil	2	3	3	3	3
Soybean oil	2.4	2	2	2	2
Soy lecithin	3	3	3	3	3
Mineral mix ²	3	3	3	3	3
Vitamin mix ¹	2	2	2	2	2
BHT	0.1	0.1	0.1	0.1	0.1

¹ Vitamin premix (per kg of premix): thiamine, 2.5 g; riboflavin, 2.5 g; pyridoxine, 2.0 g; inositol, 100.0 g; biotin, 0.3 g; pantothenic acid, 100.0 g; folic acid, 0.75 g; para-aminobenzoic acid, 2.5 g; choline, 200.0 g; nicotinic acid, 10.0 g; cyanocobalamin, 0.005 g; α -tocopherol acetate, 20.1 g; menadione, 2.0 g; retinol palmitate, 100,000 IU; cholecalciferol, 500,000 IU.

² Mineral premix (per kg of premix): Calcium hydrogen phosphate dihydrate, 727.2 g; hydrated magnesium carbonate, 127.5 g; potassium chloride, 50.0 g; sodium chloride, 60.0 g; iron (III) citrate dihydrate, 25.0 g; zinc carbonate, 5.5 g; manganese (II) chloride, 2.5 g; copper (II) chloride, 0.785 g; cobalt (III) chloride hexahydrate, 0.477 g; calcium iodate hexahydrate, 0.295 g; chromium (III) chloride hexahydrate, 0.128 g; aluminum chloride hexahydrate, 0.54 g; sodium selenite, 0.3 g.

RESULTS

Table 2. Effect on growth performance and nutrient retention of UPV-SPIN Tilapia fed with different mycomeal replacement levels.

	T1 (Control)	T2 (MM ₂₅)	T3 (MM ₅₀)	T4 (MM ₇₅)	T5 (MM ₁₀₀)
Initial Weight (g)	1.52 ± 0.14	1.60 ± 0.07	1.38 ± 0.07	1.70 ± 0.09	1.60 ± 0.11
Final Weight (g)	41.87 ± 1.09	41.87 ± 0.68	36.89 ± 2.13	36.82 ± 1.13	34.90 ± 1.43
Survival (%)	90.00 ± 2.04	88.75 ± 6.25	92.50 ± 4.79	93.75 ± 2.40	96.25 ± 2.40
Weight gain (%)	2732.41 ± 277.35 ^a	2521.35 ± 93.79 ^a	2605.95 ± 217.33 ^a	2087.37 ± 164.79 ^a	2114.86 ± 165.59 ^a
Feed intake	47.34 ± 0.67 ^a	49.42 ± 1.78 ^a	48.18 ± 0.94 ^a	47.79 ± 1.53 ^a	46.16 ± 0.99 ^a
FCR	1.18 ± 0.04 ^a	1.23 ± 0.06 ^a	1.38 ± 0.11 ^a	1.36 ± 0.05 ^a	1.39 ± 0.05 ^a
SGR	4.16 ± 0.13 ^a	4.08 ± 0.04 ^a	4.11 ± 0.11 ^a	3.85 ± 0.09 ^a	3.86 ± 0.09 ^a
PER	1.71 ± 0.01 ^a	1.67 ± 0.00 ^a	1.65 ± 0.01 ^a	1.63 ± 0.01 ^a	1.64 ± 0.01 ^a

FCR- Feed Conversion Ratio; SGR- Specific Growth Rate; PER- Protein Efficiency Ratio

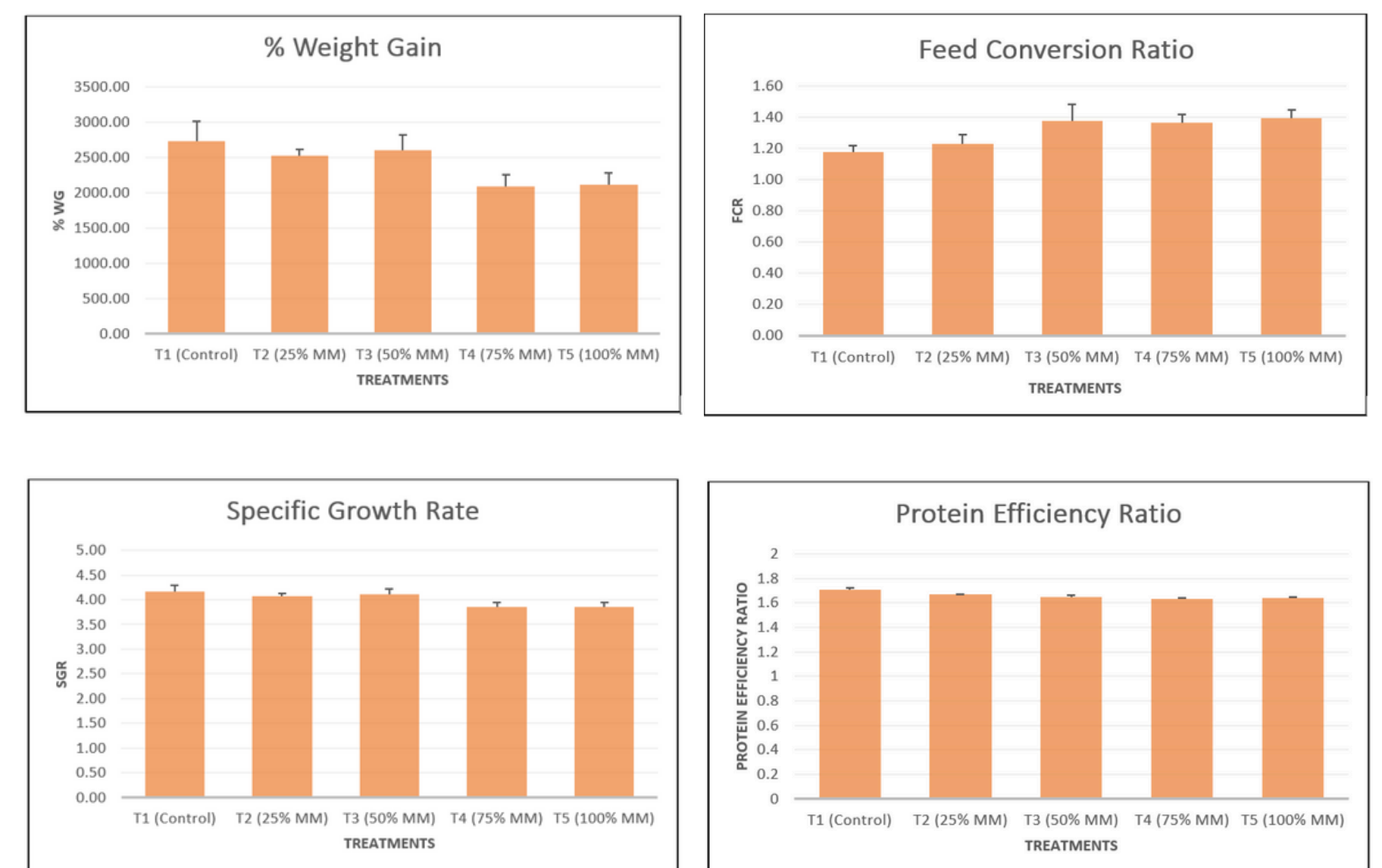


Table 3. Essential Amino Acid composition, chemical score, and Essential Amino acid Index of mycomeal (MM).

Essential Amino Acid	Mycomeal EAA (g/100 g CP)	Tilapia Tissue EAA (g/100 g CP)	Mycomeal EAA Chemical Score
Histidine (His)	1.22	2.30	53.24
Isoleucine (Ile)	0.88	3.90	22.44
Leucine (Leu)	2.08	6.00	34.75
Lysine (Lys)	0.47	7.20	6.58
Methionine (Met)	0.72	2.00	35.94
Phenylalanine (Phe)	3.21	3.20	100.32
Threonine (Thr)	0.92	3.30	27.79
Valine (Val)	1.31	4.40	29.75
Arginine (Arg)	2.75	4.20	65.51
Tryptophan (Try)	ND	ND	ND
TOTAL	13.56	36.50	
Mycomeal Chemical score index		6.58	
Essential Amino Acid Index		0.37	

Tilapia tissue EAA (Furuya et al. 2023); ND- Not Detected

CONCLUSION & RECOMMENDATION

Based on the result of the present study, mycomeal can replace soybean meal up to 100% in the diet of UPV-SPIN tilapia without adverse effects on growth performance, feed utilization, nutrient retention, and survival. Moreover, limiting amino acids were observed in mycomeal, thus, it is recommended to add these limiting amino acids in the diet.

REFERENCES

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