



High-protein yeast culture for aquatic applications

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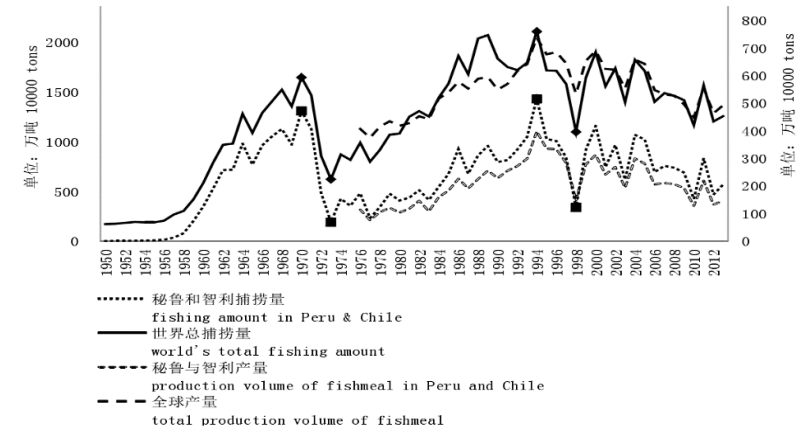
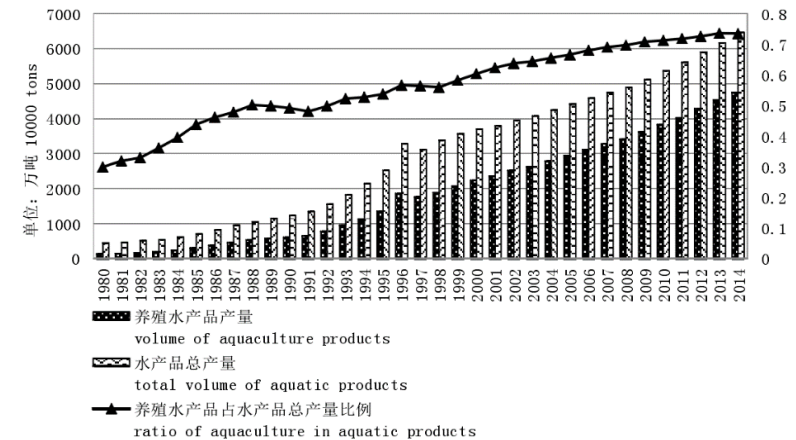
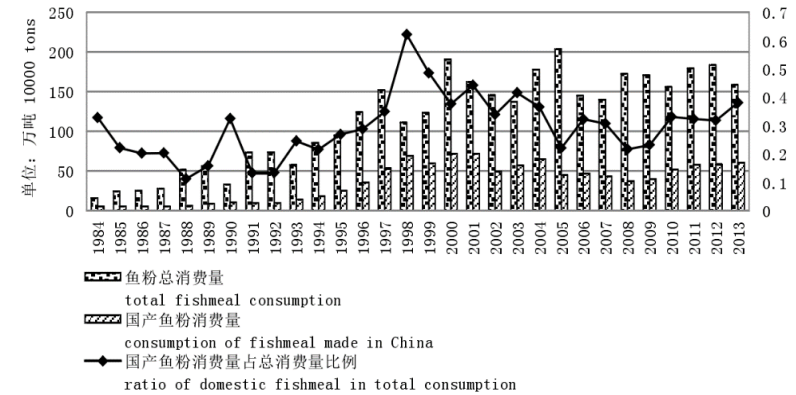
YummyWell Alternative
in Bass Application

Alternative fishmeal, an imperative

The current situation of fishmeal use in aquatic feed. :

- ❑ Large use: China is the world's largest consumer of fishmeal, with Annual consumption of about 1.7-1.8 million tons, about 30% of the world's annual production
- ❑ No standardized formulation system for fishmeal, no clear guidance Even misleading, use of ratios may be high.
- Common freshwater fish: 5-12%.
- Common saltwater fish: 10-15%
- Shrimp material: 25-35%
- Freshwater specialty species: 50-65%

Supply exceeds demand: Total aquaculture production is rising at an average rate of 10% per year, while fishmeal production remains largely unchanged



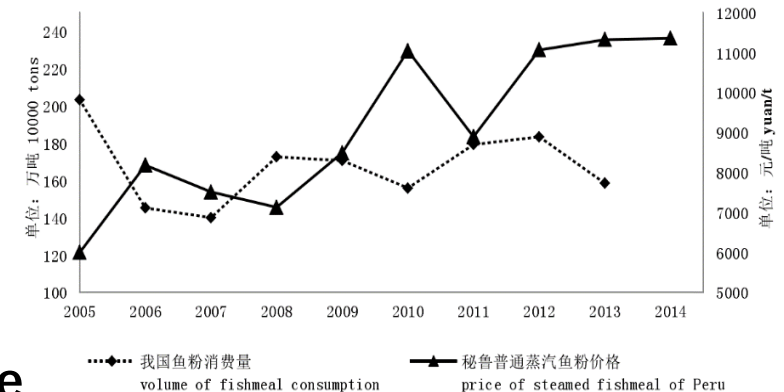
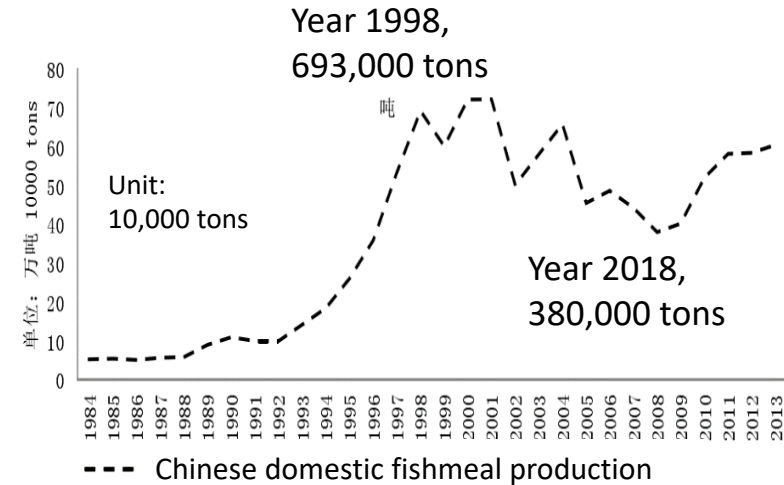


Alternative fishmeal, an imperative

❑ Domestic fishmeal problems

- Insufficient supply: overfishing, marine environmental pollution and other reasons caused by the lack of raw materials "anchovy"
- Production technology and equipment and foreign gap
- Low yield and high fat content
- Serious adulteration phenomenon

❑ Mainly dependent on imports, expensive: 70-80% of fishmeal from imports, Peruvian super steam fishmeal (68 protein) prices up to 12,000 RMB / t.



With the high price of fishmeal and the shortage of resources, finding quality raw materials to replace fishmeal has become an inevitable trend!



Yeast Culture – “Yimeiwei”

YummyWell, not just protein

- ✓ Good appetite attraction
- ✓ High digestibility
- ✓ Balance of amino acids
- ✓ High safety



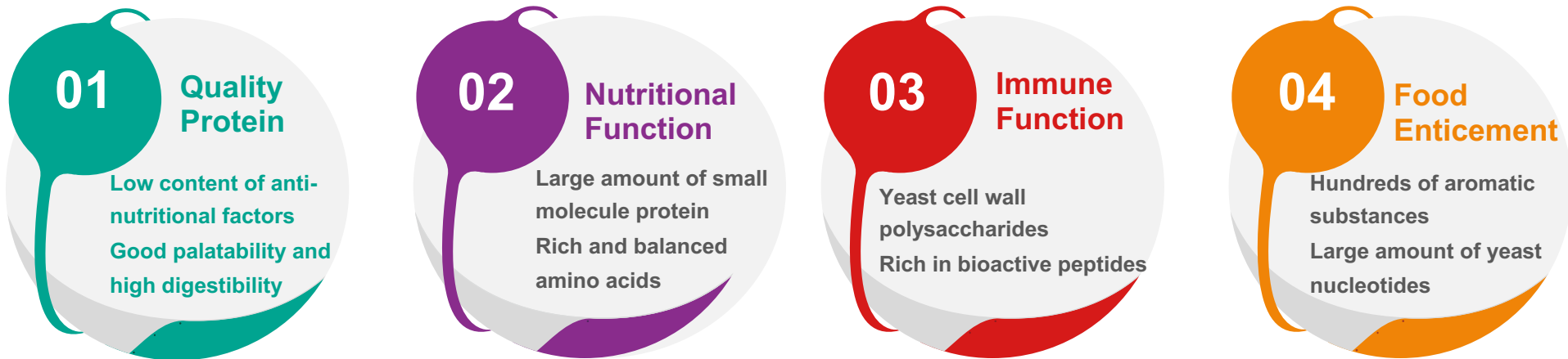
- ✓ Improve the immunity of the body
- ✓ Good viscosity, good viscoelasticity
- ✓ Yeast metabolites, improve intestinal tract
- ✓ Cost-effective

Replacing fishmeal, SPC, brewer's yeast and other protein ingredients

The only way to reduce costs is to increase efficiency!

High-Protein Yeast Culture (YummyWell)

Product Features and Effectiveness



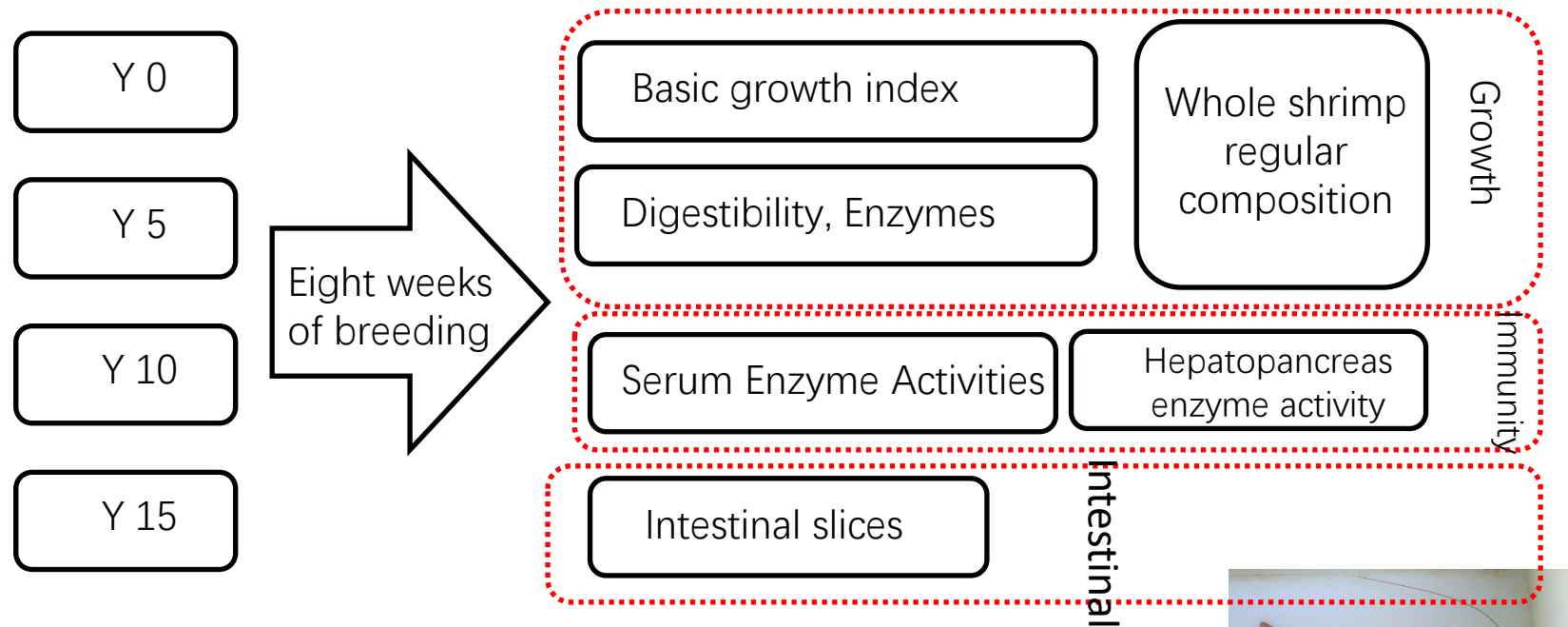
Replacing fishmeal, SPC, brewer's yeast and other protein ingredients

The only way to reduce costs is to increase efficiency!

Effects of “Yimeiwei” on growth, immunity and intestinal tract of *Penaeus vannamei*

Experimental protocol: Using different proportions of Yimeiwei (YummyWell) and other proteins to replace fishmeal to observe its effects on growth, immunity and intestinal tract of *Vannamei* shrimp

Shrimp initial weight: 2.78g

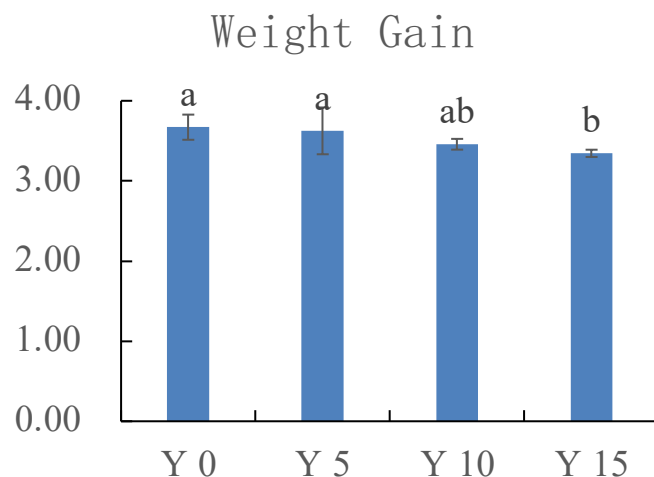
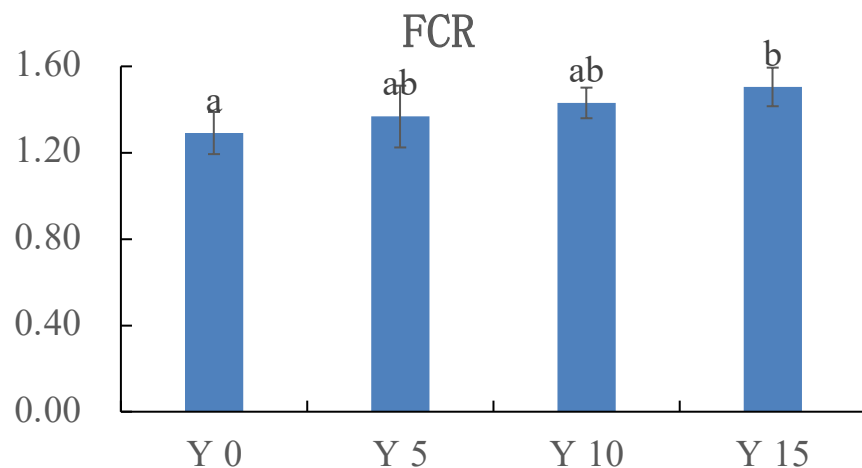
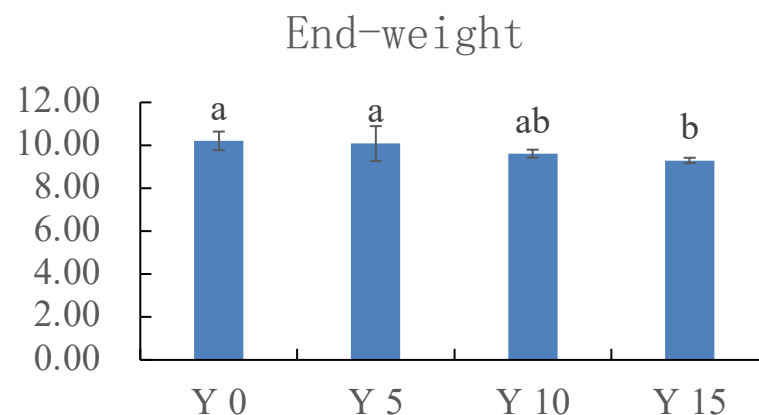
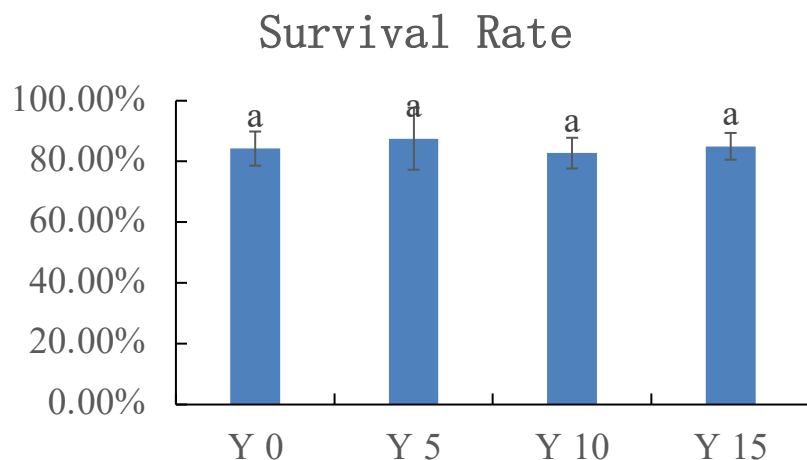


Effects of YummyWell fishmeal alternative on growth, immunity and intestinal tract of *Penaeus vannamei*

YummyWell and other proteins to replace fishmeal trial

Ingredients/%	Y-0	Y-5	Y-10	Y-15
Fishmeal	20	16	12	8
YummyWell	0	5.25	10.52	15.79
Flour	29.45	27.91	26.35	24.79
Soybean Meal	20	20	20	20
Corn protein meal	5	5	5	5
Pork meal	5	5	5	5
Gluten Meal	5	5	5	5
Squid paste	3	3	3	3
Brewer's yeast	3	3	3	3
Soybean phospholipids	1.50	1.50	1.50	1.50
Fish oil	1.50	1.79	2.08	2.37
Soybean oil	1.50	1.50	1.50	1.50
Multivitamin	0.5	0.5	0.5	0.5
Polymineral	2.5	2.5	2.5	2.5
Yttrium trioxide	0.05	0.05	0.05	0.05
Bentonite	2	2	2	2
Total	100	100	100	100

Study results (growth indicators)



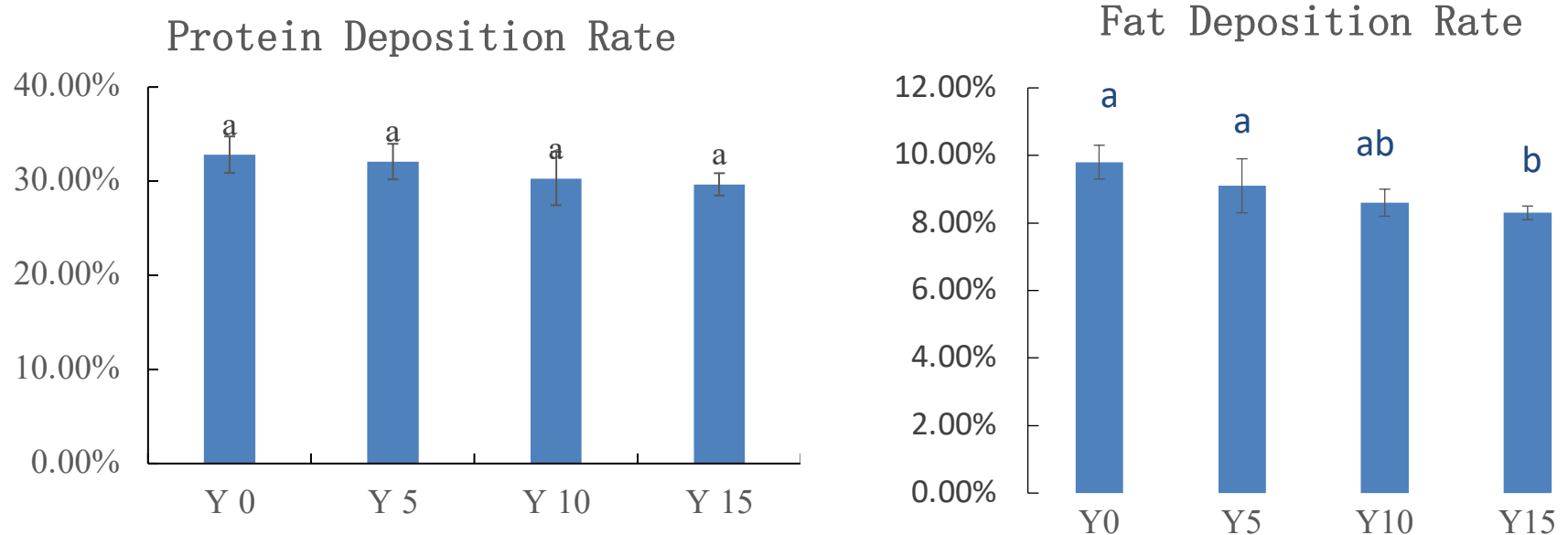
There was no significant difference in weight gain rate and feed coefficient between the 5% and 10% YummyWell alternative fishmeal groups and the 15% YummyWell alternative fishmeal group showed reduced growth performance relative to the fishmeal group.

Study results (whole shrimp conventional %)

	Y 0	Y 5	Y 10	Y 15
Moisture	74.71±2.00	75.48±2.19	76.18±1.76	76.19±1.37
Crude protein	17.77±1.52	17.19±1.48	17.31±1.7	17.88±1.27
Crude fat	1.65±0.091	1.63±0.079	1.47±0.061	1.58±0.047
Crude Ash	3.27±0.25	2.99±0.30	3.22±0.11	3.39±0.31

Whole shrimp body fractions (moisture, crude protein, crude fat and crude ash), were not significantly different between the groups ($P > 0.05$).

Study results (deposition rate)

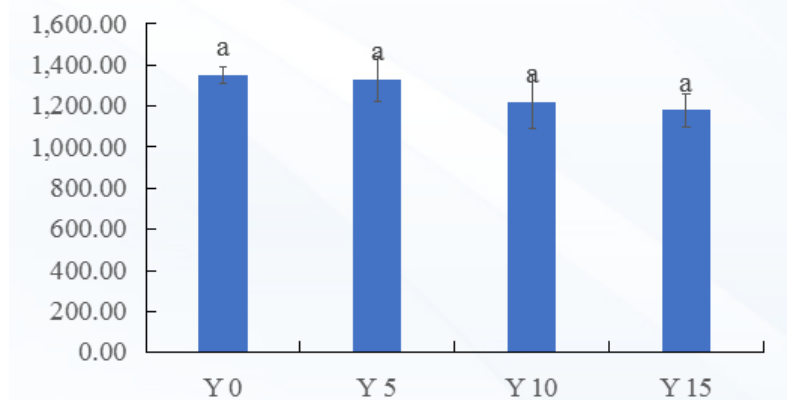


The protein deposition rate and fat deposition rate were not significantly different from the fish meal group in the 5% and 10% YummyWell alternative fish meal groups, and the fat deposition rate was reduced in the 15% YummyWell alternative fish meal group relative to the fish meal group.

Study results (hepatopancreatic digestive enzymes)

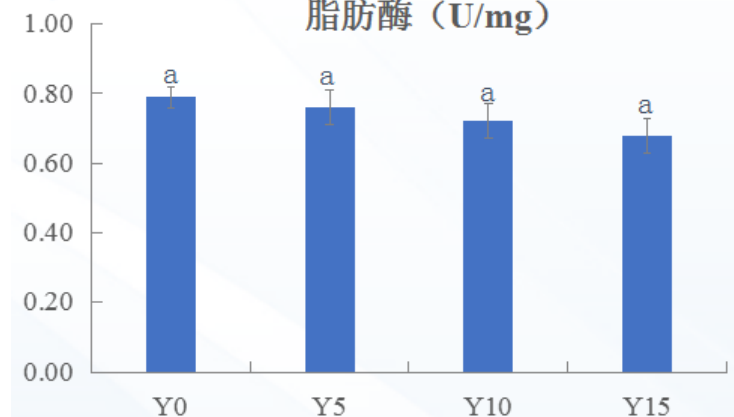
Amylase

淀粉酶 (U/g)



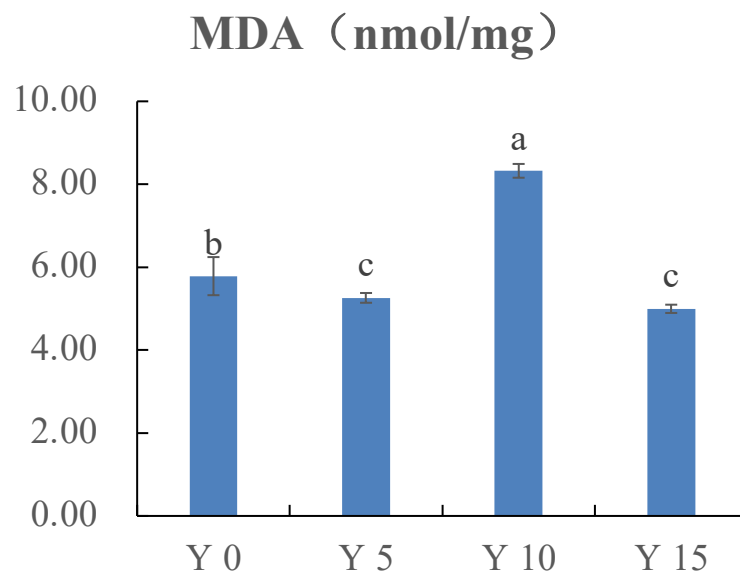
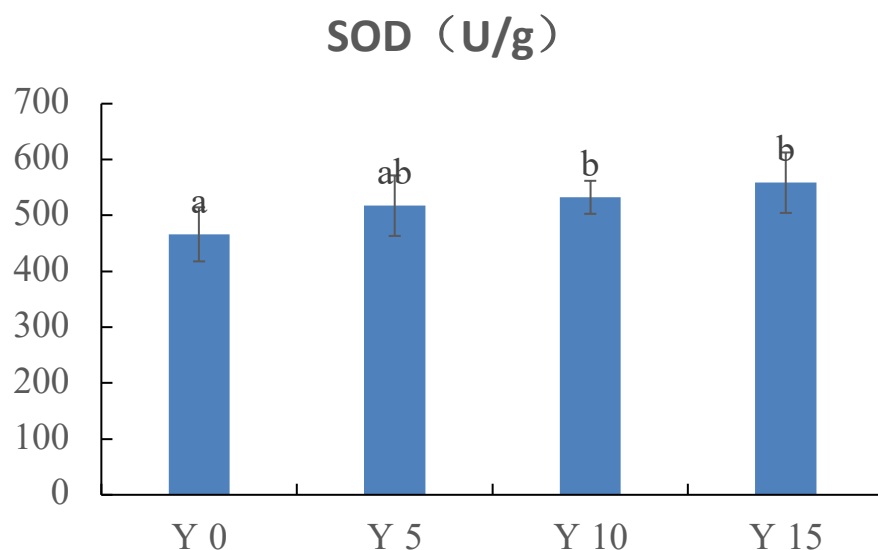
Lipase

脂肪酶 (U/mg)



There was no significant difference between amylase and lipase and fish meal groups in the 5%, 10% and 15% YummyWell substitution groups ($P > 0.05$).

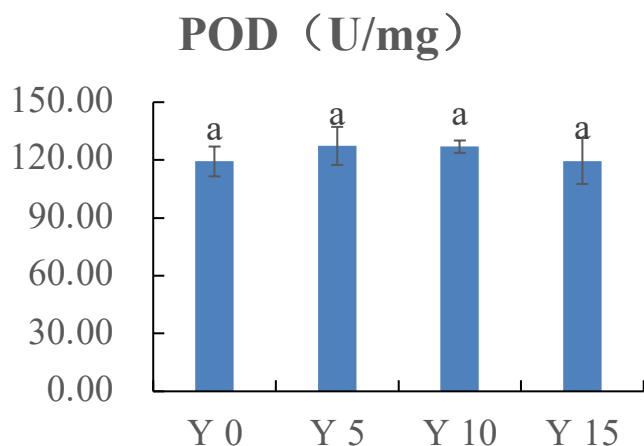
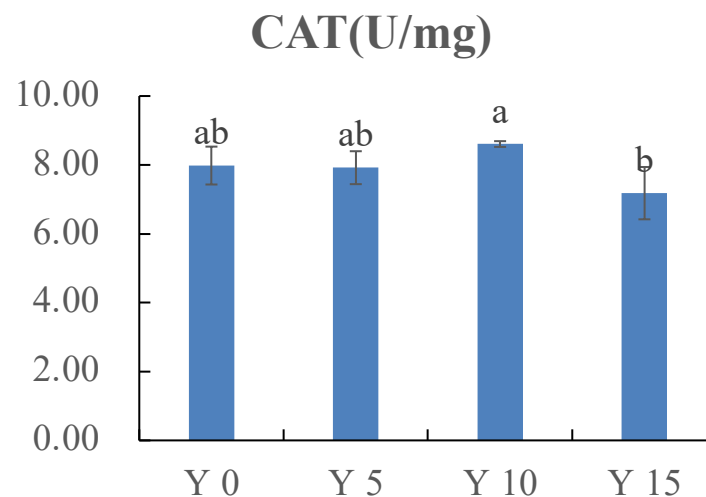
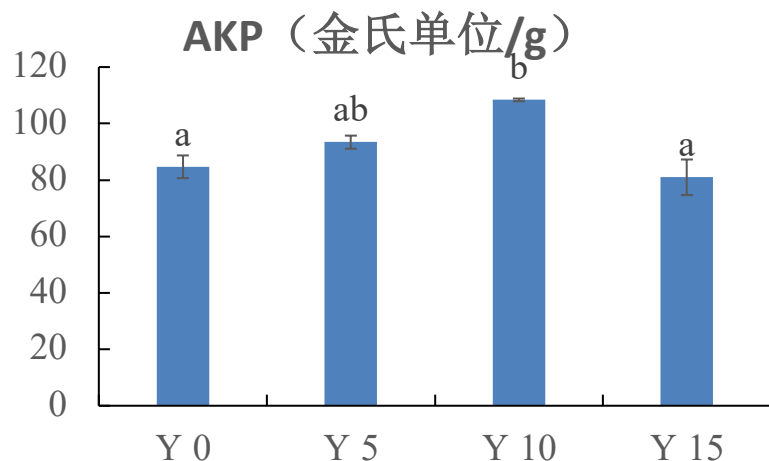
Study results (hepatopancreas)



The SOD activity was increased in the 5%, 10% and 15% YummyWell alternative fish meal groups.

The MDA content was significantly lower in the 5% and 15% YummyWell alternative fish meal groups relative to the fish meal group, and the MDA content was higher in the 10% YummyWell alternative fish meal group than the fish meal group.

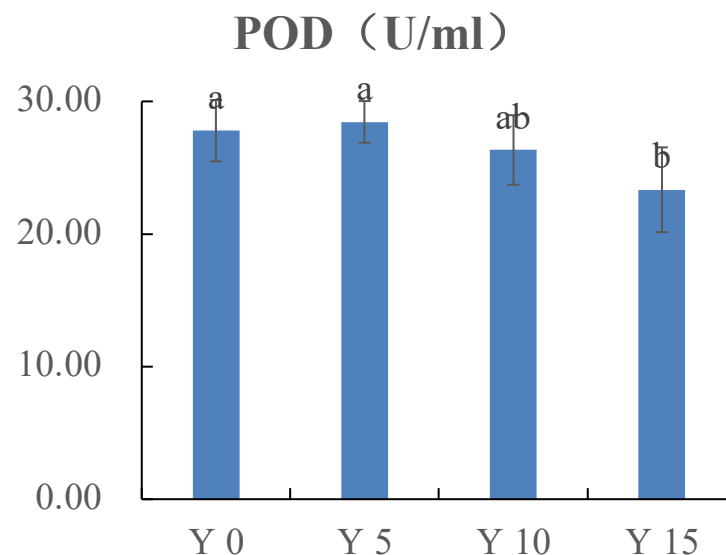
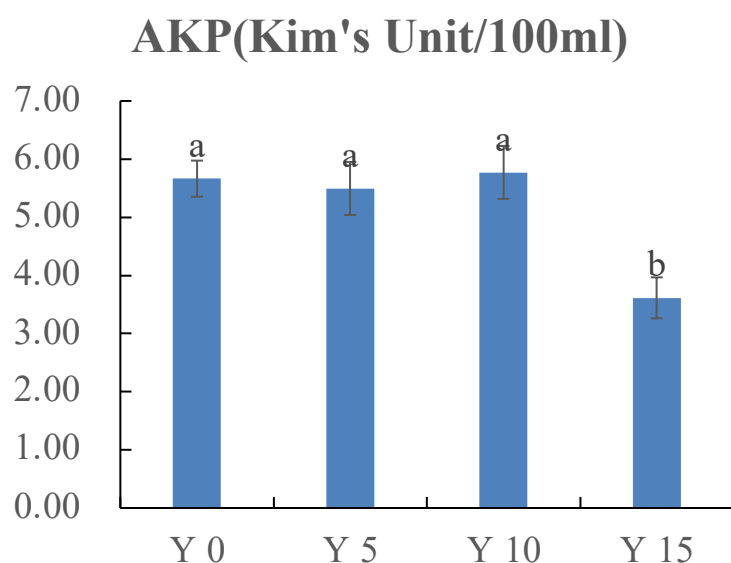
Study results (hepatopancreas)



The AKP and CAT activities were higher in the 5% and 10% YummyWell alternative fishmeal groups than in the fishmeal group, and in the 15% YummyWell alternative fishmeal group, the AKP and CAT activities were not significantly different from those of the fishmeal group.

In the 5%, 10% and 15% YummyWell alternative fish meal groups, POD was not significantly different from the fish meal group.

Study results (serum immunoenzymes)



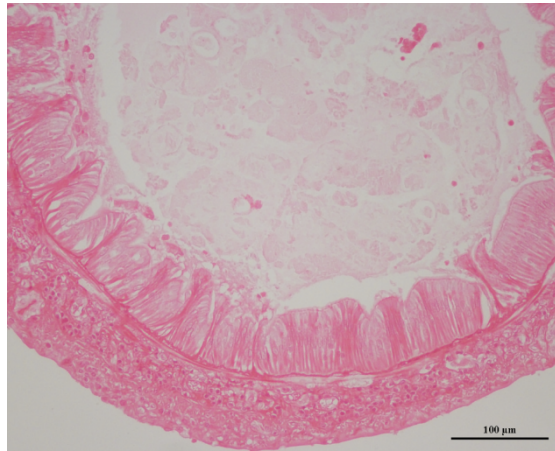
The AKP and POD activities were not significantly different from those of the fish meal group in the 5% and 10% YummyWell alternative fish meal groups.

The AKP and POD activities were lower than those of the fish meal group in the 15% YummyWell alternative fish meal group.

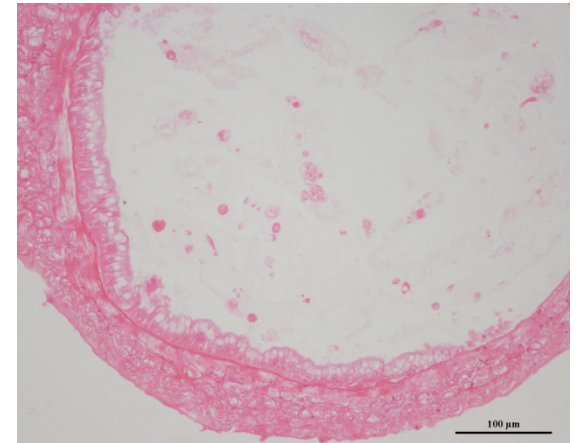
Study results (intestinal sections)



Y 0-200x



Y 10-200x



Y 15-200x

The control and 10% groups had long intact intestinal villi and the maximum replacement group (15%) had slightly shorter and partially mutilated villi



Conclusion.

YummyWell can replace 40% of the fishmeal dosage (12% of the feed fishmeal level and about 10% of the YummyWell dosage) in the feed of *Penaeus vannamei* with a 20% fishmeal content, without negative effects on growth, feed utilization and organism health.

Experimental protocol:

Effect of yeast culture (YummyWell) replacing fishmeal on growth performance, serum biochemical parameters and intestinal health of largemouth bass (*Lepomis macrochirus*).

Equal protein substitution of 5%, 10%, 15% fish meal protein in the base feed

Add to basal feed (35% fishmeal content)

Raising largemouth bass for 8 weeks

Sampling, analysis of relevant indicators

Effects of YummyWell on growth, serum biochemical indicators and intestinal tract of bass

表 1 试验饲料组成和营养水平 (风干基础) /%¹

Tab. 1 Composition and nutrient levels of the experimental diets (air-dry basis) /%¹

项目 Items ¹	FM-35 ¹	FM-30 ¹	FM-25 ¹	FM-20 ¹
原料 Ingredients ¹				
鱼粉 Fish meal ¹	35.00 ¹	30.00 ¹	25.00 ¹	20.00 ¹
大豆浓缩蛋白 Soy protein concentrate ¹	8.00 ¹	8.00 ¹	8.00 ¹	8.00 ¹
豆粕 Soybean meal ¹	8.00 ¹	8.00 ¹	8.00 ¹	8.00 ¹
玉米蛋白 Corn gluten meal ¹	6.00 ¹	6.00 ¹	6.00 ¹	6.00 ¹
面粉 Flour ¹	18.95 ¹	17.02 ¹	15.09 ¹	13.15 ¹
谷朊粉 Wheat gluten meal ¹	4.00 ¹	4.00 ¹	4.00 ¹	4.00 ¹
啤酒酵母 Brewers dried yeast ¹	4.00 ¹	4.00 ¹	4.00 ¹	4.00 ¹
鱼油 Fish oil ¹	3.00 ¹	3.36 ¹	3.72 ¹	4.09 ¹
豆油 Soybean oil ¹	3.00 ¹	3.00 ¹	3.00 ¹	3.00 ¹
大豆磷脂 Soybean phospholipid ¹	3.00 ¹	3.00 ¹	3.00 ¹	3.00 ¹
酵母培养物 Yeast culture ¹	0 ¹	6.57 ¹	13.14 ¹	19.71 ¹
鱿鱼膏 Squid visceral meal ¹	4.00 ¹	4.00 ¹	4.00 ¹	4.00 ¹
矿物质预混料 Mineral premix ²	2.50 ¹	2.50 ¹	2.50 ¹	2.50 ¹
维生素预混料 Vitamin premix ³	0.50 ¹	0.50 ¹	0.50 ¹	0.50 ¹
氧化钇 Y ₂ O ₃ ¹	0.05 ¹	0.05 ¹	0.05 ¹	0.05 ¹
合计 Total ¹	100.00 ¹	100.00 ¹	100.00 ¹	100.00 ¹
营养水平 Nutrient levels ⁴				
水分 Moisture ¹	8.72 ¹	9.03 ¹	9.55 ¹	9.73 ¹
粗蛋白质 CP ¹	43.24 ¹	43.21 ¹	43.39 ¹	43.01 ¹
粗脂肪 EE ¹	11.77 ¹	11.63 ¹	11.86 ¹	11.67 ¹
粗灰分 Ash ¹	11.06 ¹	10.72 ¹	10.50 ¹	9.98 ¹

Protein :

Fishmeal

YummyWell

Flour

Fat :

Fishmeal

YummyWell

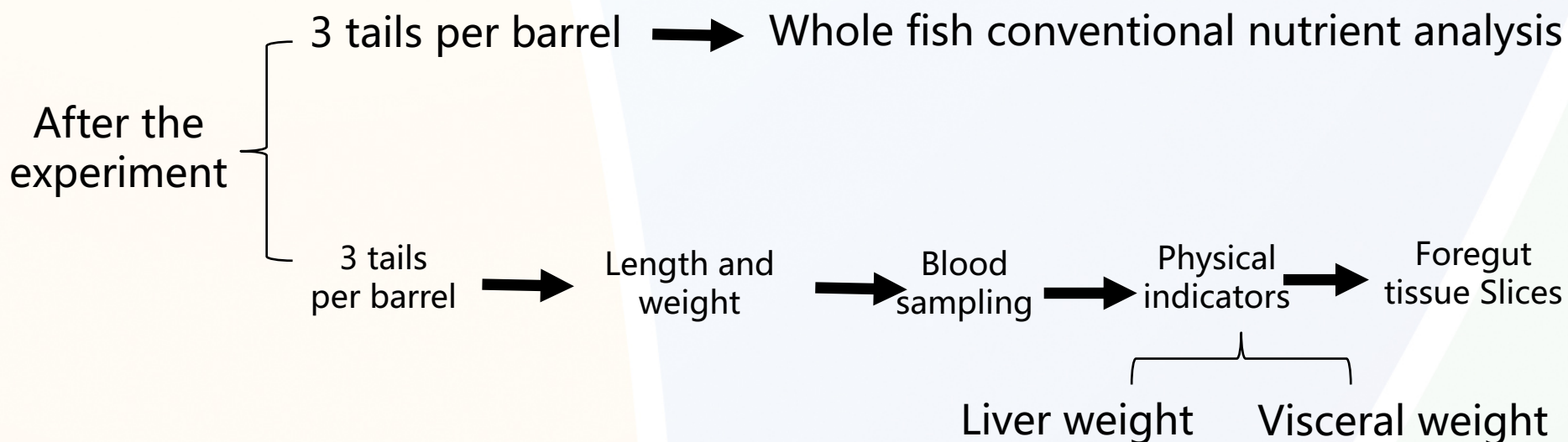
Fish oil

Amino acid composition of feed

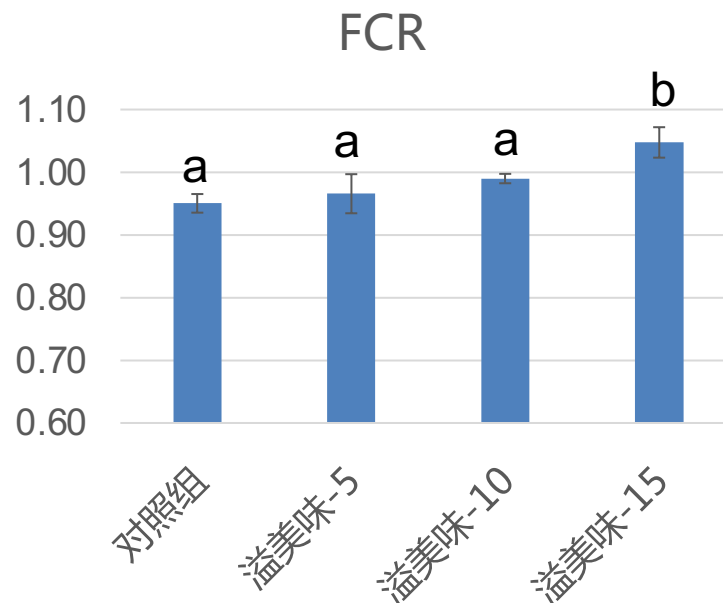
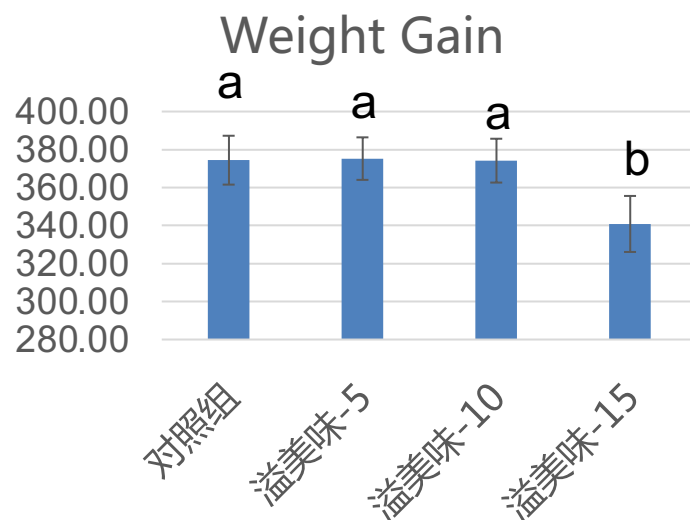
表 2 饲料氨基酸组成 (干物质基础) /%[↵]Tab. 2 Amino acid composition of the experimental diets (DM basis) /%[↵]

项目	Items [↵]	FM-35 [↵]	FM-30 [↵]	FM-25 [↵]	FM-20 [↵]
Asparticacid	天冬氨酸 [↵]	3.97 [↵]	3.98 [↵]	3.90 [↵]	3.88 [↵]
Threonine	苏氨酸 [↵]	1.92 [↵]	1.87 [↵]	1.79 [↵]	1.74 [↵]
Serine	丝氨酸 [↵]	1.98 [↵]	2.01 [↵]	1.96 [↵]	1.96 [↵]
Glutamicacid	谷氨酸 [↵]	7.63 [↵]	7.66 [↵]	7.54 [↵]	7.51 [↵]
Glycine	甘氨酸 [↵]	2.22 [↵]	2.13 [↵]	2.01 [↵]	1.93 [↵]
Alanine	丙氨酸 [↵]	2.64 [↵]	2.57 [↵]	2.43 [↵]	2.49 [↵]
Cysteine	半胱氨酸 [↵]	0.84 [↵]	0.79 [↵]	0.79 [↵]	0.41 [↵]
Valine	缬氨酸 [↵]	2.23 [↵]	2.20 [↵]	2.12 [↵]	2.10 [↵]
Methionine	蛋氨酸 [↵]	0.98 [↵]	1.01 [↵]	0.98 [↵]	0.89 [↵]
Isoleucine	异亮氨酸 [↵]	1.96 [↵]	1.95 [↵]	1.87 [↵]	1.84 [↵]
Leucine	亮氨酸 [↵]	3.82 [↵]	3.76 [↵]	3.67 [↵]	3.61 [↵]
Tyrosine	酪氨酸 [↵]	1.44 [↵]	1.37 [↵]	1.40 [↵]	1.35 [↵]
Phenylalanine	苯丙氨酸 [↵]	2.18 [↵]	2.16 [↵]	2.12 [↵]	2.12 [↵]
Lysine	赖氨酸 [↵]	2.88 [↵]	2.73 [↵]	2.55 [↵]	2.38 [↵]
Histidine	组氨酸 [↵]	1.23 [↵]	1.20 [↵]	1.14 [↵]	1.11 [↵]
Arginine	精氨酸 [↵]	2.57 [↵]	2.57 [↵]	2.54 [↵]	2.53 [↵]
Proline	脯氨酸 [↵]	2.50 [↵]	2.48 [↵]	2.41 [↵]	2.36 [↵]
Total	总计 [↵]	43.00 [↵]	42.44 [↵]	41.22 [↵]	40.20 [↵]

Before the start of the experiment → Six initial whole fish samples were kept per bucket.

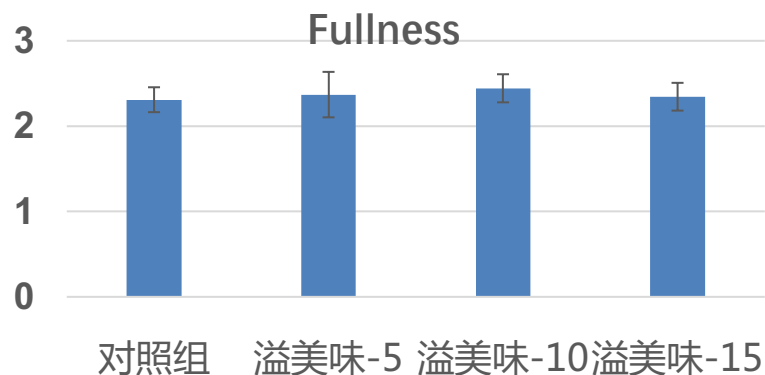


Study results (growth indicators)



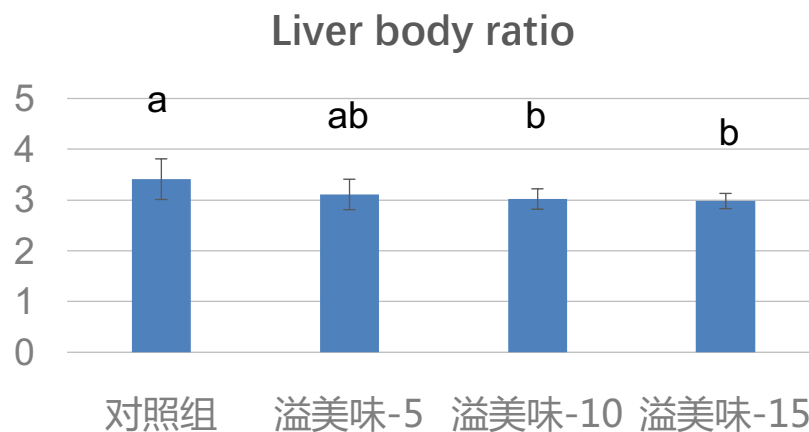
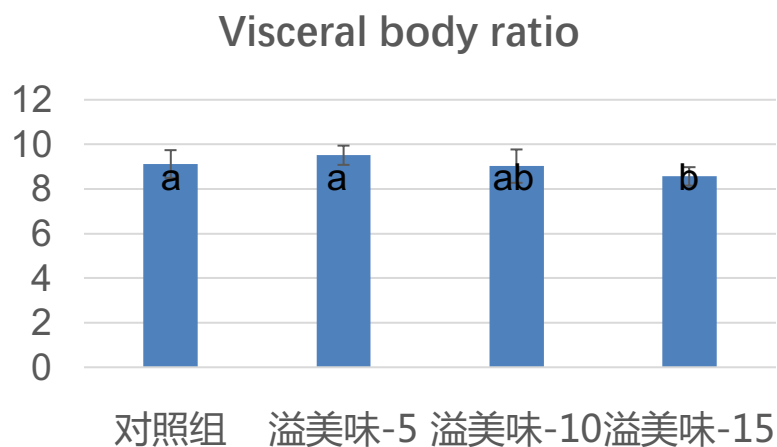
The survival rate of each substitution group was 100%. 5% and 10% substitution groups showed no significant difference in weight gain rate and feed factor compared to the control group ($P > 0.05$)

Study results (growth indicators)



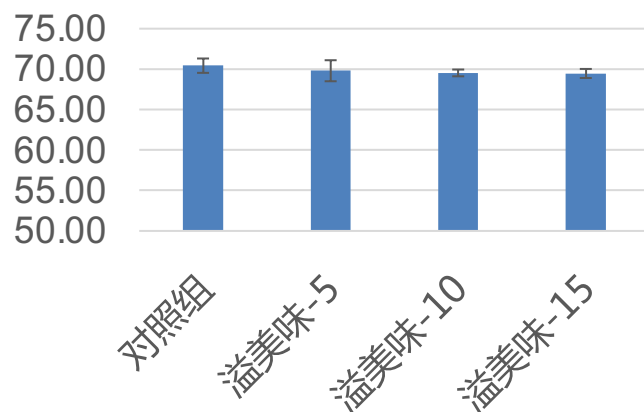
The 5%, 10%, and 15% YummyWell replacement fishmeal groups were not significantly different from the fishmeal group in terms of fatness ($P > 0.05$).

The liver-to-body and dirty-to-body ratios decreased as the level of fishmeal substitution increased.

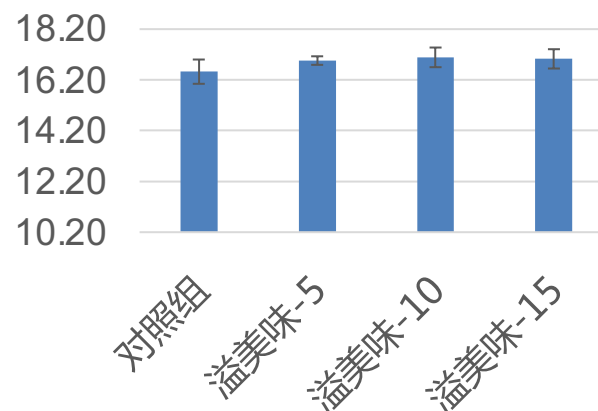


Study results (whole fish composition)

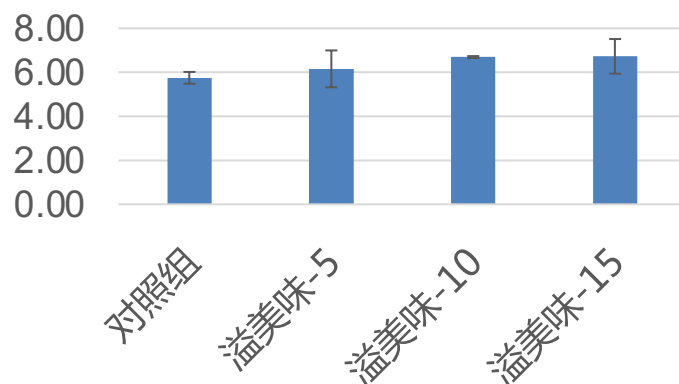
Moisture



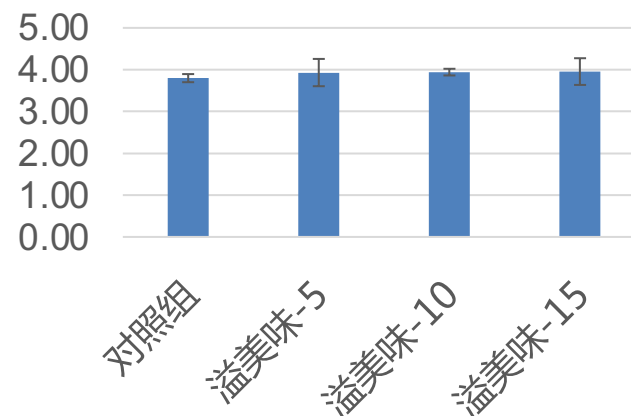
Crude protein



Crude fat

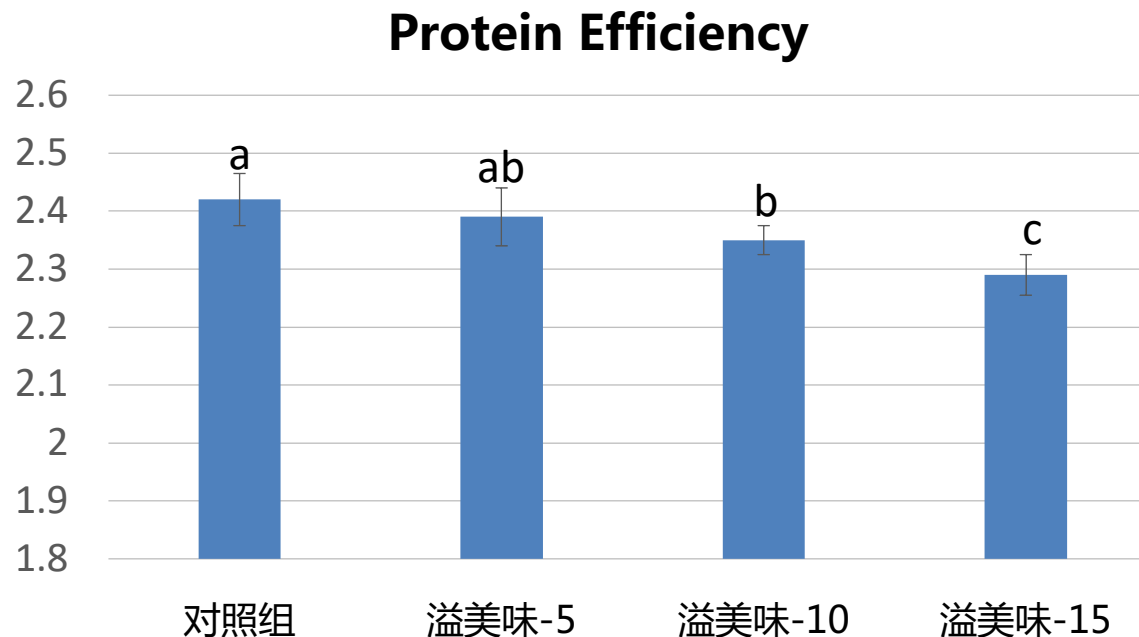


Crude Ash



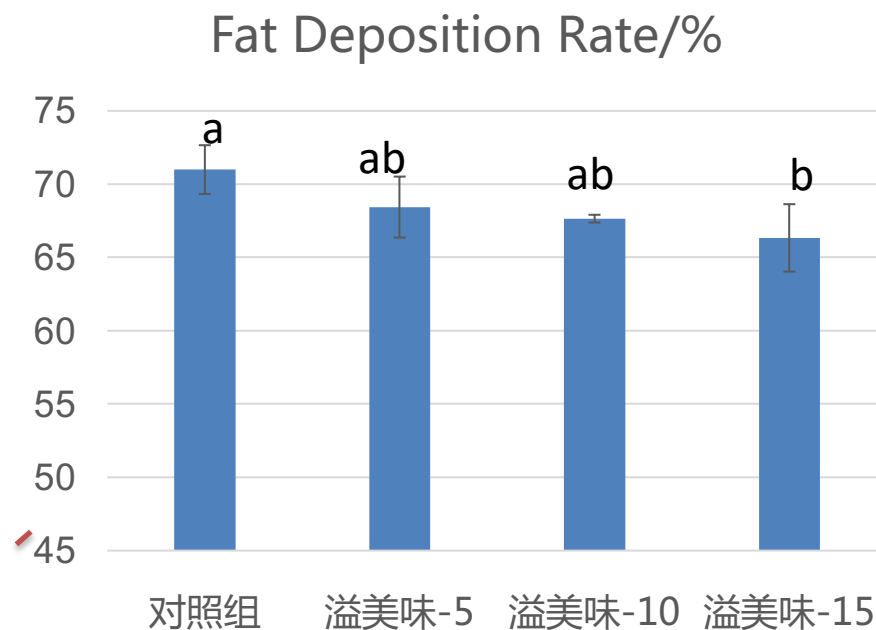
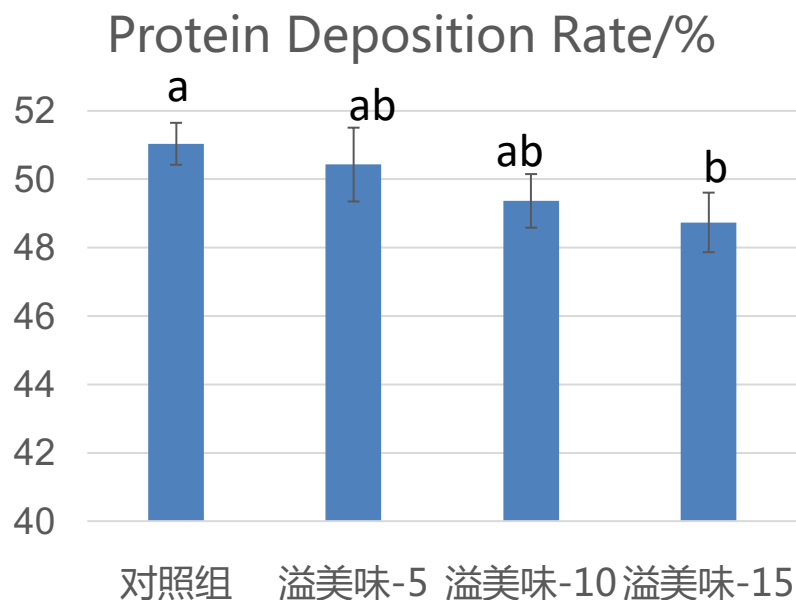
Whole fish fractions (moisture, crude protein, crude fat and crude ash), were not significantly different between the groups ($P > 0.05$).

Study results (protein efficiency)



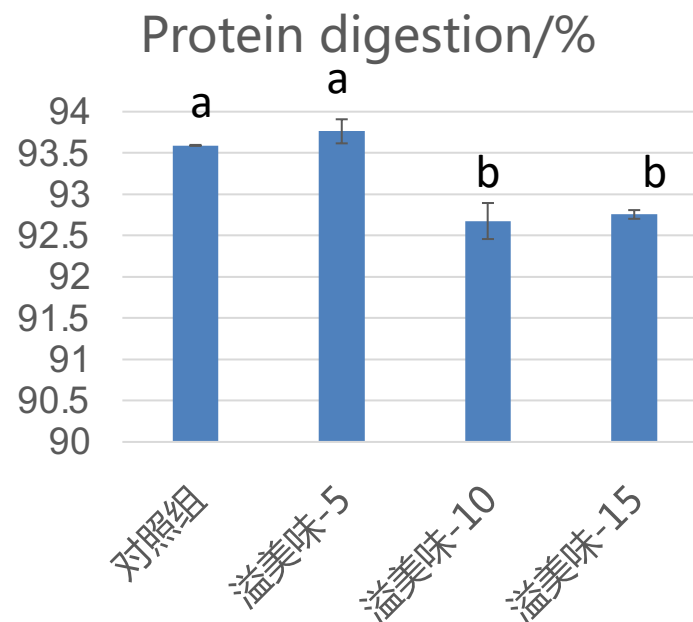
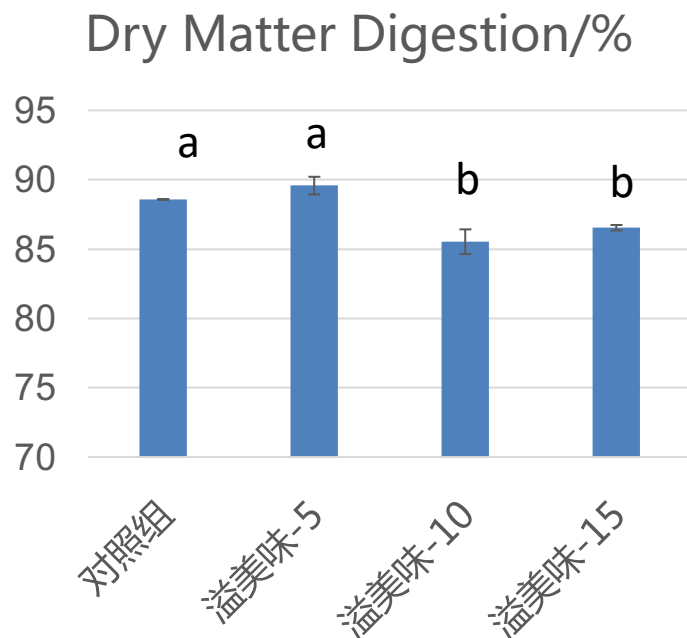
The protein efficiency of the test groups showed a decreasing trend, with the 10% substitution group being significantly lower than the control group ($P < 0.05$) and the 15% substitution group being significantly lower than all other groups ($P < 0.05$).

Study results (deposition rate)



There was no significant difference in the rate of protein deposition and fat deposition in the 5% and 10% YummyWell groups compared with the control group ($P > 0.05$).

Study results (digestibility)



There was no significant difference in dry matter digestibility and protein digestibility in the 5% YummyWell group compared to the control group ($P > 0.05$).

Study results (serum indicators)

项目 Items↵	FM-35↵	FM-30↵	FM-25↵	FM-20↵
总蛋白 TP/(g/L)↵	41.20±4.38↵	41.24±5.96↵	47.83±3.78↵	50.30±8.66↵
白蛋白 ALB/(g/L)↵	13.74±1.16↵	14.49±1.57↵	16.45±1.35↵	16.34±1.92↵
球蛋白 GLO/(g/L)↵	27.46±3.22↵	26.75±4.39↵	31.38±2.54↵	33.96±6.77↵

The effect of different proportions of fishmeal substituted by YummyWell on the total protein, albumin and globulin contents of bass serum was not significant ($P>0.05$).

Study results (serum indicators)

项目 Items	FM-35	FM-30	FM-25	FM-20
谷丙转氨酶 ALT/(U/mL)	1.44±0.26 ^b	1.71±0.25 ^{ab}	2.03±0.07 ^a	1.54±0.19 ^{ab}
谷草转氨酶 AST/(U/mL)	2.73±0.47 ^{ab}	3.17±0.52 ^a	3.16±0.21 ^a	2.20±0.38 ^b

As the level of fish meal substitution increased, glutathione activity and glutathione showed a tendency to increase and then decrease, with glutathione reaching a maximum in the 10% substitution group, which was significantly higher than the control group ($P<0.05$).

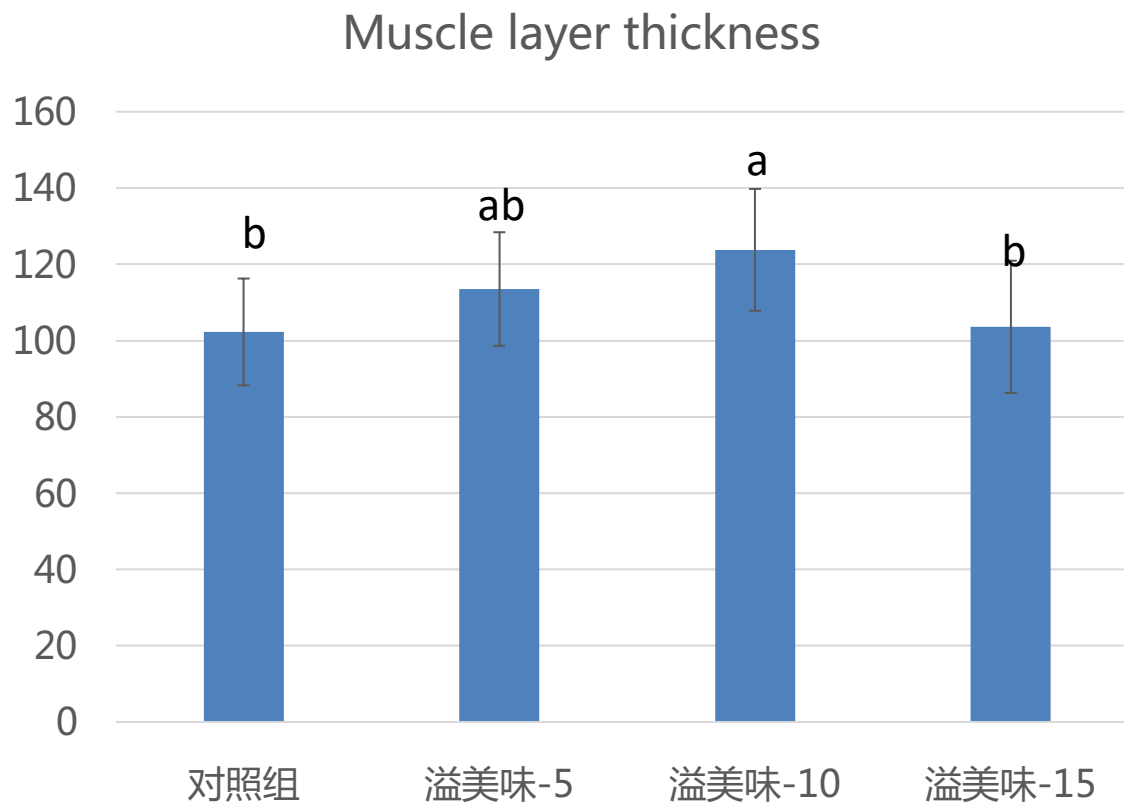
Study results (serum indicators)

项目 Items	FM-35	FM-30	FM-25	FM-20
超氧化物歧化酶 SOD/(U/mL)	126.98±8.19 ^{ab}	119.05±7.27 ^b	123.01±4.36 ^b	139.56±7.67 ^a
总抗氧化能力 T-AOC/(U/mL)	29.11±1.48 ^{ab}	22.78±2.29 ^{ab}	22.20±6.16 ^b	29.85±2.84 ^a
过氧化氢酶 CAT/(U/mL)	5.80±0.93 ^{ab}	4.79±0.43 ^b	4.79±0.83 ^b	6.32±0.43 ^a
溶菌酶 LZM/(ug/mL)	4.15±0.20 ^b	4.79±0.94 ^{ab}	4.75±0.45 ^{ab}	5.70±1.05 ^a

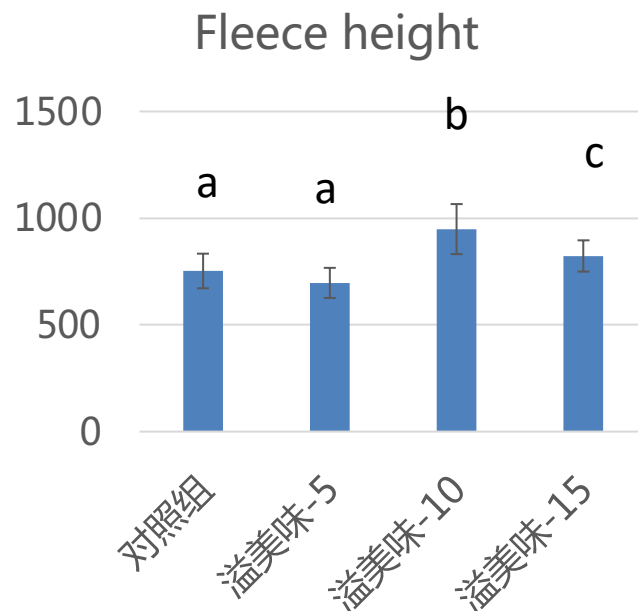
There was no significant difference in the serum superoxide dismutase activity, total antioxidant capacity and catalase activity in each substitution group compared with the control group ($P>0.05$).

The overall trend of lysozyme activity increased with the increase of fish meal substitution level, and when the substitution level increased to 15%, the lysozyme activity increased significantly compared with the control group ($P<0.05$).

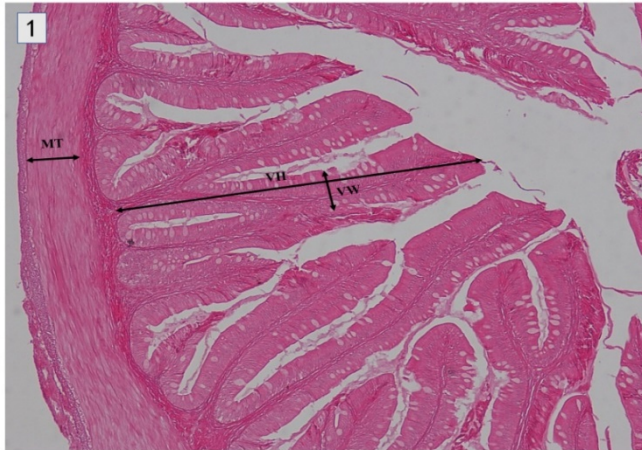
Study results (foregut morphology)



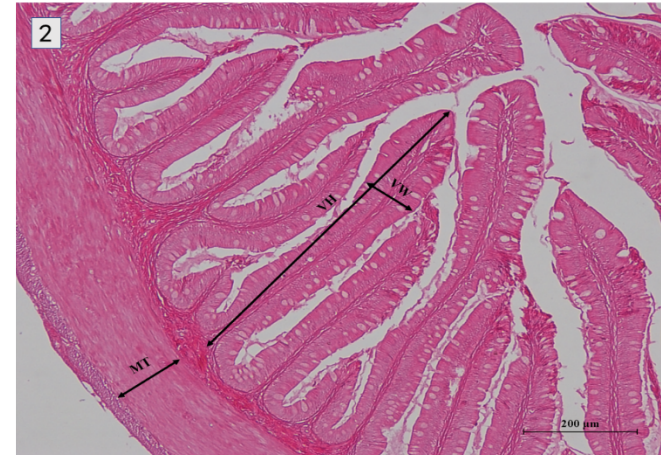
The thickness of the muscle layer in each group showed a trend of increasing and then decreasing, reaching a maximum when the replacement ratio was 10% and was significantly higher than that of the control group ($P < 0.05$).



The height of the villi was significantly higher in the 10% substitution and 15% substitution groups than in the control group ($P < 0.05$).



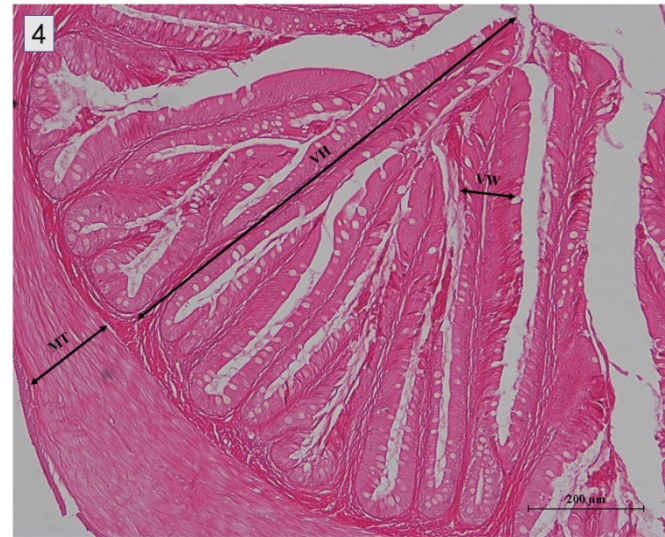
Control foregut tissue



YummyWell - 5 foregut tissue



YummyWell - 10 foregut tissue



YummyWell - 15 foregut tissue

MT-muscle layer thickness; VH-villi height; VW-villi width

Conclusion :

Alternative of 10% fishmeal dosage with YummyWell in a 35% fishmeal diet for largemouth bass does not adversely affect growth performance, feed utilization, intestinal health, antioxidant capacity and non-specific immunity of largemouth bass



Win-win collaboration

THANKS



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