Shanxi Dingxin Biotechnology Co., Ltd

Product introduction

Mealworms Protein Powder

The protein of the mealworms is rich in 18 common amino acids, including all 8 essential amino acids that cannot be synthesized by huamn body,as well as account for 40% of the recommended amount by FAO/WHO. In particular, it is also extremely rich in vitamins and minerals.

Compared with other proteins, mealworm protein has several characteristics as follows:

1.Abundant chitin: The decomposed substance of chitin (shell oligosaccharides) is the only type of oligosaccharide that can be absorbed by our intestinal tract and enter our bloodstream. It is commonly used in clinical settings to inhibit the growth of tumors.

2.High absorption rate:The amino acid types and contents in the protein of mealworms are more similar to those in the human body, can be absorbed by our bodies more easily and faster,The digestion rate reached 86.98%, which was significantly higher than other proteins.

3.High content of branched-chain amino acids: The content of branched-chain amino acids (BCAA) is as high as 12%, in a ratio of 2:1:1, which is the golden ratio for human,so it performs exceptionally well in muscle building and fat loss, as well as delaying muscle loss for the older and enhancing physical fitness for the younger.

4.It is rich in arginine, which can effectively protect the heart and liver and resist cellular oxidation.

5.It is rich in tryptophan, which can regulate and soothe the nerves, improve sleep and increase the antibodies in the babies' body.

The purity of the mealworm protein powder produced by our company ranges from 70% to 90%, which can meet the demands of various industries such as food, health supplements, and cosmetics.

Mealworm protein powder can not only be taken alone, but also added to avariety of foods to achieve multiple utilization of its nutritional value. For example, it can be added to noodles to significantly increase their protein content. It can also add a rich nutritional element to bread recipes.In addition, it can be incorporated into pasties and various bakery products, quietly improving its health benefits without compromising the original flavor and texture. As a result, mealworm protein powders can transform everyday staples such as noodles, breads, pastries and baked goods into protein-rich and healthier options while maintaining their traditional appeal.

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Analytical Report

Sample Code	128-2022-00040538	Report date	06-Aug-2022
Certificate No.	AR-22-VV-041841-02		

This report is translated from report AR-22-VV-041841-01

Shanxi Dingxin Biological Technology Co., LTD

Yunzhou Modern Agricultural Industry Demonstration

Our reference:	128-2022-00040538/ AR-22-VV-041841-02
Client Sample Code:	20220719
Sample described as:	Yellow mealworm protein powder
Sample Packaging:	Plastic bag
Sample reception date:	21-Jul-2022
Analysis Starting Date:	21-Jul-2022
Analysis Ending Date:	05-Aug-2022
Arrival Temperature (°C)	25.3
Sample Weight	570g
Sample Type	Solid

		Results	Unit	LOQ	LOD
▵ VV1TY	Sodium(Na)(F-AAS) Method: GB 5009.91-2017 1st Method				
	Sodium (Na)	197	mg/100 g	3	
▵ VV60E	Selenium(Se)(HG-AFS) Method: GB 5009.93-2017 the first method				
	Selenium (Se)	0.15	mg/kg	0.03	
▵ VV613	Magnesium(Mg)(ICP-MS) Method: GB 5009.268-2016 First method				
	Magnesium (Mg)	3270	mg/kg	3	
▵ VV618	Manganese (Mn)(ICP-MS) Method: GB 5009.268-2016 First method				
	Manganese (Mn)	16.0	mg/kg	0.3	
▵ VV61Q	Iron(Fe)(F-AAS) Method: GB 5009.90-2016 1st Method				
	Iron (Fe)	285	mg/kg	2.5	
▵ VV62V	Zinc(Zn)(F-AAS) Method: GB 5009.14-2017				
	Zinc (Zn)	169	mg/kg	3	
▵ VV6WF	Potassium (K)(ICP-MS) Method: GB 5009.268-2016 First method				
	Potassium (K)	12600	mg/kg	3	
▵ VV66Q	Copper (Cu) (F-AAS) Method: GB 5009.13-2017 2nd Method				
	Copper (Cu)	26.7	mg/kg	0.5	
▵ VV66Y	Calcium(Ca)(F-AAS) Method: GB 5009.92-2016 1st Method				
	Calcium (Ca)	476	mg/kg	1.5	

		Results	Unit	LOQ	LOD
▵ VV156	Carbohydrates Method: GB 28050-2011				
	Carbohydrates	9.7	g/100 g		
▵ VV155	Energy(Mainland) Method: GB 28050-2011				
	Energy kcal (calculated)	353	kcal/100 g		
	Energy kJ (calculated)	1496	kJ/100 g		
▵ VV134	Moisture (Direct drying method) Method: GB 5009.3-2016 First method				
	Moisture	6.24	g/100 g	0.1	
▵ VV14W	Ash Method: GB 5009.4-2016 First method				
	Ash	5.3	g/100 g	0.01	
▵ VV14Y	Protein Method: GB 5009.5-2016 First method				
	Protein	71.4	g/100 g	0.5	
	Protein Factor	6.25			

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		Results	Unit	LOQ	LOD
▵ VV1FX	Moisture (Vacuum drying method) Method: GB 5009.3-2016 Second method				
	Moisture	4.52	g/100 g	0.1	
☆ SU573	Amino acid Method: GB 5009.124-2016				
	Aspartic acid (Asp)	7.16	g/100 g	0.005	
	Threonine (Thr)	3.19	g/100 g	0.005	
	Serine (Ser)	3.31	g/100 g	0.005	
	Glutamic Acid (Glu)	8.25	g/100 g	0.005	
	Glycine (Gly)	5.29	g/100 g	0.005	
	Alanine (Ala)	6.32	g/100 g	0.005	
	Valine (Val)	4.53	g/100 g	0.005	
	Methionine (Met)	1.72	g/100 g	0.005	
	Isoleucine (Ile)	3.33	g/100 g	0.005	
	Leucine (Leu)	7.42	g/100 g	0.005	
	Tyrosine (Tyr)	3.71	g/100 g	0.005	
	Phenylalanine (Phe)	1.36	g/100 g	0.005	
	Lysine (Lys)	5.38	g/100 g	0.005	
	Histidine (His)	1.71	g/100 g	0.005	
	Arginine (Arg)	3.35	g/100 g	0.005	
	Proline (Pro)	2.48	g/100 g	0.05	
	Total Amino acids	68.5	g/100 g		
▵ VV68D	Total fat(dry basis) Method: GB 5009.6-2016 Second method				
	Total fat(dry basis)	2.1		0.001	
VV6D3	Vitamin D Method: GB 5009.82-2016 Fourth method				
	Vitamin D2	<2	μg/100 g	2	
	Vitamin D3	<2	μg/100 g	2	
VV6D7	Dietary fiber Method: GB 5009.88-2014				
	Dietary fiber	5.36	g/100 g	0.5	
VV6D6	Vitamin B2 (Riboflavin) Method: GB 5009.85-2016 First method				
	Vitamin B2 (riboflavin)	0.848	mg/100 g	0.05	
VV6D2	Vitamin E Method: GB 5009.82-2016 First method				
	Alpha-Tocopherol	0.141	mg/100 g	0.12	
	Beta-Tocopherol	<0.12	mg/100 g	0.12	
	Delta-Tocopherol	<0.12	mg/100 g	0.12	
	Gamma-Tocopherol	<0.12	mg/100 g	0.12	
	Vitamin E(α-TE)	0.141	mg/100 g	0.12	
VV6D5	Vitamin B1(Thiamine) Method: GB 5009.84-2016 First method				
	Vitamin B1 thiamin base	0.190	mg/100 g	0.2	
VV6H1	Pantothenic acid (Vitamin B5) Method: GB 5009.210-2016 2nd method				
	Pantothenic acid	3.33	mg/100 g	0.08	
VV6G0	Sugar Profile Method: GB 5009.8-2016 1st Method				
	Fructose	<0.2	g/100 g		0.2
	Maltose	<0.2	g/100 g		0.2
	Glucose	<0.2	g/100 g		0.2
	Lactose	<0.2	g/100 g		0.2
	Sucrose	<0.2	g/100 g		0.2
	Monosaccharides and Disaccharides	N/A	g/100 g		
☆ SU53D	Vitamin B12 Method: R-Biopharm VitaFast® Cyanocobalamin P1002 2017 (ESS-TP-3383 V3 2019)				
	Vitamin B12 (cyanocobalamin)	0.09	μg/100 g	0.03	
☆ SU5BX	Tryptophan Method: Internal method (ESS-TP-1434 VR 2 2021)				
	Tryptophan	784	mg/100 g	5	

Shanxi Dingxin Biotechnology Co., Ltd

Safety report on mealworms protein powder

PONY 谱尼测试
Pony Testing International Group

CMA
220000343608

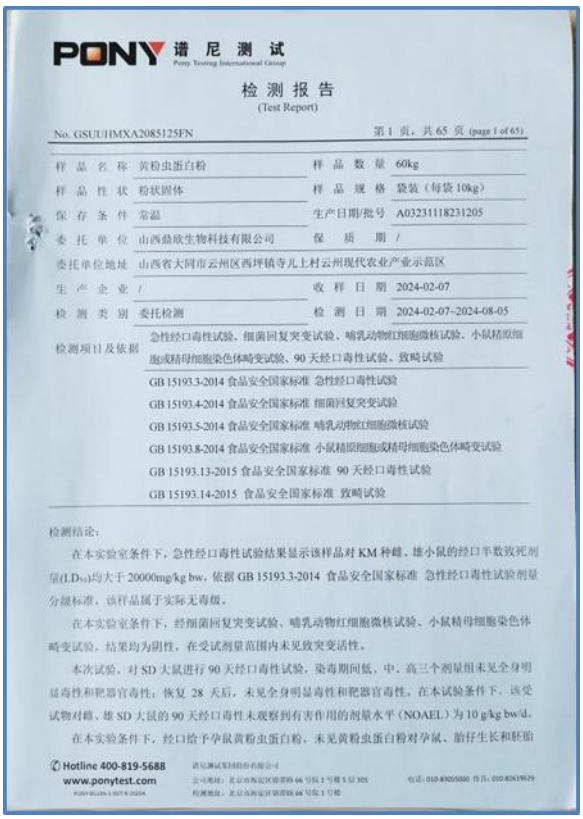
检 测 报 告
(Test Report)

No. GSUUHMXA2085125FN

样品名称 (Sample Description) 黄粉虫蛋白粉

委托单位 (Applicant) 山西鼎欣生物科技有限公司

PONY 谱尼测试
Pony Testing International Group
www.ponytest.com



PONY 谱尼测试
Pony Testing International Group

检 测 报 告
(Test Report)

No. GSUUHMXA2085125FN 第 1 页，共 65 页 (page 1 of 65)

样品名称	黄粉虫蛋白粉	样品数量	60kg
样品性状	粉状固体	样品规格	袋装（每袋 10kg）
保存条件	常温	生产日期/批号	A032311182312O5
委托单位	山西鼎欣生物科技有限公司	保质期	/
委托单位地址	山西省大同市云州区西坪镇寺儿上村云州现代农业产业示范区		
生产企业	/	收样日期	2024-02-07
检测类别	委托检测	检测日期	2024-02-07~2024-08-05
检测项目及依据	急性经口毒性试验、细菌回复突变试验、哺乳动物红细胞微核试验、小鼠精原细胞或精母细胞染色体畸变试验、90 天经口毒性试验、致畸试验		
	GB 15193.3-2014 食品安全国家标准 急性经口毒性试验		
	GB 15193.4-2014 食品安全国家标准 细菌回复突变试验		
	GB 15193.5-2014 食品安全国家标准 哺乳动物红细胞微核试验		
	GB 15193.8-2014 食品安全国家标准 小鼠精原细胞或精母细胞染色体畸变试验		
	GB 15193.13-2015 食品安全国家标准 90 天经口毒性试验		
	GB 15193.14-2015 食品安全国家标准 致畸试验		

检测结论：

在本实验室条件下，急性经口毒性试验结果显示该样品对 KM 种雌、雄小鼠的经口半数致死剂量(LD_{50})均大于 20000mg/kg bw，依据 GB 15193.3-2014 食品安全国家标准 急性经口毒性试验剂量分级标准，该样品属于实际无毒级。

在本实验室条件下，经细菌回复突变试验、哺乳动物红细胞微核试验、小鼠精母细胞染色体畸变试验，结果均为阴性，在受试剂量范围内未见致突变活性。

本次试验，对 SD 大鼠进行 90 天经口毒性试验，染毒期间低、中、高三个剂量组未见全身明显毒性和靶器官毒性；恢复 28 天后，未见全身明显毒性和靶器官毒性。在本试验条件下，该受试物对雌、雄 SD 大鼠的 90 天经口毒性未观察到有害作用的剂量水平（NOAEL）为 10 g/kg bw/d。

在本实验条件下，经口给予孕鼠黄粉虫蛋白粉，未见黄粉虫蛋白粉对孕鼠、胎仔生长和胚胎

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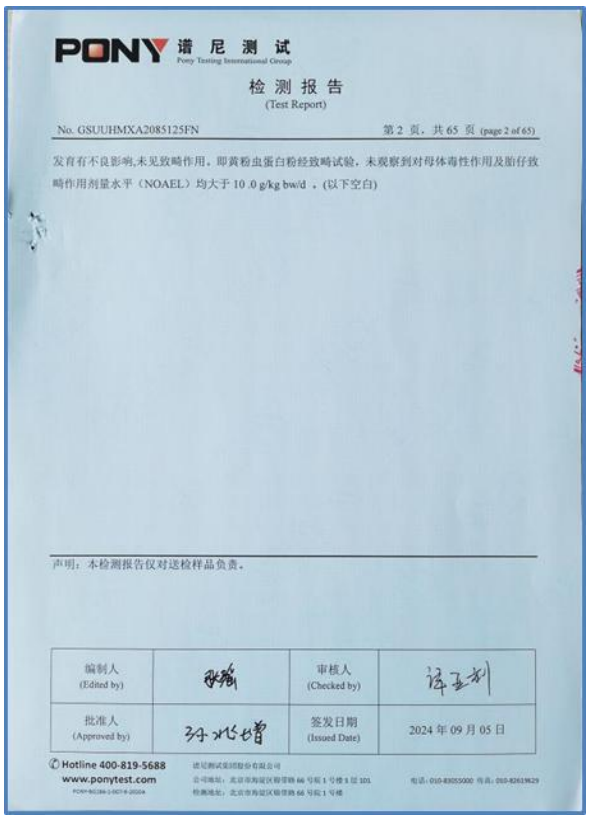

PONY 谱尼测试
Pony Testing International Group

检 测 报 告
(Test Report)

No. GSUUHMXA2085125FN 第 2 页，共 65 页 (page 2 of 65)

发育有不良影响,未见致畸作用。即黄粉虫蛋白粉经致畸试验，未观察到对母体毒性作用及胎仔致畸作用剂量水平（NOAEL）均大于 10 .0 g/kg bw/d ，(以下空白)

声明：本检测报告仅对送检样品负责。

编制人 (Edited by)		审核人 (Checked by)	
批准人 (Approved by)		签发日期 (Issued Date)	2024 年 09 月 05 日

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