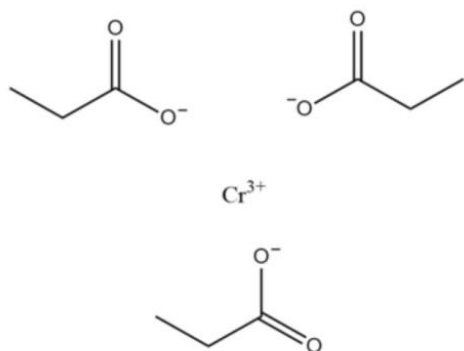


The new star in feed additives — chromium propionate

Chromium is an essential trace element for animals. Chromium deficiency can lead to stunted animal growth, low fecundity, and disorders of glucose, protein, and fat metabolism. Sources of chromium include inorganic and organic chromium. Due to the high toxicity of inorganic chromium, chromium supplementation has always been in the form of various organic chromium. Studies have shown that the absorption rate of organic chromium is 10%–25%, which is more than 10 times that of inorganic chromium.

Chromium propionate appears as dark green particles or powder. As a new type of organic trace element molecule, it is widely used in animal husbandry. As a type of organic chromium, chromium propionate has a higher absorption efficiency than other organic chromiums such as chromium picolinate, chromium yeast, and chromium niacin. Based on factors such as safety and effectiveness, the U.S. Food and Drug Administration's only chromium approved for use on dairy cows by the Food and Drug Administration (FDA) and the Ministry of Agriculture and Rural Affairs of China is chromium propionate. In addition to the Asia-Pacific region where chromium picolinate is mostly used, the main source of organic chromium in Europe, the United States, South America, and Russia is chromium propionate.



1. Biological functions of chromium propionate

The biological function of chromium is mainly composed of Cr³⁺ to form GTF to assist insulin in functioning, thereby affecting biological functions such as sugar, lipid, protein, and nucleic acid metabolism.

1.1 Effect of chromium propionate on glucose metabolism

As an important component of glucose tolerance factor (GTF), chromium can promote the binding of insulin to receptors and enhance insulin function, thereby promoting the transport and transport of glucose to the cell membrane and lowering blood sugar. Heimbach et al. believe that chromium may improve the

function of insulin in the following two ways: ① by activating the disulfide bond between insulin and the cell membrane, thereby increasing the binding force between insulin and specific variants; ② chromium improves the insulin receptor on the cell membrane surface amount thereby enhancing tissue sensitivity to insulin.

1.2. Effect of chromium propionate on fat metabolism

The effect of chromium on lipid metabolism is mainly to reduce the deposition of fat in the animal body, affect the synthesis and clearance of fat and cholesterol in the animal liver, promote the redistribution of fat, reduce the content of serum triglycerides and total cholesterol, and increase the level of high serum cholesterol. Density lipoprotein cholesterol. Chromium supplementation can reduce the deposition of cholesterol on the aorta, eliminate cholesterol that has been deposited on the aorta, and prevent atherosclerosis. It is currently believed that chromium affects lipid metabolism mainly through three pathways: ① Increase insulin activity, and regulate lipid metabolism, thereby improving hyperlipidemia. ② Increase the activity of plasma lecithin cholesterol acyltransferase (LCAT) and liver endothelial cell enzyme (HEL), and at the same time strengthen the action of lipoproteinases (LPL) in cardiac adipose tissue and skeletal muscle, thereby promoting the production of HDL. ③ By regulating the content of various lipoproteins and the metabolism of cholesterol, it can beneficially regulate and improve body fat accumulation.

1.3. Effect of chromium propionate on immune function

Trivalent chromium can enhance the body's immune function and anti-stress ability and can stimulate the body's hematopoietic function. The University of Guelph in Canada reported for the first time that chromium can affect humoral immune responses. Chromium supplementation can increase serum immunoglobulin levels under stress, reduce serum cortisol levels in growing beef cattle, reduce rectal temperature, and increase antibody titers.

2. Main applications of chromium propionate

2.1 Chromium propionate is very effective in treating heat stress and can also alleviate other stress conditions.

Insulin plays an important role during heat stress. Chromium can improve insulin function, increase the clearance rate of glucose in the blood, and increase the amount of glucose available. Chromium reduces the negative effects of heat stress by consistently lowering serum cortisol concentrations. Chromium propionate has a wide range of effects. In addition to heat stress, it also includes cold stress, group stress, dietary changes, formula changes, and other daily stresses in the pasture. The second is acute and chronic stress, including some diets rich in

carbohydrates. For example, the carbohydrates in the diets of high-yielding cattle in China are much higher than those in the United States. Many high-yielding pastures have reached 28% starch and non-fiber carbohydrates. More than 40%. With the supply of high-quality feed, the demand for chromium in livestock and poultry will also increase accordingly.

2.2 Application of chromium propionate in dairy farming

(1) Adding chromium propionate to dairy cow diets can increase milk production. Before chromium propionate entered China, a large number of scientific researches were conducted by third-party research institutions at home and abroad. 27 experimental results showed that adding chromium propionate to the diet can increase milk production, of which 18 trials significantly increased milk production compared with the control. The average yield increase is 3.7 pounds/head/day (about 1.7kg).

(2) Chromium improves the reproductive performance of dairy cows by reducing insulin resistance and increasing blood glucose levels to improve energy balance. Bryan et al. added 6.25 mg of organic chromium to the diets of 232 grazing cows. The results showed that chromium supplementation increased the pregnancy rate of cows in the first 28 days of the mating season.

(3) Alleviating heat stress in dairy cows. Multiple studies have shown that adding chromium to the diet of dairy cows under heat stress can improve insulin sensitivity and glucose utilization, increase dry matter feed intake, and thus maintain the stability of milk production.

(4) Improve the immunity of dairy cows. Chromium propionate may participate in enzyme regulation through interaction with insulin and cortisol. Affects the metabolism of copper and zinc to affect the body's immune level. Bryan found that adding chromium to the diet of early lactating dairy cows could increase the body's antibody levels and enhance cellular immune function.



2.3 Application of chromium propionate in pig nutrition

(1) Chromium propionate can effectively improve the production performance of pigs and increase feed returns. Use during the fattening period can increase weight gain, while use during the entire growing and finishing period can

increase weight gain and improve carcass quality. Valdez (2003) added 200 μ g/kg chromium propionate to the diet of growing and finishing pigs. Compared with the control group, the daily weight gain of the growing and finishing pigs in the experimental group increased by 2.4%–5.6%, and the average daily feed intake increased by 1.6%. –4.7% and the feed-to-meat ratio increased by 0.4%–3.3%.

(2) A large number of test results show that chromium propionate improves pork quality and carcass composition, increases pig eye muscle area and lean meat rate, and reduces backfat thickness.



2.4 Application of chromium propionate in broilers

As a new feed additive, chromium propionate has been widely used internationally to promote the growth of broiler chickens, resist stress, and improve chicken quality. Research reports that adding chromium propionate to the diet can improve the growth performance of white feather meat, increase the daily weight gain by 14.6%, improve the feed ratio by 13.2%, and reduce the death rate by 2.14%.



2.5 Application of chromium propionate in aquatic feed

In recent years, research on chromium propionate in aquaculture has also achieved some results, especially in fish. Research shows that chromium propionate can change the direction of deposition and utilization of nutrients such as sugars, affecting the immunity, reproduction, growth, and carcass quality of aquatic animals. It can reduce stress responses, strengthen the immune function of

animals, and improve growth and production performance. It has been confirmed that organic chromium such as chromium propionate can promote the growth and improve feed utilization of aquatic animals such as carp, grass carp, crucian carp, tilapia, large yellow croaker, salmon, river crab, and *Litopenaeus vannamei*.



3. Recommended dosage of chromium propionate

Pig	mg/kg full price compound feed
Suckling piglets	0.2
Growing/finishing pigs	0.3
First trimester	0.3
Late pregnancy/lactation	0.4
Replacement boar	0.3
Breeding boar	0.4
Poultry	mg/kg complete price compound feed
Commercial broiler chicken	
1-10days	0.2
11days-on the market	0.4
laying hens	
Breeding period	0.2
产蛋期	0.4
Egg laying period	
Egg/broiler breeders	0.2
Breeding period	0.4
Ruminant	mg/kg total mixed diet
Calf	0.3
Growing and finishing cattle	0.6
Dry period	0.3
Lactation period	0.6
Aquatic animals	mg/kg full price compound feed
Fish	0.6

ZHEJIANG VEGA BIO-TECHNOLOGY CO.,LTD

Certification of Analysis

Code:J.ZL.00.011

Report

no:CP-2023110201

PRODUCT NAME	Mixed Feed Additive Propionic Chromium	BATCH NO.	2023110201
QUANTITY	5000kg	MFG DATE	2023.11.02
SPECIFICATION	Chromium Content \cong 0.04%	EXP DATE	2025.11.02
PACKAGE	20kg/bag	REPORT DATE	2023.11.02

INSPECTION ACCORDANCE: GB/T 27984-2011

TEST ITEMS	CRITERIA	RESULTS	CONCLUSIONS	TEST METHOD
Propionic Chromium,%	≥ 0.21	0.21	CONFORM	Q/68904068-5·3-2022
Chromium Content ,%	≥ 0.04	0.04	CONFORM	Q/68904068-5·3-2022
Propionic Acid,%	≥ 0.17	0.17	CONFORM	Q/68904068-5·3-2022
Particle Size (W=0.425mm) , %	≥ 90	99.2	CONFORM	GB/T 5917·1-2008
Moisture, %	≤ 5.0	0.32	CONFORM	GB/T 6435-2014
Sample Description	Grey white powder	CONFORM	CONFORM	

CONCLUSION:

CONFORM

INSPECTOR:XING JIE

SUPERVISOR:JIANG LIHUI

RATIFIER: WEI BOWEI



ZHEJIANG VEGA BIO-TECHNOLOGY CO.,LTD

Certification of Analysis

Code:J.ZL.00.011

Report

no:CP-2023110201

PRODUCT NAME	Mixed Feed Additive Propionic Chromium	BATCH NO.	2023110201
QUANTITY	5000kg	MFG DATE	2023.11.02
SPECIFICATION	Chromium Content \geq 0.4%	EXP DATE	2025.11.02
PACKAGE	20kg/bag	REPORT DATE	2023.11.02

INSPECTION ACCORDANCE: GB/T 27984-2011

TEST ITEMS	CRITERIA	RESULTS	CONCLUSIONS	TEST METHOD
Propionic Chromium,%	\geq 2.10	2.19	CONFORM	Q/68904068-5-3-2022
Chromium Content ,%	\geq 0.40	0.42	CONFORM	Q/68904068-5-3-2022
Propionic Acid,%	\geq 1.70	1.77	CONFORM	Q/68904068-5-3-2022
Particle Size (W=0.425mm) , %	\geq 90	99.3	CONFORM	GB/T 5917-1-2008
Moisture, %	\leq 5.0	0.3	CONFORM	GB/T 6435-2014
Sample Description	Light Gray Green Powder	CONFORM	CONFORM	

CONCLUSION:

CONFORM

INSPECTOR:XING JIE

SUPERVISOR:JIANG LIHUI

RATIFIER: WEI BOWEI



ZHEJIANG VEGA BIO-TECHNOLOGY CO.,LTD

Certification of Analysis

Code:J.ZL.00.011

Report

no:CP-2023110201

PRODUCT NAME	Mixed Feed Additive Propionic Chromium	BATCH NO.	2023110201
QUANTITY	2000kg	MFG DATE	2023.11.02
SPECIFICATION	Chromium Content \geq 6%	EXP DATE	2025.11.02
PACKAGE	20kg/bag	REPORT DATE	2023.11.02

INSPECTION ACCORDANCE: GB/T 27984-2011

TEST ITEMS	CRITERIA	RESULTS	CONCLUSIONS	TEST METHOD
Propionic Chromium,%	\geq 31.29	32.31	CONFORM	Q/68904068-5-3-2022
Chromium Content ,%	\geq 6.00	6.20	CONFORM	Q/68904068-5-3-2022
Propionic Acid,%	\geq 25.29	26.11	CONFORM	Q/68904068-5-3-2022
Particle Size (W=0.425mm) , %	\geq 90	99.2	CONFORM	GB/T 5917-1-2008
Moisture, %	\leq 5.0	1.78	CONFORM	GB/T 6435-2014
Sample Description	Dark green powder	CONFORM		CONFORM



CONCLUSION:

CONFORM

INSPECTOR:XING JIE

SUPERVISOR:JIANG LIHUI

RATIFIER: WEI BOWEI